



UNIVERSITY OF HULL

**An Analysis of Storm Chasing in Contemporary American
Society and Culture**

**being a Thesis submitted for the Degree of Master's (By
Research) American Studies**

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by

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Dedicated to my colleagues at SkyWarnUK and the whole weather community. Thank you for all of your support and advice in the nine years I have been a Weather Spotter.

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Introduction

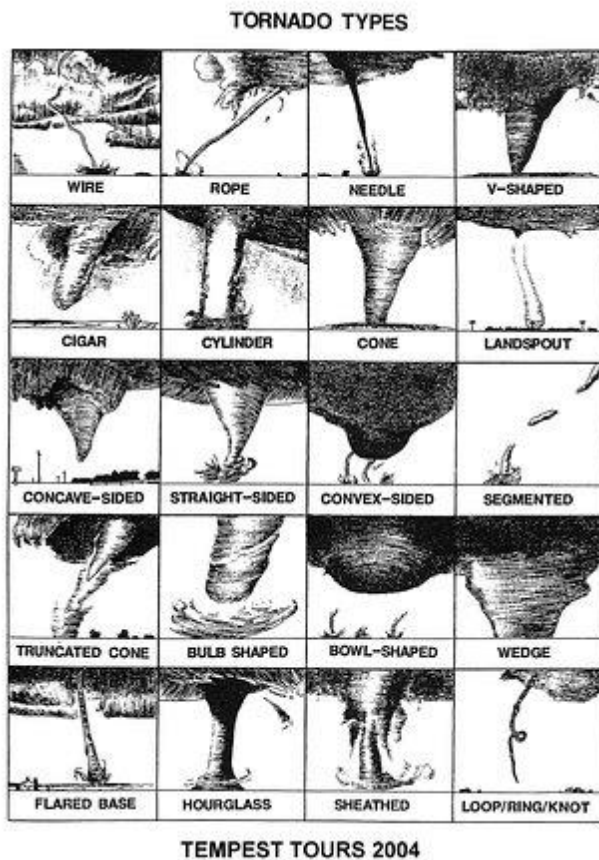


Figure 1 Trip Advisor (2022): ‘Tornado Types,’ *Tempest Tours* available at: https://www.tripadvisor.co.uk/LocationPhotoDirectLink-g30183-d7648140-i237180541-Tempest_Tours-Arlington_Texas.html (Accessed 28/11/2022).

chasing in terms of its popularity, its technological development, and its portrayal on social media, I consider storm chasing as a contemporary form of entertainment and as a science, drawing together storm chaser perspectives, and speculating on the future of storm chasing as a field. In doing so, I also demonstrate the tension between the professional and amateur, the motivations of storm chasers regarding why they continue to investigate storms, and also how preconceptions of storm chasing affects it from a cultural viewpoint. Storm chasing, I argue, helps us understand American attitudes not only to extreme weather but to risk and to the relationship of human beings to natural forces.

The US, while popular for its baseball or American football, is also renowned for another popular activity: storm chasing. A storm chaser is described as ‘a person who observes and follows a developing thunderstorm either for educational purposes, scientific research, or as a recreational activity.’¹ As this thesis demonstrates, “storm chasing” is a nebulous and wide-ranging term which encompasses a number of activities. Storm chasers may for instance track storms on mobile radar, via cars/trucks, and weather spotters report to weather organisations such as SKYWARN.

This thesis investigates the scientific and recreational variations of storm chasing, and considers the extent to which these motivations are reconcilable. By considering the evolution of storm

¹ Zunkel, P R (2017): ‘The Sensation-Seeking and Motivational Dimensions of Storm Chasers,’ [DISSERTATION], available at: <https://digital.library.txstate.edu/handle/10877/6598> (Accessed 12/09/2022).

Before investigating the endeavour and motivation of storm chasing, it is foremost essential to understand what exactly they are chasing; in summary, to describe the meteorological phenomena known as tornadoes. Studying the tornado involves gathering data about its size, intensity, formation, associated damage, and characteristics (such as its shape/type. Such types are demonstrated in *Figure 1*, which presents the different tornadoes that can form. Storm chasers generally call the cylinder type a ‘stovepipe.’ They pursue severe storms and tornadoes in order to collect data, take photographs, document events via videography, and simply to enjoy nature at its most aggressive. Severe storms themselves are common in Tornado Alley throughout the months of March to June; however, tornadoes do occur outside of this ‘season’ due to weather anomalies and conditions. Storm season during these months is the most favourable time for severe storms to generate due to the geographical and meteorological environment, which together present an opportunity for the necessary ingredients for severe storms to initiate. Despite the fact that only one in ten severe storms- known as supercells- produce tornadoes, storm chasing is still an extremely popular activity, with people travelling across states in order to witness the action. A supercell storm contains a rotating updraught known as a mesocyclone, which is only present on these types of storms due to wind shear (changes in wind velocity and direction, usually resulting in a rotational force).² The rotation of a supercell begins as horizontal vorticity, meaning that the rotation initially begins horizontally and not vertically. It is wind shear which turns the rotation vertical and creates the mesocyclone within a supercell thunderstorm. This does not, however, indicate that tornado formation will occur, and the existence of a supercell is also not suggestive of tornadogenesis. It is this that scientists are attempting to understand.

Multi-vortex tornadoes exist also, meaning that the tornado has more than one vortex around its base as depicted in the convex-sided and bowl-shaped tornado illustrations above. Multi-vortex tornadoes are often violent and create much damage. These vortices are known as sub-vortices/suction vortices, and demonstrate their own rotational influence. They can be responsible for smaller areas of incredible destruction but do not last for a long period of time compared to the parent tornado.³ It is important to note that a tornado’s size is an extraneous factor regarding its intensity; a smaller tornado can be extremely violent regardless of its weak appearance, and a large tornado, while usually extremely destructive, is not necessarily

² Lindop, L (2003): *Chasing Tornadoes*, first edition, Twenty-First Century Books, Connecticut, pp.16-17.

³ National Oceanic and Atmospheric Administration (2022): *Multiple Vortex Tornado*, Online Tornado FAQ [ONLINE], available at: <<https://www.spc.noaa.gov/faq/tornado/altus.htm>> (Accessed 28/11/22).

the strongest. For example, the widest tornado on record, the El Reno tornado of 2013 which was 2.6 miles wide and will be discussed in a later chapter, was not the strongest tornado ever recorded. The overall, unpredictable enigma that is the tornado continues to enchant storm chasers today. Annually, there are approximately 800-1200 tornadoes in the US, according to NOAA.⁴ Tornadoes cause around 80 deaths and 1500 injuries every year, in addition to causing approximately \$229 million dollars' worth of damage in 2021.⁵ The United States Government's annual expenditure relating to tornado safety is variable, given that each county in each tornado-prone state requires a warning system. However, it is clear that costs run to millions, if not billions, of dollars every year. This is the reason that storm chasers consider their work important: it helps collect valuable data and therefore has an impact on protecting communities.

While tornadoes- and storm chasing- do occur in other cultures, there is an argument to be made that storm chasing is a peculiarly American pursuit. The most straightforward explanation for this is the particular climate of a specific area in the United States, which is unique to the country in terms of tornado frequency and genesis. To put it even more simply, storm chasers chase tornadoes in America because that's where the tornadoes are. Within the central states area of the US is a vast area known as Tornado Alley (Fig .2), a large region covering several states which has proven a popular destination for weather tourists and professional chasers alike.⁶

⁴ NOAA (2022): 'Severe Weather 101: Tornadoes,' [ONLINE], available at: <https://www.nssl.noaa.gov/education/svrwx101/tornadoes/> (Accessed 06/12/2022).

⁵ Statista (2021): 'Economic damage caused by tornadoes in the United States from 1995 to 2021,' [ONLINE], available at <https://www.statista.com/statistics/237409/economic-damage-caused-by-tornadoes-in-us/#:~:text=Economic%20damage%20caused%20by%20tornadoes%20in%20the%20United%20States%201995%2D2021&text=In%202021%2C%20tornadoes%20resulted%20in,damage%20across%20the%20United%20States.>> (Accessed 06/12/2022).

⁶ Both categories of weather enthusiasts can be interchangeable in that they are both considered storm chasers but with independent objectives. This research will articulate this throughout the thesis.

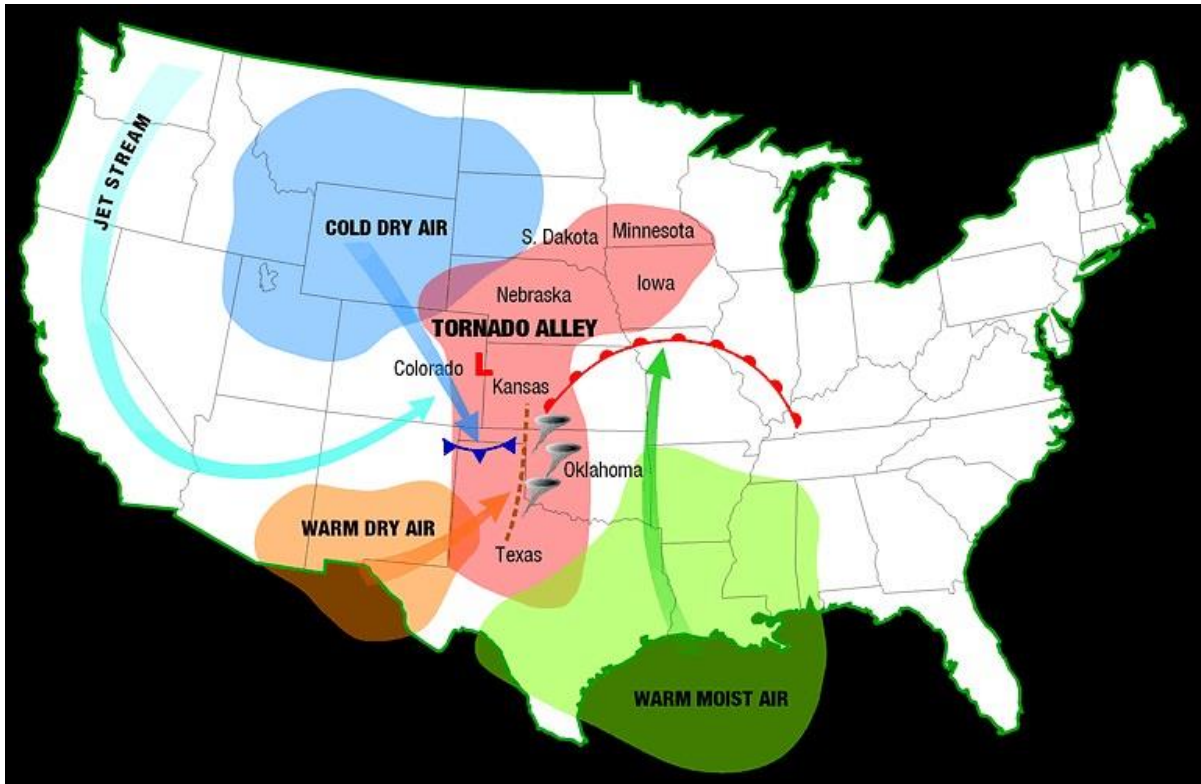


Figure 2 Tornado Alley (Image from Universetoday.com).

The geographic concentration of tornadoes in Tornado Alley is not the only factor which makes storm chasing particularly American, however. According to sociologist Stephen Lyng, risk-taking of a voluntary nature is appealing to a large number of Americans, and while agreement exists regarding protecting society from danger, ‘there are many who actively seek experiences that involve a high potential for personal injury or death.’⁷ Chasing storms is one such experience, and it is described as “risk tourism” due to the dangers involved. Throughout this thesis, I explore different cultural understandings and of responses to storm chasing, discovering how Americans’ relationship with severe weather affects their ability to live with it. This thesis also discusses how storm chasing has been depicted- not without contradiction- as a sport, an adventure holiday, a scientific endeavour, and a legitimate career. I use the tensions between entertainment and education, fear and admiration for extreme weather, and the quest for danger as a lens to understand how Americans have incorporated storm chasing into their culture. For example, storm chase tours appeal to those who wish to encounter the force of nature and potential danger, leading to an adrenaline rush, and also the feeling of empowerment relating to facing this force and surviving. This ties in with the risk tourism perspective. Human nature is such that dangerous activities are

⁷ Lyng, S (1990): ‘Edgework: A Social Psychological Analysis of Voluntary Risk Taking,’ *American Journal of Sociology*, Vol.95, Number 4, pp.851-852.

appealing; people seem to be drawn to the risks involved in order to satisfy the survival instinct through fear and awe.

In exploring these questions, I am contributing to an existing field of scholarship on social and cultural attitudes to the weather.⁸ Storm chasing exists within a longer history of Americans struggling to live with, but being awed and inspired by, extreme weather. Richard Conn in his important article 'The Aesthetics of Storm Chasing' (1989), states that 'beauty in the sky- perceived as colour, form, and motion' signifies changes in atmospheric conditions, and that he is 'enthralled by the terrible beauty of atmospheric turbulence...'⁹ This captures the foundational reason for storm chasing in the first place (as we will see, many storm chasers draw upon similar ideas in explaining their passion): the weather's ability to entice and awe humans by its immense power and beauty. Mark Svenfold, author of the book *Big Weather: Chasing tornadoes in the heart of America*, describes storm chasing as an 'extreme sport.'¹⁰ The extreme sport paradigm leads to the idea that storm chasing is now considered almost like a leisure activity, albeit a dangerous one. Ted Steinberg claims that 'nature [is] not nearly as passive and unchanging as historians may have led us to believe.'¹¹ Such a perspective suggests that in order for Americans to truly understand their place alongside nature, they need to understand nature itself. We might speculate that, in hunting down storms across the vast plains of Tornado Alley, storm chasers are resurrecting and reenacting the myth of the taming of the frontier that scholars like Richard Slotkin have argued is central to the American psyche.¹² Other research into storm chasing, whether in geography, tourism studies, sociology, or cultural studies, has also uncovered more about the cultural interpretations of American storm chasing. Walker S. Ashley and Stephen M. Strader conclude in their journal article 'Recipe for Disaster' that tornado deaths/injuries could be a combination of risk and vulnerability, yet little research exists to fully validate this.¹³ If we observe the wider history of severe weather in America, events such as the Dust Bowl of the 1930s provide an insight into American resilience, as well as the development of scientific

⁸ See, for instance, Ted Steinberg, *Down to Earth: Nature's Role in American History* (Oxford: Oxford University Press, 2002).

⁹ Conn, R (1989): 'The Aesthetics of Storm Chasing,' *Weatherwise*, Vol. 42, Issue 3, pp.143-148.

¹⁰ Svenfold, M (2006): *Big Weather: Chasing Tornadoes in the Heart of America*, Henry Holt and Company, New York.

¹¹ Steinberg, *Down to Earth*, x.

¹² Slotkin, R (1973): *Regeneration Through Violence: The Mythology of the American West, 1600-1860*.

¹³ Ashley, W S; Strader, S M (2016): 'Recipe For Disaster: How The Dynamic Ingredients Of Risk and Exposure Are Changing the Tornado Disaster Landscape,' *Bulletin of the American Meteorological Society*, Vol.97, No.5, pp.767-768.

methods to overcome the adverse conditions. Donald J. Pisani has suggested that the Dust Bowl event 'is a testament to the contest between Man and Nature, the power of human greed, and the dignity, pride and resilience of people confronted with hard times.'¹⁴ The technology and culture of the time, though basic by current standards, reflects today's battle with nature, in that technology and resilience is helping American people overcome difficult meteorological events. I build upon this scholarship to explore Americans' relationship with severe weather and how risks and the lure of adventure have shaped this little-understood sub-culture.

Chapter 1 explores the beginning of storm chasing, its history, and the relationship that Americans have with extreme weather. It also researches how different disciplinary approaches to storm chasing exist, from a meteorological perspective to a cultural viewpoint. These are areas which define storm chasing as a uniquely American activity, as the dynamics of Tornado Alley weather are unique to the flat plains. This chapter also embarks on research to discover if there is something in the American psyche that is drawn to this pastime, such as a fascination with the unique climate of Tornado Alley. Chapter 1 also describes the evolution of storm chasing and how meteorological equipment and technology has developed over time, from the most basic forecasts to the hi-tech methods of research used in contemporary meteorology.

Chapter 2 uses autobiographical storm chasing accounts to further explore the psychology behind chasing storms. While the community incorporates many other storm chasers, meteorologists, and weather enthusiasts, in this chapter I focus in particular on "celebrity" storm chasers Reed Timmer and the late Tim Samaras, and how they educate, inform, and entice audiences through their various outputs. Their books, *Into The Storm* (2010) and *Tornado Hunter* (2009) respectively, give readers a glimpse of the storm chaser existence, while captivating the reader with stories which combine bravado and science. The TV show used in Chapter 2, *Storm Chasers* (2007), focuses on both individuals and how they and the storms are portrayed visually. By examining their careers through their published and filmed works and their social media presences, this research considers how they became enamoured with severe weather and how their career trajectories led to them becoming career weather experts. I use Timmer and Samaras' careers, and how they represent themselves to their audiences, to explore ideas about American masculinity and its performance in the

¹⁴ Pisani, D J (1998): 'Reviewed Work: *Surviving the Dustbowl* by Chana Gazit ,' *Agricultural History*, Vol.72, no.4, pp. 767-769.

public sphere. While we will encounter women storm chasers (such as Chris Kridler and fictional counterparts) in later chapters, the gender imbalance in storm chasing is stark, and not coincidental. I consider what storm chasers' endeavours can tell us about narratives of heroism and individualism in American culture. I also use Samaras and Timmer to interrogate the contrast and tension that exists in storm chasing between entertainment and science. Both their careers contain elements of storm chasing for entertainment - as portrayed through the use of dramatic and adrenaline-fuelled television series - and the scientific aspect as described in both chasers' books and as part of the series also. These factors present a unique contrast between the intention to inform and educate, and to portray the excitement and action of storm chasing itself. Despite this tension, ultimately I conclude that scientific research is the professed focus of Timmer and Samaras' work, as indicated by their development of meteorological probes, and by their concerted efforts to demonstrate and legitimise their extensive knowledge and experience.

The tension between science and entertainment also underpins cultural representations of storm chasing. Chapter 3 explores further instances of severe weather representations, in the form of popular films. The three case study films, *Twister*, *Night of the Twisters* (both released in 1996), and the more modern *Into The Storm* (2014), provide a deliberately entertaining view of storm chasing, yet they also play a part in encouraging people to attempt it for themselves. This chapter investigates how films depict the risk and grandeur of storms, with a view to discovering how much of an impact had on storm chasing popularity, as well as the potential increase in risk and danger. I argue that the films romanticise storm chasing to a degree that people with no experience try to pursue severe storms. Storm films focus on special effects and fantastical, exaggerated action, which serves to depict storm chasing as exciting, action-packed, risky, and easy. This can create problems in reality when experienced storm chasers have to contend with inexperienced people putting themselves at risk and therefore creating a negative view of storm chasing itself. This has caused tensions which are an ongoing issue in the storm chasing community.

In Chapter 4, I explore how social media is changing American storm chasing culture through the use of Facebook, Twitter, YouTube, and blogs. That is to say, this chapter investigates how storm chasers build virtual communities beyond the storm itself. The chapter explores a different version of storm chasing representations, in the form of personal video, opinions of storm chasers themselves in real-time, and how storm chasers can use social media to update followers minute-by-minute and potentially save lives. Adding to this,

the future direction of storm chasing is suggested, providing possible outcomes for future circumstances, such as another pandemic. This is discussed in the conclusion in more detail.

In exploring the motivations and cultural impact of storm chasing I must first acknowledge my own positionality, and my vested interest in the survival of, and greater public understanding of, this pursuit. My interest in this topic stems from my own amateur involvement in weather watching, having been a SkyWarnUK Weather Spotter for over nine years. I have storm chased in the UK and have ambitions to go to the US to see tornadoes for myself. I believe that this will help me to definitively understand the power of these storms from a first-hand perspective, while engaging with people of similar interests. My motivations are not scientific, but from a curiosity borne out of a passion for severe weather, in particular tornadoes, and photographing storms, as they represent a power greater than ourselves.

This thesis demonstrates the value of a cultural studies approach to understanding this peculiarly American sub-culture. It demonstrates the interactions between American disaster TV/movies and peoples' attitudes towards tornadoes, as well as how severe weather is perceived by Americans living in areas which are most at risk. It also demonstrates the link between risk and entertainment, in that extreme weather events in the US attract people to the potential dangers involved and the opportunity to witness danger directly. I aim to argue that storm chasing is an American activity based on the sociocultural representations of it, which are not equalled elsewhere in the world. The evolving interest in the environmental humanities, which endeavours to understand cultural attitudes towards, and storytelling about, climate and climate change, and to use humanities approaches to educate and inform climate policy, suggests that projects like this one have a vital role to play in the fight to prevent climate catastrophe. These representations are expanded on throughout the thesis, motivated by the ambition to understand storm chasing and its role in American culture overall. In addition, why storm chasers are drawn towards danger to gain knowledge of extreme weather is another motivation, coupled with the juxtaposition of entertainment and science. Each chapter demonstrates how all of these research themes link together because of their essentially American elements, as will be explained.

Storm chasing, as an ever-growing community of people from various backgrounds, has become synonymous with a unique part of American culture; the desire to conquer and overcome the dangerous and dominating force of nature. As extreme weather events become

more frequent and more extreme in the future due to climate change, then it is necessary to study and understand those who are at the forefront of confronting and witnessing this: storm chasers.

Chapter 1: The science behind tornadogenesis, the history of storm chasing, and Americans' relationship with the weather

In this chapter I examine the history of tornado research, along with the genesis of storm chasing as a recognisable activity. It also explores how contemporary culture has affected storm chasing over time, and how Americans have changed it through technology, research, and enjoyment. In so doing, I draw together research from multiple disciplines, including meteorology, history, sociology, and cultural studies. While sustained scholarly inquiry into the motivations, methods, and cultural function of storm chasing is thin on the ground, academics have paid some attention to the ethics and aesthetics of storm chasing. My research builds on this scant but growing body of work by emphasising the importance of the scientific dimension, and by considering how cultural depictions of storm chasing, and social media have revolutionised the pastime in the 21st century.

The research into tornadoes is ongoing and there is much about tornadoes that we still do not know. They remain mysterious and extensive knowledge of how and why they form remains elusive. Tornadoes themselves continue to entice and fascinate. They are violent, rotating columns of air, which are caused by the downdraughts within the storm to focus the inner rotation downwards, leading to the concentration of low pressure which spins faster and creates a funnel cloud. If the funnel cloud touches the ground, it is then a tornado. Tornadoes are usually born from what is known as a wall cloud, also known as a pedestal cloud, which is an isolated lowering of an area of the cloud base. This may display rotation on its underside and is a visible part of the supercell storm's central mesocyclone's base. Despite the turbulence and ominous appearance of the parent storm, tornadoes do not always emerge from them.¹

Tornadoes are not always completely visible, either. A funnel cloud may be present from the cloud base, but the majority of the tornado may not actually be visible apart from rotation seen on the ground. It can be the only indication that a tornado is actually present, indicated by dirt flying around underneath the funnel cloud. The debris can sometimes form

¹ Met Office (2022): 'How are tornadoes formed?', Met Office [ONLINE], available at: <<https://www.metoffice.gov.uk/weather/learn-about/weather/types-of-weather/tornadoes/how-are-tornadoes-formed>> (Accessed 22/11/2022).

around the rotating winds, making the tornado's form visible without the condensation funnel (the full tornado funnel which can be observed developing from the cloud base). Warm air is pulled into the tornado, called 'inflow', and this sustains its existence, until cold downdraughts, called 'outflow,' overwhelm and cut off the flow of the hot air and cause tornado dissipation, which storm chasers call the 'rope out' stage. The flanking line is an area of clouds with strong updraughts behind an existing mature cumulonimbus storm cloud, which generally merge with the main storm and provide it with energy. The flanking line is usually situated at the rear of the main storm in the south-west area.

Figure 3 shows an illustration of the ingredients for tornado formation, though why this does not happen in all storms is still elusive to scientists. Mammatus is a cloud accessory, also known as 'mamma' which is Latin for 'breast,' a name which is relevant to mammatus' bulge-like appearance. This type of cloud accessory can protrude from a cloud base; on a supercell it emerges from the anvil (top) area as illustrated in Figure 3.

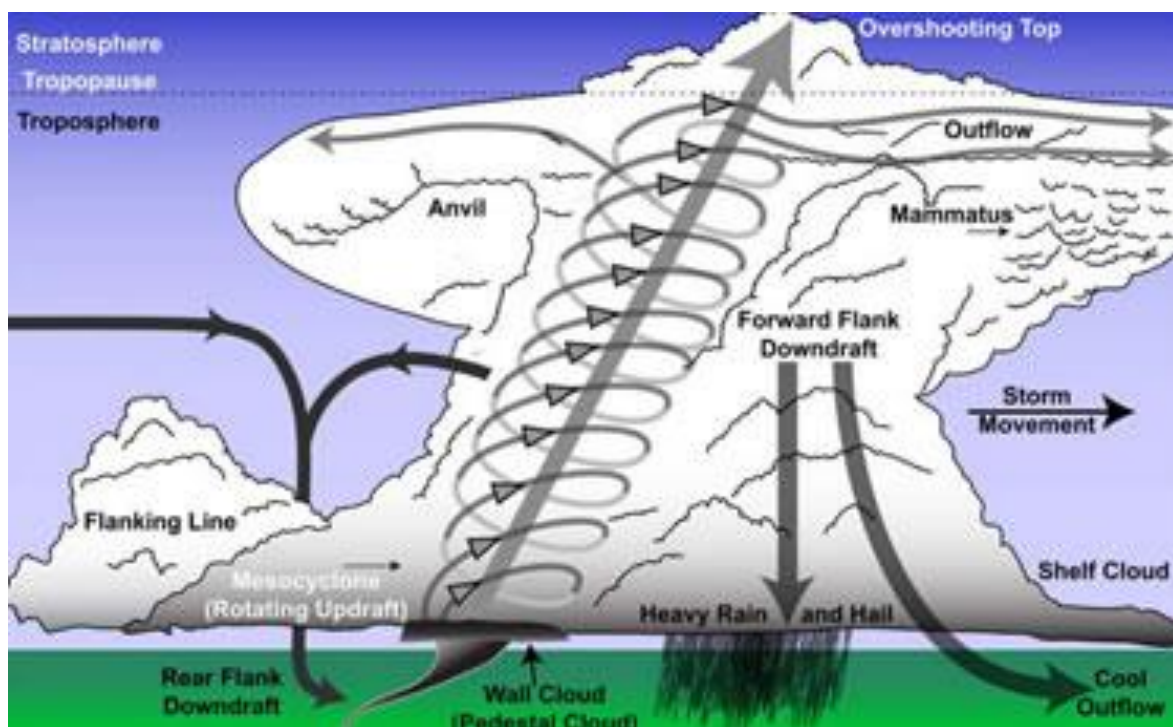


Figure 3 Anatomy of a tornadic supercell, from 'How Tornadoes are Formed' [ONLINE], available at: <https://www.groundzeroshelters.com/the-science-of-tornados> (Accessed 22/11/2022)

It is related to the turbulence within the cloud and does not signify the risk or imminence of a tornado. The general belief is that mammatus is formed when cold air at the top of the cloud sinks, creating the unique udder-like appearance that mammatus is associated with.²

These severe storms are unique to specific atmospheric conditions, and certain areas of the US are prone to these storms during Spring and Summer in particular. Tornado Alley, the area comprising of several states which have a higher ratio of tornado activity per year, witnesses supercells frequently during these seasons. Not all supercells produce tornadoes, on the other hand, despite that the belief once stood that tornadoes formed on the most southern storm due to the warm air available there.³ Statistics suggest that only 20% of supercells produce tornadoes, in fact.⁴ Meteorologists do not understand completely why some supercells produce tornadoes and others do not, though there have been theories relating to wind shear, downdraughts, and instability. Research continues to determine why tornadogenesis is favourable in some instances and not others. Dr Matthew Parker of NC State University suggests that weather science requires ‘more detailed explanations of the tornadogenesis process, including the failure points that hinder tornadogenesis in nontornadic supercells, and their physical linkages to specific environmental traits.’⁵ In other words, meteorologists are still unsure why tornadoes form, or which environmental/meteorological conditions help or hinder the formation process. As later chapters of this thesis will suggest, many storm chasers are motivated by their drive to reduce ignorance in scientific knowledge.

The US has a geographical advantage relating to tornado formation, with large, flat plains and convergence of northern and western winds in the Spring which results in wind shear. Wind shear is an important ingredient in tornado and indeed severe storm formation. It is an interaction between the wind direction and velocity at a right angle, resulting in a rotational effect. Because supercell thunderstorms have rotating updraughts, wind shear is a key ingredient in the development of severe storms. Tornado development is only partly understood, however over the years meteorologists and storm chasers have developed an

² Schultz, D M; Kanak, K M; Straka, J M (2006): ‘The Mysteries of Mammatus Clouds: Observations and Formation Mechanisms,’ *Journal of Atmospheric Sciences*, Vol.63, Issue 10, abstract.

³ Beveridge, S L; Houser, J L; Marzola, S R (2019): ‘A Statistical Evaluation of Tornado-Production Tendencies of Southernmost Supercells Compared to Adjacent Supercells In A North-South-Orientated Line,’ *Electronic Journal of Severe Storms Meteorology*, Vol.14, Issue 1, pp.2-3.

⁴ Michael V (2018): ‘Types of Tornadoes,’ *Michigan Weather Center* [ONLINE], available at: <<https://michigan-weather-center.org/types-of-tornadoes>> (Accessed 22/11/2022).

⁵ Parker, M (2022): ‘Storm-environment interactions controlling the probability of supercell tornadogenesis,’ NC State University [ONLINE], available at: <<https://sites.google.com/ncsu.edu/mdparker/projects?pli=1>> (Accessed 22/11/2022).

array of probes and drones, and have utilised radar technologies to try to understand why some storms produce tornadoes and why some do not. If the origin of tornado development were to be discovered, this could have a large impact on how they could be forecast, warning system developments, what atmospheric phenomena develop in order for a storm to become tornadic or remain without, and how Americans can live with severe weather in the future.

Despite this fact that most supercells do not produce this violent weather phenomenon, the number of storm chasers per year is increasing, according to Illinois Storm Chasers.⁶ The number has risen from a select few from when storm chasing first officially began, to an unspecified and impossible-to-accurately-measure number in present times. This imprecision is due in no small part to the elasticity of the term “storm chaser”: as discussed below, the label is self-selecting and malleable, though, as we will see, debates have erupted in recent years about the necessity of policing who is able to adopt this identity. The pastime is becoming more popular, especially as better technology emerges over time to accommodate improved photography/videography/weather tracking abilities. This increased interest in nature’s most powerful storms has led to increased awareness and a better understanding of severe weather. As tornadoes become more frequent due to climate change, it is possible that storm chaser numbers will increase and the activity will become more regulated, thus causing issues to career storm chasers who have seen difficulties with increased chaser populations through time. This theme will be researched in a later chapter.

Meteorological understanding of tornadoes has evolved in tandem with (and in part because of) storm chasing, and so a brief historical overview of the sub-culture and its evolution is warranted here. Storm chasing emerged as a popular form of entertainment and scientific research in the mid twentieth century. However, storm chasing as an organised and named activity is part of a much longer preoccupation with extreme weather on the American continent that predates the arrival of European invaders in the late fifteenth century.⁷ From the emergence of storm chasing as a regular activity to the development of weather-specific technology, Americans have become preoccupied with severe weather and how to understand it. As a career or hobby, the evolution of storm chasing did not escalate in earnest until

⁶ Illinois Storm Chasers LLC(2022): *Storm Chasing Info* [ONLINE], available at: <<https://www.illinoisstormchasers.com/storm-chasing-info.html>> (Accessed 07/09/2022).

⁷ Laskin, D (1996): *Braving the Elements: The Stormy History of American Weather*, New York: Anchor Books , pp.19-41;

Twister romanticised and dramatised it in 1996.⁸ Although storm chasers existed beforehand, it was previously a niche activity in which fewer people engaged. Before *Twister*, which is investigated as a cultural representation of storm chasing in Chapter 2, it was undertaken by scientists, weather enthusiasts, or people who had a genuine interest in storm genesis. The data that current storm chasers gather can be used to help scientists to understand what causes tornadoes to form by comparing different account/videos/photos.

When storm chasing became a more defined concept in 1956, it was a relatively unexplored area with little research. As time progressed, meteorologists undertook different research tactics to better understand the basic grasp of severe storms that people had at the time. Storm chasing itself can be classed as both a science and a hobby, since the weather community involves people from various disciplines, or none at all. This chapter analyses how meteorological methodologies of investigation differ from the methods of hobby storm chasers, and how a professional approach juxtaposes an amateur one. Meteorologists, who study weather as a career and usually have a degree, focus on the dynamics of weather and the scientific data that weather events generate. Scientific teams case tornadoes in order to gather information about their origin and formation, resulting in a more detailed understanding of such events.

The development of storm chasing emerged as a popular activity once *Twister* had dramatised both the thrill-seeking excitement and scientific labour of storm chasing. This, combined with the enticement of danger and the power of nature, further encouraged storm chasing to become an established career or hobby. The whole field of storm chasing is versatile in that it includes people from different backgrounds. For example, it involves meteorologists, weather enthusiasts, academics, professional storm chasers who have a public reputation, photographers, videographers, and also amateur storm chasers who are interested in severe weather or who enjoy the experiences of the career storm chasers they follow on social media. Storm chasing as a pastime intersects with professional weather science through the existence of storm spotters, who monitor storm systems out in the environment and report any severe consequences of dangerous weather, such as tornadoes or heavy rainfall. By doing so, spotters provide meteorologists with useable data, which can be used in future weather studies to determine climatic weather anomalies or patterns.

⁸ Cantillon, H (2000): 'Tornado Chasing: An Introduction to Risk Tourism Opportunities,' *Proceedings of the 2000 Northeastern Recreation Research Symposium*, Geography and Regional Planning, pp.234-235.

The activities we commonly recognise as ‘storm chasing’ today are part of a longer American history of fascination with extreme weather. According to author William B. Meyer, Americans’ relationship with the weather began when the first colonists settled onto what would become the United States, when people had to adapt their farming techniques to a new, varying climate.⁹ Meyer also goes on to state that ‘the history of American weather to date is not principally the story of how the weather has changed, but how Americans have changed.’¹⁰ Meyer’s hypothesis indicates that, rather than the weather being something which dominates the people of America, it is actually something which has been dominated through Americans adapting to and preparing for severe instances of weather. Although Americans have had to change in order to live with it, this change shows that Americans have depended on this story of survival to fuel a narrative of resilience and indomitability. Yet Meyer, in dating this ambivalent and frequently confrontational relationship to colonial settlement, pays scant attention to existing indigenous attitudes to nature. White colonial attitudes to extreme weather coexisted alongside, and sometimes came into conflict with, indigenous understandings of phenomena like tornadoes. The first tornado fatality was recorded as a Native American in Massachusetts, in 1680.¹¹ While some indigenous communities viewed tornadoes as evil, others believed them to be ‘cleansing entities.’¹² In response to the threats posed by storms and tornadoes, indigenous communities developed and practised methods of keeping themselves safe, which could be considered as a precursor to modern storm chasing. The diversity of indigenous beliefs regarding tornadoes led to the evolution of multiple methods to protect themselves from destruction.¹³ For example, Jason Baird Jackson, the director of the Mathers Museum of World Cultures in Indiana, suggests that certain figures within indigenous communities (now located in Oklahoma) were believed to possess the power to ‘turn or reroute storms away from people in their path.’ He claims that ‘it was — often still is — understood that such a person with the right knowledge or personal power could do this.’¹⁴

⁹ Meyer, W B (2000): *Americans and Their Weather*, Oxford University Press, New York, pp.6-26.

¹⁰ Meyer, W B (2000): *Americans and Their Weather*, Oxford University Press, New York, pp.6-26.

¹¹ Agee, E; Taylor, L (2019): ‘Historical Analysis of U.S. Tornado Fatalities (1808-2017): Population, Science, and Technology,’ *Weather, Climate, and Society*, Vol.11, No.2, pp.357-358.

¹² Grazulis, T P (2001): *The Tornado: Nature’s Ultimate Windstorm*, University of Oklahoma Press, USA, p.223.

¹³ For more, see Garrison, T A (2020): ‘Twisting Air: Native Southerners and Their Encounters with Tornadoes,’ *Native South*, Vol.13.

¹⁴ Weeks, L (2014): ‘A Native American Take on Tornadoes,’ *The Protojournalist*, quote of Jason Baird Jackson [ONLINE], available at: <<https://www.npr.org/sections/theprotojournalist/2014/06/17/319078684/a-native-american-take-on-tornadoes>> (Accessed 29/11/22).

That is to say, Americans of all types have long been preoccupied by the relationship between humans and nature, and by the power of human beings to conquer and control nature. It parallels current human behaviour towards tornadoes by almost trying to outsmart it. While in previous centuries people largely attempted to comprehend tornadoes by attributing severe weather to gods or evil entities, in contemporary culture people use technology to reach the nucleus of understanding. This suggests that throughout history, humans have attempted with whatever tools and frames of reference they had at their disposal to confront, and overthrow, the reign of nature's severest weather so that communities can be protected.

In contemporary storm chasing culture, we can still identify an irresistible compulsion to overpower an immense force which is impossible to tame. In other words, despite the involvement of meteorologists today, there is still a primal and almost spiritual impulse that exists at the very centre of storm chasing. As scholars have suggested, exploring the quasi-spiritual dimensions of modern storm chasing can help us understand the complex and sometimes contradictory motivations which drive the pursuit. Writer Rebecca Onion has said, 'America has many more tornadoes than any other country, and its citizenry has long regarded twisters with a mix of fear, awe and thrilled pleasure. Fast-moving and dramatic, tornadoes have been both catalysts for American religious thought and irresistible centerpieces for popular entertainment.'¹⁵ Onion adds that the early colonies of the United States were 'fascinated and sometimes horrified' by the weather and used theology to explain different meteorological circumstances. For example, the Christian God was blamed for extreme climatological circumstances as a means of punishment for sins. Tornadoes and other weather phenomena were viewed as evidence of a power above humanity: only God could create such a destructive and overwhelming force. This belief has not entirely vanished with the secularisation of American culture and the evolution of scientific understandings of weather. People are constantly attempting to overcome severe weather in order to understand it, capture it in photographs or video, and parade it live on the internet for entertainment. In this way, Americans have found ways to ensnare weather and to use it as a form of art/entertainment in popular culture, yet still grapple with the fact that it is also a overpowering and potentially dangerous entity. It could be suggested that this entices people to chase severe storms. As Jen Henderson suggests, Americans' relationship with the weather

¹⁵ Onion, R (2020): 'The Thrill of the Chase,' *American Experience* [ONLINE], available at: <https://www.pbs.org/wgbh/americanexperience/features/mr-tornado-thrill-chase/> (Accessed 05/09/2022).

also extends to the thrill of the unknown and the compulsion to ‘seek pleasure from risk.’¹⁶ With the US experiencing around 1200 tornadoes annually, the number of people being killed by tornadoes has increased since the 1990s, probably due to the link between an increase in amateur storm chasing and the availability of technology.¹⁷ Although risk is analysed more thoroughly in later chapters, it is relevant here because it relates to Americans’ perceptions of severe weather and how they live with it. In other words, they seek to understand it and force it into the realm of control via knowledge, rather than surrender and accept it as a consequence of living in tornado-prone areas.

As storm chasing is a pastime primarily dominated by men, gender roles play an important part too, in that men in Western culture are stereotyped to be strong and powerful. Author David Orrell provides the viewpoint that ‘ever since Plato described women as originating from morally defective souls and Aristotle excluded them from his Lyceum, science has been a game dominated by men.’¹⁸ Throughout time, men have been viewed as the protectors, the defenders, and the dominant gender. In storm chasing, the protective aspect is relevant because gathering data to understand storms, as well as using data to improve technology, is protecting people from being badly affected by tornadoes or other weather phenomena. Because storm chasing is very male-dominated, it leads to the cultural definition and expectations of masculinity: Provider. By chasing ominous weather systems and monolithic clouds, putting themselves in danger in order to gather data from tornadoes, male storm chasers are confirming the role of men to those who believe in masculine clichés. The fact that nature is sometimes referred to as Mother Nature is an indication that, while men are considered providers, females are considered the nurturers and the central axis of survival. While nature can be violent and destructive, it is also supportive of life on Earth, creating both an awe-inspiring and almost deity-like presence. Storm chasers work alongside nature’s worst to protect communities and attempt to provide them with safety and education.¹⁹

¹⁶ Henderson, J (2013): ‘Tuning Up: What We Chase: A writer mourns colleagues lost in May’s killer storms but knows she’ll pursue tornadoes once again,’ *The American Scholar*, Vol.82, no.4, p.18.

¹⁷ Stokoe, R M (2016): ‘Putting people at the centre of tornado warnings: How perception analysis can cut fatalities,’ *International Journal of Disaster Risk Reduction*, Vol.17, pp.137-153.

¹⁸ Orrell, D (2012): ‘Chapter Five: The Masculine Philosophy,’ *Truth or Beauty: Science and the Quest for Order*, Oxford University Press, Oxford, UK, pp.116-117.

¹⁹ Jelinski, D(2010): ‘On The Notions of Mother Nature and the Balance of Nature and Their Implication for Conservation,’ *Human Ecology: Contemporary Research and Practice*, Springer-Verlag, pp.37-50.

While American preoccupations with extreme weather are a recurring theme throughout history, modern ‘storm chasing’ has specific and recognisable origins. In the aftermath of the Tri-State Tornado in 1925, which affected Missouri, Illinois and Indiana, the lack of public awareness of tornado safety or the technology available to improve warning times was heavily scrutinised. Storm spotting began as part of a military activity in the early 1940s, focusing primarily on lightning at first, with networks being organised throughout different states in order to provide a wider distribution of forecast data.²⁰ Doswell *et al* indicate that by the mid-1950s there existed a recognisable community of ‘spotters’, and suggest that the debate about amateur vs professional forms of weather research (a tension still present in the pursuit today) was already beginning to crystallise. They suggest: ‘This evolution followed rather directly in the wake of the inception of public tornado forecasts, permitting the alerting and deployment of spotters in advance of threatening weather situations.’

While, as we have seen, other individuals and groups may have engaged in following storms throughout American history, it was David Hoadley of North Dakota who started the modern understanding of *chasing* storms. Beginning his weather pursuits in 1956, Hoadley, also an artist and photographer, is viewed as the pioneer of storm chasing and remains revered within the severe weather community.²¹ His self-professed objective was to simply chase storms to document their beauty and witness the power of nature. Hoadley himself stated that:

My interest in storms began in June, 1956 in Bismarck, ND, after a severe thunderstorm knocked over trees and power lines in town. I spent the next day driving around, taking 8mm movies of the damage. I was soon hooked on the power and fascination of mother nature. The next six years were spent chasing and photographing thunderstorms across the Dakotas...²²

²⁰ Doswell, C A; Moller, A R; Brooks. H E (1999): ‘Storm Spotting and Public Awareness since the First Tornado Forecasts of 1948,’ *Weather and Forecasting*, Vol.14, Issue 4, pp.554-557.

²¹ Illinois Storm Chasers LLC (2022): *About Storm Chasing* [ONLINE], available at: <<https://www.illinoisstormchasers.com/storm-chasing-info.htm>> (Accessed 01/02/2022).

²² Marshall, T (1987): ‘Chase Fever: The Early Years- A biography of David Hoadley,’ *Storm Track* [ONLINE], available at: <<https://stormtrack.org/library/people/hoadley.htm>> (Accessed 05/09/2022).

As we will see, the intoxicating effects of witnessing extreme weather and its aftermath is a recurring theme in the career paths of several high-profile chasers. Hoadley perfectly embodies this trope.

Hoadley created the first storm chasing magazine called *Storm Track*. The first magazine issue was published on December 31st 1977 and contained information relating to good photography, and commentary on Hoadley's experience with public perception. In that first issue, Hoadley reflected: 'one of my long standing concerns has been that storm-chasers may eventually draw too much publicity, and chasing will become another mass cult of the leisure class...' ²³ He also mentions that should this happen, there may have to be Federal intervention and licensing. Even in 1977, this was an almost prophetic glimpse into the future of storm chasing (the storm chasing community is currently locked in heated discussions about the viability and desirability of licensing). *Storm Track* is still in publication today, focusing on the latest weather community updates and research. The magazine's website hosts a forum: <https://stormtrack.org/community/>, where weather enthusiasts gather to talk about weather news and experiences. I will discuss the creation of virtual storm chasing communities in the final chapter of this thesis.

From national volunteer weather spotters, the storm chasing field evolved further into monitoring storms via scientific experiments and university-led meteorological groups. During the 1970s, the National Severe Storms Laboratory, based at the University of Oklahoma, utilised a remote Doppler radar (equipment which can detect weather using radio wave pulses) to identify and document severe weather occurrences. ²⁴ This meant that severe storms could be monitored to detect any anomalies such as tornado development, which is hinted at by the appearance of a hook echo on radar. Hook echoes are hook-shaped radar signatures, usually situated on the southwest part of the storm, and they usually indicate that a tornado is forming or has formed. The hook is usually an indication that there is turbulence, rotation or debris from tornadic activity. The first hook echo was observed during 1953 by a team of scientists, and in the 1960s it was suggested that they were related to storm rotation and tornado development. ²⁵ As the above examples suggest, the evolution of professional,

²³ Hoadley, D (1977): *Storm Track* premiere edition, *Storm Track* archives [ONLINE], available at: <<https://stormtrack.org/library/archives/issue1.jpg>> (Accessed 22/11/2022).

²⁴ Bluestein, H B (1999): 'A History of Severe-Storm Intercept Field Programs,' *Weather and Forecasting*, Vol.14, Issue 4, pp.558-577.

²⁵ Markowski, P M (2002): 'Hook Echoes and Rear-Fank Downdrafts: A Review,' *Monthly Weather Review*, Vol.130, Issue.4, pp.852-876.

scientific tornado research and the increasing popularity of amateur storm spotting came hand in hand. As technology developed and storm monitoring became more hi-tech, many people outside of the scientific community became interested in chasing storms, particularly in the 1990s when *Twister* was released. It provided a unique perspective to the field of storm chasing, from both a scientific and non-professional viewpoint. This led to storm chasing becoming a more documented, mainstream profession.

The additional attraction of storm chasing can be attributed to the risks involved in doing so. An abundance of media in the 21st Century, including popular TV shows, magazines, books and weather documentaries, have encapsulated the ongoing glamorisation of severe weather. Since *Twister* was released, the risks modern storm chasers take have increased, not only due to the enduring fascination with nature's power and dominance but by the technological ability to get closer and closer to the storm. The exposure to risk is driven by the adrenaline factor, which is a result of the exposure to danger and escaping from it. Lives are put at risk in storm chasing, whether scientists or amateur, as seen in Chapter 2 with Samaras. In his example, Samaras risked his life multiple times when deploying a probe directly in a tornado's path, which he undertook in the name of scientific progress. Doing this meant that he, as well as other storm chasers with similar intentions, exposed themselves to incredible danger. Risk-taking and fatalities in storm chasing demonstrate that, while storm chasers may emphasise that they take these risks in pursuit of knowledge, this scientific motivation can be hard to disentangle from a - sometimes subconscious or unacknowledged - search for thrills and the rush of adrenaline.²⁶ It is this adrenaline factor which causes other storm chasers to pursue storms and tornadoes; it can be compared to the feeling of participating in extreme sports, such as climbing Mount Everest. In this way, storm chasing has been considered as a sport because of its high thrill-seeking properties. This extends to tornado tours, which are linked with risk tourism, and their ability to provide a front-row seat view of the weather action.

According to author Heather Cantillon,

Traditionally, risk recreation is a self-initiated activity in a natural environment that people partake in due to the activity's uncertain and potentially harmful nature and it's cognitive and affective involvement... In terms of storm chasing, the following

²⁶ Samaras, T (2009): 'Introduction', *Tornado Hunter*, 1st edition, National Geographic Society, Washington DC, USA, pp.11-12.

definition is utilised: the recreational pursuit of an uncontrollable meteorological event.²⁷

This element of non-control is what drives the urge to chase storms, because it is an almost human nature-related characteristic to want to control powerful forces. The concept of conquering the atmosphere and severe weather is discussed also in Chapter 4, which details how this is a fundamentally human concept which has driven us to seek dangerous activities. The quest for knowledge is another factor, increasing the impulse to pursue severe storms and engage with them directly.

By the end of the twentieth century, a recognisable storm chasing community had emerged. This was best demonstrated by the establishment in 1998 of ChaserCon in 1998 by late storm chaser Tim Samaras. An annual event, ChaserCon provides a way for storm enthusiasts to meet *en masse* in pre-arranged locations and discuss storm chasing, research developments in meteorology, and talk about their experiences. It generally lasts for two days and represents a network for chasers to communicate. There are different ChaserCons nationally, occurring in different cities such as Denver (Colorado), where it originated, Wichita (Kansas), and Oklahoma City (Oklahoma), to name several. These can include famous storm chasers giving talks, storm chasers sharing stories from their experiences, and meteorologists sharing information or discussing new data. Although it ended in Colorado after Tim Samaras' death- he lived in Colorado- it is still occurring elsewhere and helps the storm chasing community remain updated on the latest developments. Line-ups have included famous storm chasers and meteorologists such as Reed Timmer, and also Dr Greg Forbes, a Weather Channel meteorologist. For example, for the Denver ChaserCon in 2020, a list by ChaserCon itself on Facebook included Dr Forbes, Tim Marshall, Brandon Sullivan, and Dr Karen Kosiba, among others.²⁸ All are experts in the field and contributed their views about various weather topics.

While the relationship between academic meteorology and storm chasing is not always uncomplicated, the two have interacted with each other since Hoadley's first organising innovations. Meteorologists and other scientists produced an effective tornado

²⁷ Cantillon, H (2000): 'Tornado Chasing: An Introduction to Risk Tourism Opportunities,' *Proceedings of the 2000 Northeastern Recreation Research Symposium*, Geography and Regional Planning, pp.234-235.

²⁸ ChaserCon (2019): Facebook status [ONLINE], available at: < <https://www.facebook.com/chasercon/posts/heres-the-official-2020-chasercon-speaker-list-in-no-particular-orderdr-greg-for/2452595188142585/>> (Accessed 21/11/2022).

warning system in the 20th Century, and they continue to deploy probes and drones into tornadoes and storms to enhance their knowledge further, thus providing themselves with data to determine better ways of warning the public.²⁹ Doing so helps forecasters to predict the probabilities of severe storms and how they are likely to impact people, potentially saving many lives. Different types of probe include rockets full of instruments/cameras shot directly into the tornado, instruments/cameras in ground-based probes left in the path of a tornado, the use of drones around a tornado and its damage path in order to record how locations have been affected, using Doppler radar or GPS on probes to be able to pinpoint where the probe is after a tornado hit, and the ‘Turtles’ which Tim Samaras deployed, which are mentioned later in this document. Meteorologists use probes and instruments to study storm structures and observe development of storms via radar and other meteorological equipment, in addition to studying how different storms produce tornadoes while others do not.

Regular technological updates and satellite observations of severe storms have helped determine different characteristics of each supercell, such as their velocity, rotation and structure. Discovering how tornadic storms differ from non-tornadic storms is an ongoing investigation which will lead to significant changes in our understanding of tornado genesis, should the data present itself.³⁰ This can be considered as the aim of meteorology; to better understand severe weather and save lives with improved warning systems. According to Brooke Fisher Liu *et al*, citizens who become involved in scientific research do so in order to understand the problems they are presented with in the form of severe weather, and assists them with contributing to a useful cause.³¹ This is the positive aspect of citizens becoming involved in severe weather research, either professionally or amateur. Storm chasers and spotters assist by being the extra observers when required, thus helping to create a larger idea of a storm’s behaviour. Storm chasers are the eyes on the ground, including weather spotters, photographers, videographers, etc. Footage can be used to determine the exact location of a tornado, how it developed from the beginning, its damage potential, and how powerful it is. An example of a dangerous, well-documented event is a recent tornado which put many storm chasers’ lives in danger. The El Reno tornado of 2013, which killed Tim Samaras, was

²⁹ Brotzge, J; Donner, W (2013): ‘The Tornado Warning Process: A Review of Current Research, Challenges, and Opportunities,’ *Bulletin of the American Meteorological Society*, Vol.94, no.11, pp.1715-1718.

³⁰ Sandmæl, T N; Homeyer, C R; Bedka, K M; Apke, J M; Mecikalski, J R; Khlopenkov, K (2019): ‘Evaluating the Ability of Remote Sensing Observations to Identify Significantly Severe and Potentially Tornadic Storms,’ *Journal of Applied Meteorology and Climatology*, Vol.58, No.12, pp.2569-2575.

³¹ Liu, B F; Seate, A A; Iles, I; Herovic, E (2020): ‘Eyes of the Storm: How Citizen Scientists Contribute to Government Forecasting and Risk Communication,’ *Weather, Climate and Society*, Vol.12, Issue.2, pp.263-277.

unprecedented and unpredictable, breaking records for diameter and particular wind speeds of smaller vortices within/around the body of the main tornado. Teams of weather scientists studied this tornado in detail to attempt to understand why it was so different to other storms.

Meteorology itself has benefited from storm chasers because they have been able to directly study tornadoes through science, popular media, and visual documentation of damage and behaviour. An example of how storm chasers assist meteorological research is the Moore, Oklahoma tornado of 2013, which occurred 11 days before the El Reno tornado of the same year (discussed in Chapter 2). It was the strongest category of tornado on the Enhanced Fujita Scale, which is illustrated by *Figure 4*.

ENHANCED FUJITA SCALE

WEAK	MODERATE	INTENSE	SEVERE	DEVASTATING	CATASTROPHIC
65-85 MPH	86-110 MPH	111-135 MPH	136-165 MPH	166-200 MPH	>200 MPH
MINOR DAMAGE	ROOF DAMAGE	HOMES DAMAGED	BUILDINGS LOST	TRAINS TOPPLED	TOWNS DESTROYED
EF-0	EF-1	EF-2	EF-3	EF-4	EF-5

Figure 4 EF Scale of Tornado Intensity, from Spectrum News 1 (2022): *The Science Behind the Enhanced Fujita Scale* [ONLINE], available at: <<https://spectrumlocalnews.com/nc/charlotte/weather/2022/03/04/the-enhanced-fujita-scale>> (Accessed 25/11/2022).

Tornadoes this large are rare; according to NOAA and the National Weather Service, only 2% of tornadoes are in this violent category.³² The Moore tornado caused incredible damage, as seen from both ground and aerial views after the tornado had dissipated. Storm chasers not only follow a tornado as it is in progress, but they can also document the damage caused and gather their own data relating to wind speeds and video evidence of intensity. This data assists scientists with understanding and learning more about tornado dynamics. Timmer, for example, has used drones when gathering his own visual data of tornadoes, which can then be used along with satellite images of the area, to determine how it has been

³² NOAA (2022): 'Violent Tornadoes,' National Weather Service [ONLINE], available at: <https://www.weather.gov/lmk/violent_tornadoes> (Accessed 25/11/2022).

affected and the tornado's place on the EF scale.³³ Storm chasers can also contribute to simulations made of a tornado by gathering data with mobile meteorological technology, helping scientists to make as accurate models as possible to understand tornadoes.³⁴ It is even possible to use photographs taken by observers to triangulate an estimate of the tornado's width, as long as there are several photos available.³⁵ The Moore tornado was an example of how storm chasers can contribute towards meteorology, although some are professional meteorologists already. TV news agencies sent their own storm chasers out to document the storm in real time, ensuring that it could be observed as early as possible.

Therefore, in the realm and pursuit of scientific discovery, the late twentieth and early twenty first Centuries have seen considerable cooperation between professional meteorologists and amateur storm chasers – and, indeed, an increasing blurring of the lines between those two categories. However, the same period has also witnessed the growing commercialisation of storm chasing, raising questions about where financial motivations fit within the science vs entertainment debate, and prompting scholars (working in, for instance, Tourism Studies and Anthropology) to engage with storm chasing, not merely as a scientific endeavour, but as an extreme sport or a form of risk tourism. Storm chase tours, for example, were developed in order to provide regular people with first-hand experiences of severe weather. They were established in the 1990s, according to netweather, after better radar/GPS technologies were more widely accessible.³⁶ It could be closely linked with peoples' passion for climbing Everest, which also began in the 1990s when companies began to offer commercial guided packages.³⁷ Storm chasing has a similar appeal. The enticement of such a tourist activity not only involves a thrill-seeking component, but also an educational one, since these tours generally do not pursue storms too closely and instead focus on showing the

³³ Atkins, N T; Butler, K M; Flynn, K R; Wakimoto, R M (2014): 'An Integrated Damage, Visual, and Radar Analysis of the 2013 Moore, Oklahoma, EF5 Tornado,' *Bulletin of the American Meteorological Society*, Vol. 95, Issue 10, pp.1550-1556.

³⁴ Hanley, K E; Barrett, A I; Lean, H W (2016): 'Simulating the 20 May 2013 Moore, Oklahoma tornado with a 100-metre grid-length NWP model,' *Atmospheric Science Letters*, Royal Meteorological Society, Vol.17, Issue 8, pp.453-455.

³⁵ Atkins, N T; Butler, K M; Flynn, K R; Wakimoto, R M (2014): 'An Integrated Damage, Visual, and Radar Analysis of the 2013 Moore, Oklahoma, EF5 Tornado,' *Bulletin of the American Meteorological Society*, Vol. 95, Issue 10, pp.1550-1556.

³⁶ Nick Finnis (2022): 'Storm Chasing in Tornado Alley: All You Need To Know,' *netweather.tv* [ONLINE], available at: <<https://www.netweather.tv/weather-forecasts/news/8912-storm-chasing-in-tornado-alley---all-you-need-to-know>> (Accessed 22/11/2022).

³⁷ Wilkinson, F (2022): 'Want to climb Mount Everest? Here's what you need to know,' *National Geographic* [ONLINE], available at: <<https://www.nationalgeographic.com/adventure/article/climbing-mount-everest-1#:~:text=Mount%20Everest's%20popularity%20soared%20in,to%20its%20slopes%20each%20year.>>> (Accessed 06/12/2022).

participants the power of nature from what the tour leaders consider a safe distance. Many of these tour companies bear names - Ultimate Storm Chasing Tours, Storm Chasing Adventure Tours, and Tempest Tours, to name a few – that trade on the promise of danger and thrill rather than on any pedagogical impulse. This adds to the feeling of exposure to risk and may be an attractive feature of the tours. Canadian anthropologist Catherine Morin Boulais opines that since the mid-1990s and the appearance of *Twister*, weather tourism has increased and is ‘an enduring trend in nature-based adventure tourism.’³⁸ Weather tourism is now a popular holiday choice and relates to humans’ desire to face and capture severe conditions directly, discussed in more detail further on. The commercial availability of risky storm chasing tours have also influenced the internationalisation of American storm chasing, making the plains of Tornado Alley increasingly available to a worldwide clientèle who may reside in less tornado-prone areas of the world. US storm chasing may actually be a pinnacle to which global storm chasers aspire, in terms of US storm chasing being the most adventurous, exciting, and dangerous as depicted in popular culture.

The development of a profit-driven storm chasing industry has prompted soul-searching within the community and scrutiny from scholars about the implications – malign or otherwise – of this commercialisation. As early as 2012 (before the death of Tim Samaras), the *Washington Post* asked, “Is tornado voyeurism killing people?” Pessimists suggest that the ubiquity of modern technology, namely constant access to internet with mobile phones and laptops, provides people with the ability to track storms with no experience whatsoever.³⁹ This idea of voyeurism relates to humans’ curiosity about the macabre and the dangerous. Seeing something as violent as a tornado destroying infrastructure across a wide area is awe-inducing yet terrifying, and the power of nature is available to witness directly and without ceremony. The opportunity to see things occurring in person is very likely what attracts regular people to storm chasing: A chance to view a destructive and uncontrollable power, and its effects on populations and the landscape. Unfortunately, the more people who engage with storm chasing in this way, the more the risks are likely to increase.

³⁸ Boulais, C M (2017): ‘When Severe Weather Becomes a Tourist Attraction: Understanding the Relationship With Nature In Storm-Chasing Tourism,’ *Weather, Climate and Society*, Vol. 9, No.3, pp.367-369.

³⁹ Livingston, I (2012): ‘Storm chasing goes mainstream: Is tornado voyeurism killing people?’, *Washington Post* [ONLINE], available at: <https://www.washingtonpost.com/blogs/capital-weather-gang/post/storm-chasing-goes-mainstream-is-tornado-voyeurism-killing-people/2012/04/16/gIQACa6YLT_blog.html> (Accessed 12/09/2022).

Chapter 2: Celebrity storm chasers and public perception: Tim Samaras and Reed Timmer's influence on storm chasing culture through their use of social media and books

Storms, particularly violent ones, have in ancient cultures been linked to storm gods, a hypothesis based on religious beliefs.¹ Framing storms as wrathful “acts of God” implies that they are by their very nature beyond human control, that they are theoretically untameable. Of course, this has not deterred human beings from trying. Human hubris and egotism has played a part in storm chasing, as amply evidenced by the rise of incidents whereby chasers attempt to get closer to tornadoes for videos or photographs. This provides the impression that some chasers believe they cannot be affected by danger, or that they are willing to risk themselves for glory, commercial success, or even – in the 21st century - social media appreciation. It is this that is cultivating a negative bias towards storm chasing as an activity. While the David vs Goliath stakes of the man against the whirlwind stokes an increasing public appetite for storm chasing content - especially that which can be accessed from the safety of one's own home - the perceived arrogance and recklessness of prominent storm chasers also has the potential to distort and damage understandings of what storm chasing is and what it is for. To explore the ambivalent public profile of storm chasing, and the science vs entertainment tension at its core, this chapter explores the lives, careers, and writings of, arguably, the two most famous American storm chasers: Tim Samaras and Reed Timmer.

This chapter demonstrates how different public perceptions and media representations of storm chasing can influence peoples' involvement with storm chasing. It also shows how popular culture has framed storm chasing as adventure-driven and action-filled, meaning that the layperson may find it an exciting yet dangerous hobby to pursue. Timmer's and Samaras' weather experiences have shaped storm chasing culture in both positive and negative ways, as will be discussed later. Overall, this chapter reflects on how two famous storm chasers have influenced storm chasing culture, how TV shows and books have emphasised nature's role in popular culture, and how, through the use of forums and reviews, storm chasers have provided an insight into how these mediums have been received.

¹ Thuesen, P J (2020): *Tornado God: American Religion and Violent Weather*, Oxford University Press, Oxford, abstract.

Due to the representations of storm chasing in popular media, people have viewed storm chasing as an adrenaline-fuelled, adventurous endeavour. As time has progressed, documentary film-makers have followed storm chasers through Tornado Alley to record the drama and power of nature, and also represent the adventures of storm chasing as a career. Two particular storm chasers, the late engineer Tim Samaras (1957-2013) and self-proclaimed 'extreme' meteorologist Reed Timmer (b.1980), are renowned for their involvement in the scientific and thrill-seeking aspect of storm chasing. They were also involved in television shows (*Storm Chasers* (2007-2011) and *Tornado Chasers* (2012)), depicting the lives of storm chasers, the dangers that could potentially arise, any dramas on the road, and the mesmerising beauty of nature. Samaras and Timmer epitomise existing tensions and contradictions in storm chasing, by showing both the drama and beauty of storms, yet being represented in TV shows which emphasise – perhaps even exaggerate - the jeopardy that storm chasers can end up stuck in. This in turn portrays storm chasing as a hazardous yet exhilarating activity, possibly encouraging non-experienced people to undertake it. This glamorisation and glorification of severe weather created a view in peoples' minds about how action-packed storm chasing is, rather than focusing on the purely scientific aspect. The chasers' motivations include warning followers of imminent storms or the chances of storms, in order for people to reach safety if and when necessary. To do this with more time available for people to find shelter, both storm chasers devised instruments to deploy directly into tornadoes and take measurements. There are times within the series where this is apparent, such as when Samaras is deploying his 'turtle' probes, but the drama of storm chasing also has a significant role in maintaining suspense and interest.

While Tim Samaras was known for his more careful, considered approach to tornado research and did not have any professional qualifications, Reed Timmer is viewed as a more risk-taking, excitable individual with academic credentials as a competent meteorologist. In addition to shows such as *Storm Chasers* (2007-2011) and *Tornado Chasers* (2012), both individuals used social media to update their followers on severe weather warnings and tornado chases; indeed, Timmer still regularly uses his Facebook, Twitter and YouTube to inform and educate others, as well as share live streams of his chases. The "celebrity" storm chaser represents the confluence of several phenomena that appear peculiarly American: storm chasing, innovative and exhaustive social media coverage, and the figure of the rugged (male) frontier hero. Although severe weather happens in many places in the world, it is Tornado Alley which gains the most attention online. It is also true of storm chasers; while

there are chasers in other countries, American chasers seem to have the most followers and fame. Tornadoes are not yet fully understood and so the two case study chasers for this chapter focused- and in Timmer's case, still focuses- on trying to discover more as time progresses. Samaras described his work as his passion and articulated that scientists 'still don't know why some thunderstorms create tornadoes while others don't. We're trying to collect as many observations as possible, both from outside and from the inside [of tornadoes]... If we better understood some of the final mechanisms for tornado genesis, our forecasting will be greatly improved.'² This proposes that the appeal of tornadoes for Samaras was that there is still more to be understood. His research focused on discovering the unknown qualities of tornado genesis, to unlock new knowledge for future use.

Timmer described his own objective as an aspiration to be 'a tornado ambassador to the world', in his book *Into The Storm* (2010).³ His aim is to educate while embarking on the thrill of the chase, as well as collecting useful data for forecasting, ongoing research, and prediction purposes. His own reasons for studying tornadoes echo Samaras'; the deployment of probes in order to discover new information about tornado development. Both individuals' scientific work has led to an increase in both weather safety and the pursuit of tornadoes through the lens of hobbyist amateurism. Scientific projects continue to study storms in great detail to establish new understandings through data. Samaras' legacy has been a continuation of what he began, whereas Timmer continues to push the limits in scientific tornado research for the same purpose: To educate people and enhance knowledge. Regular online updates, YouTube videos, data sharing, and TV shows have been several methods Timmer and Samaras utilised to do this.

While both men therefore have bona fide meteorological expertise and assert that their primary goal is education, the rising interest in pursuing dangerous storms has simultaneously led to veteran chasers maintaining a more negative view of modern storm chasing. Timmer stated that Dr. Charles Doswell, a prominent storm researcher, is concerned that pursuit of tornadoes is 'increasingly about adrenaline instead of science or the appreciation of meteorology.'⁴ Timmer himself believes that to an extent this is true; he opines in his book that Doswell's statement is 'prophetic'; the storm chasing phenomenon has changed over

² Lee, JL (2013): 'Our Haunting Last Interview With Storm Chaser Samaras,' *National Geographic* [ONLINE], available at: <<https://www.nationalgeographic.com/science/article/130602-tim-samaras-dead-storm-chaser-tornadoes-last-interview-weather>> (Accessed 02/03/2022).

³ Timmer, R (2010): *Into The Storm*, 2nd edition, New American Library, New York, USA pp.104-252.

⁴ Timmer, R (2010): *Into The Storm*, 2nd edition, New American Library, New York, USA p.104-252.

time as it has become more popular. Instead of a community comprising of mostly scientists or weather enthusiasts, there is now an abundance of adrenaline seekers, people who love nature, and those who have watched the movie *Twister* and have become entranced by the idea of chasing tornadoes. He does, however, note that most storm chasers are respectful of the field and do not undertake dangerous manoeuvres. They also have an understanding of the dangers presented nature and generally do not put themselves or others at risk.

Timmer's first storm chase was in his penultimate year of high school, when he intercepted a supercell- a severe thunderstorm- outside of his home in Michigan.⁵ Weather became an 'obsession' for him, according to Timmer himself in his book, and he invested more of his time into chasing storms as the years progressed. He attended the University of Oklahoma to study a degree in meteorology, eventually obtaining a Doctorate in the same subject. In 2003, he established the video-sharing medium Tornadovideos.net (TVN), primarily to share his storm chasing footage in order to generate money for future weather pursuits. His website Tornadovideos.com soon followed and gained hundreds of millions of streams over the years.⁶ Timmer became a pioneer in video content specifically centred around both tornadoes and money-generating. This assisted Timmer in both showcasing the mesmerising power of nature and informing the general populace of its dangers, as well as providing an income he could utilise to fund future chases. The website brought the general public to an almost front-row view of Timmer's adventures, and the more 'hits' (views) he achieved, the more money he was able to earn and the more people became interested. As time progressed and Timmer became further known, he embarked on a TV career in the show *Storm Chasers* in 2007, alongside his team and other storm chasers in the community. The show presented several storm chasing teams as they pursued storms, also showcasing the scientific agendas that the teams followed. It also documented tensions within the teams and the situations they found themselves in, representing adrenaline, friendship, science and adventure. In addition to this, *Storm Chasers* highlights a dichotomy between the scientific aspect of storm chasing and the emotional/compulsive side, which was evident in Timmer's overall persona. The show enabled him to utilise his meteorology skills through the deployment of tornado probes to measure different characteristics of the weather phenomenon, such as wind speeds, air pressure within the funnel, and other properties

⁵ All American Speakers Bureau (2022): *Reed Timmer Biography* [ONLINE], available at: <<https://www.allamericanspeakers.com/celebritytalentbios/Reed+Timmer/386324>> (Accessed 01/02/2022).

⁶ Worldwide Speakers Group (2022): *Dr. Reed Timmer* [ONLINE], available at: <<https://www.wmsg.com/speakers/dr-reed-timmer/>> (Accessed 07/02/2022).

relating to the storm. His passion for tornadoes and his mission to understand them have driven him to construct several armoured vehicles, known as Dominators. These vehicles, which also contain weather instrumentation for data collection and were shown in *Storm Chasers*, have been used during storm chases in order for Timmer's Dominator team to get closer to tornadoes in a safer manner, and can withstand up to 200mph winds if not struck by debris.⁷ Timmer still uses Dominator Fore, the latest version, to chase storms and gather data on tornado genesis and atmospheric characteristics.

Another storm chaser with similar objectives but a different storm chasing approach was Tim Samaras of Denver, Colorado. He described storm chasing as an 'obsession' and an opportunity to discover new information about tornadogenesis.⁸ He invented and produced a conical tornado probe to view inside the tornado funnel, as well as take meteorological measurements. On 24th June 2003, he successfully deployed the probe, known as a 'turtle', into a large tornado in Manchester, South Dakota, and measured a pressure drop of 100 millibars in the funnel's centre- an incredible and unexpected occurrence.⁹ Samaras was known within the storm chasing community as careful, someone who was relatively risk averse and did not embrace danger. After Samaras' death, Canadian storm chaser George Kourounis expressed that Samaras 'is one of the most respected storm chasers out there... Extremely knowledgeable... He knew what he was doing, and whenever I'd be out there on a chase and saw Tim out there, I knew I was in the right place.'¹⁰ Samaras and Timmer knew each other and had much mutual respect. It demonstrated how esteemed Samaras was and how his work affected others, to the point where other storm chasers admired him significantly.

He was an engineer by vocation and spent his childhood taking apart old technology and reassembling it. His weather interest began after watching *The Wizard of Oz* as a child, having been enraptured by the tornado in the film.¹¹ He did not have academic qualifications

⁷ Boyer, M (2011): 'Into The Storm', *FF Journal: The Magazine For Today's Metal Fabricating and Forming Technologies*, Issue: October 2011 [ONLINE], available at: <<https://www.ffjournal.net/item/10681-into-the-storm.html>> (Accessed 07/02/2022).

⁸ Bechtel, S; Samaras, T (2009): *Tornado Hunter*, 1st edition, National Geographic Society, Washington DC, USA, pp.9-10.

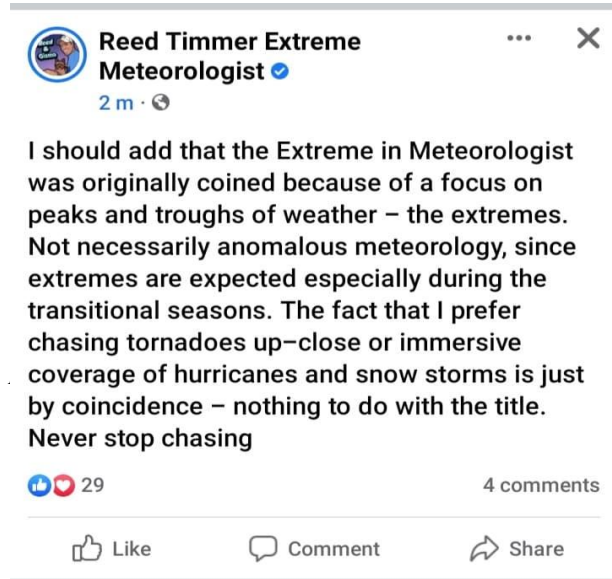
⁹ Hargrove, B (2018): *The Man Who Caught The Storm*, 1st edition, Simon & Schuster Paperbacks, New York, USA, pp.105-254.

¹⁰ Mortillaro, N (2013): 'Storm Chasing: Worth the Risk?', *Global News* [ONLINE], available at: <<https://globalnews.ca/news/608650/storm-chasing-worth-the-risk/>> (Accessed 08/02/2022).

¹¹ Bechtel, S; Samaras, T (2009): *Tornado Hunter*, 1st edition, National Geographic Society, Washington DC, USA, pp.9-46.

in meteorology but later gained credentials as a volunteer storm spotter for Skywarn, an organisation which relies on such individuals to relay important weather information while out on the road. The storm spotter tests entail taught classes to train spotters on weather safety, severe weather, and how to report weather-related incidents such as tornado damage.¹² Samaras formed a storm research team named TWISTEX (Tactical Weather Instrumented Sampling in Tornadoes Experiment) in 2007, which enabled him to research tornadoes more intensely.¹³ He continued to undertake tornado research and was attempting to intercept the El Reno tornado on 31st May 2013, trying to maintain a distance ahead of it to deploy a probe. However, he did not have time to do so before he and his team were overtaken and killed.

Timmer's and Samaras' work has influenced storm chasing culture in both positive and negative ways. The rise of amateurism has emerged within the storm chasing field. This has increased as chasers have regularly updated their social media with their adventures. This is also true for others in the storm chasing community, who update their profiles with live streams of chases, weather updates, storm footage and photographs, and YouTube videos.



These updates have encouraged an interest in severe weather, as well as severe weather safety, within the communities that Timmer is informing. In this way, his meteorological background has had a positive effect on how Americans perceive weather. On the other hand, his YouTube videos portray storm chasing as both adventurous and dangerous, with Timmer appearing determined and overexcited simultaneously. One example would be his 2009 video of a tornado chase in Wyoming, where he and his team are

Figure 5

attempting to intercept a tornado and feel exhilarated.¹⁴

¹² National Weather Service (NOAA) (2022): 'NWS SKYWARN Storm Spotter Program,' *National Weather Service* [ONLINE], available at: <<https://www.weather.gov/SKYWARN>> (Accessed 18/03/2022).

¹³ Hargrove, B (2018): *The Man Who Caught The Storm*, 1st edition, Simon & Schuster Paperbacks, New York, USA, pp.105-254.

¹⁴ Timmer, R (2009): 'Video INSIDE a tornado! Goshen Co, Wyoming- June 5, 2009,' *YouTube* [VIDEO], available at: <<https://www.youtube.com/watch?v=94qCoLdpRIQ>> (Accessed 18/03/2022).

Although Timmer is professional and capable, even being Red Cross certified in order to help severe weather victims, some have suggested that his methods are extreme; indeed, Timmer describes himself as such in his self-given title of extreme meteorologist, although he declared in a Facebook post in March 2022 that his ‘extreme’ status is not due to his methods; it is more related to the types of weather he pursues (*Figure 5*).

His armoured vehicles allow him to follow tornadoes closely to deploy instruments, while his YouTube updates maintain the viewer’s interest through exciting videography. The rise of YouTube and other social media, as explored in Chapter 4, have given the opportunity for the ‘extreme’ identification which Timmer has adopted. This is because some chasers are more willing to get closer to tornadoes for the best video or photographs, but as mentioned above, Timmer insists that this self-branding is related to the extremes of weather rather than his actions. According to people in the July 2014 forum of *Storm Track*, Timmer’s passion is ‘admirable’ and he raises awareness of severe weather safety.¹⁵ On the other hand, people of the same forum have expressed opposing views. A forum user named Raymond Mason stated that, although he respected Timmer and that he is ‘good’ at what he does, he thought that:

...we really should discourage people from thinking getting close to tornadoes is a good idea. For all we know someone might think "Wow, chasers get really close to tornadoes so it must be safe". I am not saying the vast majority of chasers do this..but it really is an unsafe thing that is being popularized though.¹⁶

Mason’s comments suggest that by viewing Timmer’s activities, people believe that storm chasing is safer than it is. The popularisation of storm chasing this way means that people with no weather knowledge may attempt to chase tornadoes for the risk factor. Another user named Warren Faidley added that he disagreed with Timmer’s ethics in storm chasing but that he was professional and ‘very kind’. Therefore, he is viewed as competent at his role yet sometimes his apparent public persona was perceived to encourage dangerous activities. Timmer does not openly advocate amateur storm chasing or pursuing tornadoes recklessly; he is a professional meteorologist with data-collecting instruments and an abundance of weather knowledge. However, the way he is portrayed as extreme seems to contribute towards people

¹⁵ Clope, A (2014): ‘Opinions regarding Reed Timmer from within the chaser community?’, *Storm Track*, Issue: July 2014 [ONLINE FORUM], available at: <<https://stormtrack.org/community/threads/opinions-regarding-reed-timmer-from-within-the-chaser-community.27630/>> (Accessed 13/02/2022).

¹⁶ Mason, R (2014): ‘Opinions regarding Reed Timmer from within the chaser community?’, *Storm Track*, Issue: July 2014 [ONLINE FORUM], available at: <<https://stormtrack.org/community/threads/opinions-regarding-reed-timmer-from-within-the-chaser-community.27630/>> (Accessed 13/02/2022).

undertaking amateur chasing. In addition, meteorologist Jason Samenow was concerned in 2015 that

there's a strong feeling from veterans in the chasing community that the industry is heading in a dangerous direction, given the pressures to get so close to a storm... It's become, 'Who can get the closest? Who can get the most dramatic footage?' The fears have been long held that someone would get hurt or killed in the process.¹⁷

These fears were partly realised when Samaras and his team were killed. Samaras was viewed as an individual who understood and respected severe weather, specifically tornadoes. *National Geographic* journalist Robert Draper stated that Samaras' team TWISTEX 'would prefer a legacy other than the proliferation of reckless souls courting death for the sake of an adrenaline rush and awesome video footage.'¹⁸ This indicates that the weather community believed that Samaras was careful in his pursuit of tornadoes, and that he did not take risks when doing so unless deploying probes in their path. Draper adds that 'no one has come close to matching the comprehensive data Samaras was able to get from inside the tornadoes themselves.' Data collection is an important aspect of chasing to many in the community, and Samaras attempted to gather more to further understand tornado behaviour. Storm chaser friends of Samaras mentioned in their obituaries that Samaras was 'a pioneer and great man' (Jim Cantore, 2013), that 'the weather community owes so much to him' and that his tornado research 'undoubtedly saved countless lives.' (Shawn Reynolds, 2013).¹⁹

Both Timmer and Samaras have strived to obtain measurements from inside tornadoes, in order to understand them and to comprehend how their data could assist in earlier tornado warning times. Their work has influenced people to become scientists in order to continue this research, as well as providing the public with more dramatic, exciting storm chasing footage through YouTube and TV shows. Though they both have different

¹⁷ Kramer, M (2013): 'Are Storm Chasers 'Crossing The Line'?', *National Geographic* [ONLINE], available at: <<https://www.nationalgeographic.com/science/article/130604-storm-chasing-dangers-samaras-weather-tornadoes>> (Accessed 13/02/2022).

¹⁸ Draper, R (2014): 'Storm Chaser Tim Samaras: One Year After His Death, His Gift Is Unmatched,' *National Geographic* [ONLINE], available at: <<https://www.nationalgeographic.com/adventure/article/140527-samaras-storm-chasers-tornado-weather-twistex-science>> (Accessed 13/02/2022).

¹⁹ Taylor, A (2013): 'Storm Chasing Community Pays Tribute to Tim Samaras', *Business Insider Australia* [ONLINE], available at: <<https://www.businessinsider.com.au/tim-samaras-tributes-begin-2013-6>> (Accessed 13/02/2022).

methodologies, their objective is the same: to discover more about this enigmatic weather phenomenon and to better prepare populations for future outbreaks.

The National Oceanic and Atmospheric Administration (NOAA) said on Samaras' death that Samaras was 'a respected tornado researcher... who brought to the field a unique portfolio of expertise in engineering, science, writing and videography.' They included that 'We know storm chasing is also done by local government and media personnel who provide valuable warning information, and by amateur storm chasers who wish to see and photograph storms.' Timmer's and Samaras' work may have inspired people to chase storms via these methods, but NOAA adds that 'We encourage all who chase to do so as safely and as responsibly as possible in order to avoid danger for themselves and all those threatened by tornadoes.'²⁰ Samaras was known as a safe storm chaser despite his close encounters with tornadoes for his work. His death led some members of the weather community acknowledging the risks involved in storm chasing, yet the reaction to Samaras' death from many quarters was one of disbelief. Speaking to *National Geographic*, photojournalist Doug Kisinger stated that 'We knew this day would happen someday, but nobody would imagine that it would happen to Tim. Tim was one of the safest people to go out there.'²¹ It proves that nature is indiscriminate, that even the most respected storm chasers can be killed. NOAA advises safe chasing, yet it was Samaras' close approach, despite his record as a risk-averse chaser, that led to new and surprising discoveries.

The depiction of tornado chasing in popular culture has provided people with an insight into the dangers associated with nature. The TV show *Storm Chasers* (2007-2011) presents storm chasing as exciting, adrenaline-fuelled, tense, and risky. Both Timmer and Samaras have active roles within the show, documenting their different approaches to storm chasing for entertainment. While Samaras is depicted as determined and professional, Timmer's videos contain much excitement, as is evident by his almost hyperactive personality during chases. How they represent storm chasing has had an effect on storm chasing itself, in that it has become more enticing and interesting to people who did not consider it before. For example, due to shows like *Storm Chasers*, a weather docudrama,

²⁰ Pirtle, K (2013): 'NOAA statement on deaths of storm researchers Tim Samaras, Paul Samaras and Carl Young', *National Oceanic and Atmospheric Administration* [ONLINE], available at: <<https://www.weather.gov/news/130603-chasers>> (Accessed 13/02/2022).

²¹ Kramer, M (2013): 'Tornado Chaser Tim Samaras Killed; Fans Pay Tribute,' *National Geographic* [ONLINE], available at: <<https://www.nationalgeographic.com/science/article/130602-tim-samaras-dead-storm-chaser-tornadoes-reno-oklahoma-tornado>> (Accessed 28/02/2022).

weather tourism, arguably more of an American phenomenon due to its popularity in the US, has emerged to offer the general public a glimpse of storm chasing life.²²

Storm Chasers, as a dramatic portrayal of severe weather, enhances its thrill-seeking, dangerous nature. It dramatises the thrill of the chase, highlighting the excitement of nature's power and relentlessness. Using armoured vehicles to close in on the tornadic targets, both Timmer's and Samaras' teams seek to deploy weather probes as close to the tornado's path as possible. Tony Laubach, an experienced storm chaser, comments in a research paper that shows like *Storm Chasers* have shown the action-packed aspect of storm chasing, which was the 'biggest catalyst' and the 'final big push of popularity', and culminated in a 'more permanent influx of storm chasers.'²³ An increase in traffic and hundreds of chasers on one storm have increased the potential for danger. Due to such media representations of storm chasing, people within the chasing community agree that some amateur chasers are irresponsible. For example, Charles Doswell and his colleague Roger Edwards opine that

TV chase crews are putting themselves at even greater risk than other chasers, even if they actually do practice good driving habits. Some TV news crews assigned to cover severe storms have little or no knowledge of storm structure and morphology, which can thrust them into extreme danger before they realize it. Lack of both safe storm chasing experience and meteorological knowledge are increasingly common, especially among TV chase crews... It surely won't be long before some eager-beaver reporter blindly leads his crew right into a rain-wrapped tornado. We believe it is extremely fortunate that nobody has been killed in the last 10 years while chasing, especially considering the sheer increase in numbers of human lightning rods congregating around supercells. That risk may be magnified for TV crews, with their tall antennae and plethora of electronics.²⁴

Moreover, despite the show's introduction declaring: 'This program depicts highly trained professionals engaging dangerous tornadoes. DO NOT ATTEMPT', the show has met with criticism based on the apparent 'soap opera' style of the series.

²² Boulais, C M (2017): 'When Severe Weather Becomes a Tourist Attraction: Understanding the Relationship with Nature in Storm-Chasing Tourism,' *Weather, Climate, and Society*, Vol. 9, No. 3, pp. 367-376.

²³ Laubach, T (2016): 'Tragedy and Ethics in Storm Chasing,' *Southern Illinois University Carbondale* [PDF], pp.1-2.

²⁴ Doswell, C, Edwards, R: 'Irresponsible Media Storm Chase Practices,' *StormEyes.org* [ONLINE], available at: <<https://www.stormeyes.org/tornado/media.htm>> (Accessed 01/03/2022).

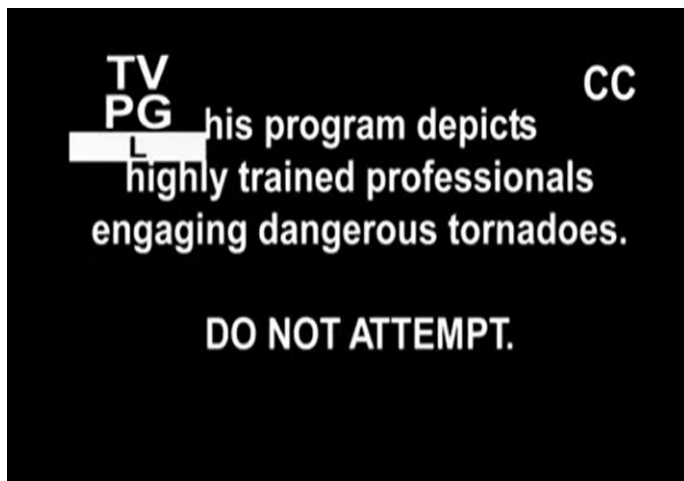


Figure 6 Screenshot from *Storm Chasers* (Series 3, Episode 1) series 3

In the Netweather community forum, member A.J commented just that, while another forum user, Paul Sherman, added that ‘it was just not interesting anymore and the drama was taking over.’²⁵ The show does not show the many hours of waiting that storm chasers actually experience, nor the endless travelling that is sometimes required. Instead, it focuses on the most thrilling moments and

dramatic events. Tony Laubach comments that the TV show had a ‘combination of scientific, thrill-seeking, and media’ representations of storm chasing.²⁶ While many documentaries on severe weather incorporate the drama of nature’s fury, *Storm Chasers* incorporates a more exclusive perspective of storm chasing. It achieves this by following the teams, showing their interpersonal relationships, and their successes and failures, providing an exclusive view into the practice of storm chasing itself (minus the uninteresting parts such as long travelling). In Season 3, episode 1, which is titled ‘Storm Catchers,’ the introduction shows Timmer’s excitement in the form of shouting as they approach a tornado, while Samaras is more collected with a radio/microphone in his hand. Close-ups of tornadoes and Timmer’s reactions are other first impressions, portraying Timmer as passionate and enthusiastic.²⁷ He is also introduced via a chyron as an extreme meteorologist, which Timmer uses in his professional life as seen.

Samaras is introduced as a ‘severe weather engineer’. This contrast of images portrays Samaras as the serious, scientific individual, while Timmer is depicted as a hyperactive, intense person despite his extensive knowledge in the meteorological field. Throughout the episode, the contrast is evident by the way that their methodologies are represented. Although they both seek to deploy probes in the tornado’s path, Timmer seems to take more risks and is

²⁵ Dorsetbred (2011): ‘Storm Chasers Tv Series,’ *Netweather Community* [ONLINE], available at: <<https://www.netweather.tv/forum/topic/69164-storm-chasers-tv-series/>> (Accessed 02/03/2022).

²⁶ Laubach, A (2016): ‘Tragedy and Ethics in Storm Chasing,’ Southern Illinois University Carbondale, Chapter 2, p.10.

²⁷ ‘Storm Catchers’ (2009), *Storm Chasers*, series 3, episode 1, directed by Christian D’Andrea, Discovery, 18th October 2009.

very determined to get as close as possible while using his armoured vehicle, the TVN Dominator (*Figure 9*).



Figures 7 and 8 Screenshots from *Storm Chasers* (Series 3, Episode 1)

He describes the vehicle as the ‘ultimate research machine’ with its onboard instruments and protective plating against debris. In more recent times he has more vehicles in use, while Samaras used an un-armoured vehicle.

Storm Chasers states that Samaras is ‘one of the best chasers out there’ and shows him communicating with other storm chasers over the radio. Samaras also describes his ‘turtle’ probe, an orange conical machine with internal cameras and weather instruments. Its role is to collect data from inside a tornado once it has been deposited in the tornado’s path. Samaras designed and built the probes himself and, according to the *Storm Chasers* episode mentioned, ‘changed the way tornadoes are studied’ by being the first probe of its type to measure data from inside a tornado. Samaras details on the episode that TWISTEX is ‘not all



Figure 9 Screenshot from *Storm Chasers* (Episode 1, Series 3)

about getting pretty pictures of tornadoes. We are all about collecting data from inside of tornado cores. We’re not your typical chasers [who] stop at the side of the road and watch a pretty tornado transverse the countryside.’ His comment infers that

he is more interested in the science behind chasing rather than aesthetics, because he emphasises that his purpose is to collect data rather than admire the storm. His role on the show is to provide a scientific side to the storm chasing community from an engineer’s perspective. Part of the episode shows the TWISTEX team trying to ‘punch the core’, whereby storm chasers try to drive through the heavy precipitation that is occurring in the middle of the storm. Storm chasing is believed as

dangerous because a tornado can be obscured behind the rain. Therefore, Samaras did take risks in this respect; however, he is able to proceed unscathed. Later, he is seen describing a new tornadic circulation while maintaining a calm yet determined exterior. The nature of the TV show does, however, provide a noticeable hint of impatience when Samaras is ready to intercept the storm, though he acknowledges when he is in a dangerous environment and understands when to leave. He comments on a lorry driving past and calls the driver ‘crazy’ for ‘driving right into [the tornado’s path]’. As a result of this approach, Samaras is characterised by other chasers as careful in his storm pursuits and proves his own opinions on this here.

In contrast to Samaras’ mainly level-headed appraisal of the weather conditions, Timmer is seen excitably raising his voice along with his colleague while using National Weather Service radar to track storms. The show also builds tension by filming discussions between Timmer and his colleagues on the build-up to a chase. Timmer describes the storm base as something he’s been ‘waiting for for the last ten years of storm chasing’, which indicates that something huge is to follow. During Timmer’s time on the episode it is clear that his representation of the storm chasing phenomenon is dramatic and energetic, while Samaras is more collected and serious. Timmer adds that he is happiest when he’s standing north east of a wall cloud (a protrusion from a severe storm cloud where a tornado forms) as it’s about to develop a tornado. He shows passion in abundance and it is clear that he takes his role extremely seriously despite his hyperactive persona. This creates tensions within the storm chasing field because although Timmer can be overexcitable and has been viewed negatively in the past, his work in meteorology has been extremely useful. Like Samaras during this episode, Timmer also ‘punches the core’ to reach the optimal position for his first Dominator vehicle intercept. During Timmer’s parts, there is energetic music and much shouting, which enhances the view that his chasing methodology is based on anticipation and eagerness. Timmer’s parts also show dramatic close-ups of a tornado while Timmer exits the vehicle to speak to the camera about it and to film it. The focus on both sides is always on deploying probes and gathering data, despite their different chasing approaches.

Both Samaras and Timmer maintain important roles in how storm chasing is represented, but the show’s format involves emphasising the excitement of the chase. In this way, it is able to draw the viewer’s attention to the adrenaline rush that is involved while omitting the more mundane aspects of the activity, such as long journeys and waiting for storms to consolidate. The opening scenes introduce the weather as menacing, building up,

waiting for action, which maintained viewer interests. The editing is completed in a way which manufactures a feeling of anticipation for the audience, such as the transitions between car views and tornado views during the chase. As we will see in Chapter 3, the personification of storms as an enemy which needs to be conquered is a recurring theme in cultural depictions of storm chasing.



Figure 10 Screenshot from *Storm Chasers* (Series 3, Episode 1)

This emphasises both the tornado's evolution and the chasers' reactions, keeping the viewers in suspense. The ways that both chasers came across was also noted by viewers. Public perception of Timmer and Samaras varied, with one review on Amazon by Betty L. Wilkins opining that it was 'interesting to see the late Tim Samaras at work, although he was more often a little too cautious for his team mates from time to time... he was the most level headed of all... Reed's clashes with his team mates often proved annoying...'²⁸ Another reviewer on the same Amazon page, Aaron R, contrasted with the thought that he doesn't 'buy the idea that these great scientists have altruistic motives behind their research. They all are obviously in it for the thrill of storm chasing and beyond that seem to be motivated by ego.' It links to the earlier point regarding hubris and machismo; the comment suggests recognition is sought for chasing down storms and being the first to achieve a revolutionary method of data collection, or simply just intercepting a tornado for thrills. These

²⁸ Wilkins, B L (2014): 'Customer Review: *Storm Chasers* Season 3,' *Amazon reviews* [ONLINE], available at: <https://www.amazon.com/gp/customer-reviews/R3EZSUGCRAR0LG/ref=cm_cr_ar_p_d_viewpnt?ie=UTF8&ASIN=B004X7VRLC#R3EZSUGCRAR0LG> (Accessed 02/03/2022).

contradictory reviews insinuate that storm chasing combines both personal and professional elements which sometimes differ, and this can lead to the drama not only existing in the atmosphere. Since risk-taking is viewed as masculine, it also relates to the machismo hypothesis above.

The problems faced during travelling are additional factors. In a severe weather blog called WXForum, one user named online as *chief-david*, who is an Educational Weather Forecaster, says that popular TV shows such as the Discovery Channel’s “Storm Chasers” and the advent of smartphones spurred many to think “I can do this.”... Storm behaviours change. Cell service drops out. And computer models are often shaky at best. Today’s “homegrown” storm chasers may have what they need to get by 99% of the time. It’s easy to



Figure 11 Screenshot from *Storm Chasers*(Series 3, Episode 1)

know what to do when things go right. But it’s only a matter of time before things go wrong.’²⁹

His argument follows the reasoning that shows like *Storm Chasers* encourage regular people without experience or knowledge to pursue storms, without accounting for the possible incidents they may face or

cause. The comment indicates that the progression of technology has allowed people to track US weather more easily, despite the potential difficulties of finding a signal in the open, and it has encouraged more people to believe that they can storm chase easily. As *Figure 11* demonstrates, its design is dramatic to ensure that attention is drawn to it, emphasising the sinister view of nature. It draws people in and maintains their interest, ensuring that tornadoes are kept in the public consciousness as an almost behemoth-like evil creature.

²⁹ *chief-david* (2019): ‘Storm chaser mad and calling it quits,’ *WXForum.net: The Independent Weather Enthusiast’s Forum* [ONLINE], available at: <<https://www.wxforum.net/index.php?topic=36980.0>> (Accessed 02/03/2022).

Being able to chase storms and view such an awe-inspiring weather phenomenon directly, is another contributing factor to the rise of chasing, in that shows like *Storm Chasers* show the drama of cloudscapes, the darkness of storms, and the anger of tornadoes, almost like American weather is a living entity. This gives the audience an almost-physical experience of chasing, which in turn will affect the adrenaline factor and excitement of chasing tornadoes. As the introductory scene in this image shows, storms are powerful, destructive, and menacing, and the show presents several people driving towards the storm to ‘intercept’ instead of retreating to safety. Representations of the sublime in this way provide a

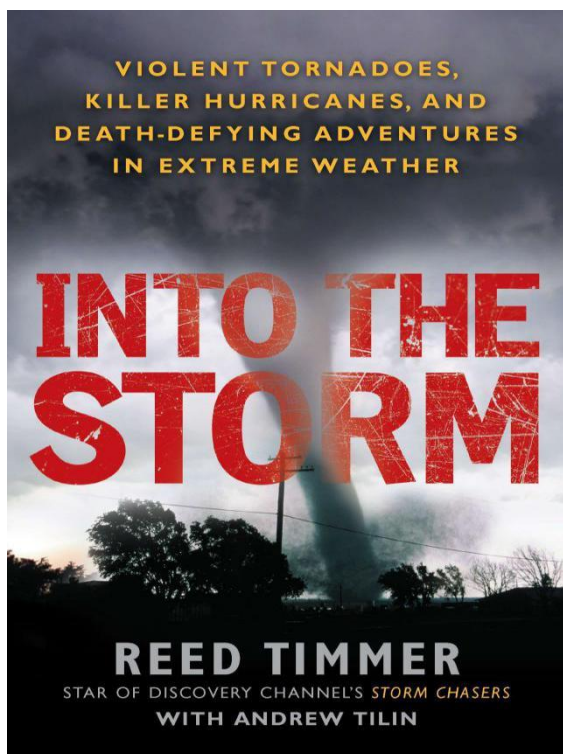


Figure 12

cinematic experience of humans vs nature, the weak vs the strong.³⁰ The concept of the sublime- a perspective through which to view nature as an overwhelming yet beautiful force- is also reflected in the narrative.³¹ For example, the use of the words ‘awesome’, ‘incredible’, and ‘dangerous,’ coupled with the voiceover announcing, ‘The Great Plains are erupting... America’s top chasers take on nature itself,’ hints at something greater than mere humanity (Season 3, episode 1).

The voiceover also adds that ‘these are the conditions storm chasers dream about,’ giving the impression that seeing a tornado is a once in a lifetime, rare opportunity. It enhances

the view that nature is untameable and tornadoes almost mythological. Charles Sanford opined that ‘the special grandeur of America’ is best articulated as ‘awesome aspects of nature: by tempests, towering mountains, craggy precipices, thundering waterfalls...’³² Tornadoes can be added to this category due to their looming, ominous, powerful nature, thus characterising themselves as a phenomenon of American grandeur.

³⁰ MacDonald, S (1999): ‘From the Sublime to the Vernacular,’ *Film Quarterly*, Vol.35, No.1, pp.12-25.

³¹ Mathias, N (2020): *Disaster Cinema in Historical Perspective: Mediations of the Sublime*, Amsterdam University Press, Chapter 6: ‘Disaster Cinema: A Historical Overview,’ pp.173-178.

³² Doak, R (2002): ‘The Natural Sublime and American Nationalism: 1800-1850,’ *Studies in Popular Culture*, Vol.25, No.2, pp.13-22.

In addition, *chief-david* adds that the behaviour of storms is unpredictable and changes frequently, meaning that there can be unforetold dangers in following storms and tornadoes. For example, another *WXForum* user named *SlowModem* suggests that ‘As long as TV shows keep glorifying the chasers, and paying big bucks for pictures and videos, there are going to be throngs of storm chasers out there trying to get the money shot.’³³ Obtaining photographic or videographic evidence of tornadoes for money is one way some chasers fund their excursions, while scientists are studying tornadoes for data collection purposes. Doing this requires no qualifications or reputation in the chaser community, and so anyone can undertake this endeavour. The growth of storm chasing has also affected the overall public perceptions of the activity, with it being described as a ‘sport’: Chasing storms as a form of entertainment, which includes storm chase tours, is ‘highly misleading, and growing participation in the sport is affecting storm chasing in the region’, according to David Robertson.³⁴ Storm chasing also emphasises the American-ness of the activity because it represents the pursuit of something that is unique to Tornado Alley. Furthermore, the TV shows mentioned are American, which almost provides the entertainment sector with US-centred weather patriotism.

Timmer and Samaras have both published autobiographies which reflect on their storm chasing careers, and which to a great extent echo the tropes and tensions visible in their television personas. Timmer’s *Into The Storm* (2009) introduces itself on the cover with the words ‘Violent tornadoes, killer hurricanes, and death-defying adventures in extreme weather’, which provides the reader with the hint of an enticing and exciting account of severe weather pursuits. The cover also shows an ominous tornado image (*Figure 12*) with the book title standing out over it in red, which engages the reader’s eyes to the subject immediately. In this way, Timmer’s cover designer has drawn the attention to the dramatic, eerie side of nature and has hinted at the danger involved. Timmer writes with the same excitement and vigour as he expresses during storm chases, which reflects his passion.

Into The Storm’s blurb also reflects a book full of excitement and action. It explains the power of tornadoes and the damage they cause, while adding that Timmer has intercepted more than any other person. It mentions the scientific aspect of Timmer’s objectives,

³³ *SlowModem* (2019): ‘Storm chaser mad and calling it quits,’ *WXForum.net: The Independent Weather Enthusiast’s Forum* [ONLINE], available at: <<https://www.wxforum.net/index.php?topic=36980.0>> (Accessed 02/03/2022).

³⁴ Robertson, D (2010): ‘Beyond *Twister*: A Geography of Recreational Storm Chasing on the Southern Plains,’ *Geographical Review*, Vol. 89, Issue 4, abstract.

commenting that his work will potentially save lives one day. For example, part of the blurb declares: 'Part adrenaline junkie, part meteorologist, Timmer has intercepted more than three hundred extreme tornadoes, hurricanes, and blizzards... It will show you... how storm chasers and scientists are working together to gather data that will someday save lives.' The juxtaposition of weather carnage and careful data-gathering science encapsulates Timmer's career, in that he pursues a dangerous activity yet strives to help others with his work. He mentions in *Into The Storm* that he approaches storm chases 'with a thrill-seeker's excitement, a scientist's curiosity... and the enormous passion of a man who can never stop chasing.'³⁵ His passion and dedication are echoed throughout the book in descriptions of his chases, yet his scientific side is present to represent his true reasons for chasing tornadoes.

The mixed public reception for the book thoroughly illustrates the contradictions inherent in Timmer's career and self-presentation. One reviewer named Brian Orzechowski rated the book four stars out of five, and said that 'Reed is very passionate about meteorology and storm chasing. This book reflects his passion and it's very admirable. I thought it was written well, highlighting his adventures... Despite the many references of the meteorological community giving him grief about being reckless, I feel him and his team's heart and interests are in the right place - improving severe weather preparedness and warnings through the use of science and technology.'³⁶ Timmer's scientific side is portrayed in his book with the mention of the Dominator vehicle, which includes an array of meteorological instruments to measure storm data. However, another reviewer named Zora rated the book with one star out of five and declared that '... this fellow says his name would become... "synonymous with tornado." I think that word should be not "tornado" but "egotist." The book is an egofest of tornadic ferocity. There are about 10 pages of interesting information, but otherwise it may as well say "me me me me me me me me me"...' ³⁷ While Timmer has the qualifications to study weather from an academic perspective, readers such as Zora believe that he is driven by his sense of self-worth rather than science. Timmer himself states that in order to learn more about tornadoes, instruments have to be placed within tornadoes, and added that for the

³⁵ Timmer, R (2010): *Into The Storm*, 2nd edition, New American Library, New York, USA pp104-252.

³⁶ Orzechowski, B (2013): 'Into the Storm: Violent Tornadoes, Killer Hurricanes, and Death-Defying Adventures in Extreme Weather,' *Goodreads* review [ONLINE], available at: <https://www.goodreads.com/book/show/9563548-into-the-storm#other_reviews> (Accessed 03/03/2022).

³⁷ Zora (2014): 'Into the Storm: Violent Tornadoes, Killer Hurricanes, and Death-Defying Adventures in Extreme Weather,' *Goodreads* review [ONLINE], available at: <https://www.goodreads.com/book/show/9563548-into-the-storm#other_reviews> (Accessed 03/03/2022).

chasers who are ‘obsessed and equipped enough’, to put themselves inside the storm.³⁸ Despite this, he notes that other chasers, particularly those with more experience, have declared him reckless during chases because he puts himself in dangerous situations. Timmer mentions in the book that he is ‘prone to hyperbole and over-optimism’, which explains his eagerness in his YouTube videos and his written accounts.³⁹ Due to this, *Into The Storm* was marketed to emphasise that Timmer was the star of *Storm Chasers* and a thrill-seeking meteorologist.⁴⁰ This provides the potential reader with an attention-holding introduction to the book, which serves to make it sound full of adventure. Additionally, reviews such as these suggest that public opinion is important, since the shows are aimed at the public. Therefore, reviews act as opinions about storm chasing, which in turn generates a wider viewpoint nationally or globally. Ergo, it can be suggested that book reviews are not only reflective of general opinion, but also the conduit of it.

Samaras’ book *Tornado Hunter* has a more professional tone, though his strong enthusiasm is evident also. The book, which Samaras wrote with Stefan Bechtel except the introduction, reflects a similar drama to Timmer’s through the subtitle: ‘*Getting inside the most violent storms on Earth*’, yet the cover shows video stills of Samaras deploying a probe and so it reflects his scientific objectives also (see below). The style of writing is more reserved yet betrays Samaras’ obsession with tornadoes in a similar way to Timmer’s, though not quite as expressive. For example, when Samaras is describing his weather interest in the book, he mentions how scientists he’d watched on TV had ‘turned his flame of passion for the weather into a raging bonfire of obsession.’⁴¹ *Tornado Hunter*’s page on *Goodreads* calls the book a ‘potent combination of high adventure and hard science.’⁴²

³⁸ Timmer, R (2010): *Into The Storm*, 2nd edition, New American Library, New York, USA pp.104-250.

³⁹ Timmer, R (2010): *Into The Storm*, 2nd edition, New American Library, New York, USA pp.104-252.

⁴⁰ Penguin Random House (2022): ‘Into the Storm: Violent Tornadoes, Killer Hurricanes, and Death-Defying Adventures in Extreme Weather,’ *Science, Biography and Memoir* [ONLINE], available at: <<https://www.penguinrandomhouse.com/books/307650/into-the-storm-by-reed-timmer/>> (Accessed 03/02/2022).

⁴¹ Samaras, T (2009): ‘Introduction’, *Tornado Hunter*, 1st edition, National Geographic Society, Washington DC, USA, pp11-12.

⁴² Goodreads (2022): ‘Tornado Hunter: Getting Inside the Most Violent Storms on Earth,’ *Goodreads* [ONLINE], available at: <https://www.goodreads.com/book/show/2083243.Tornado_Hunter> (Accessed 03/02/2022).

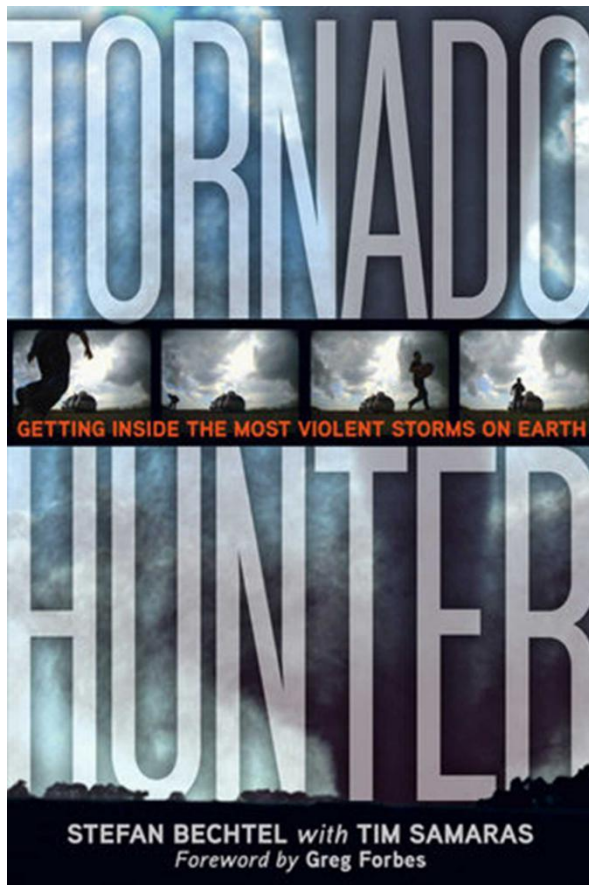


Figure 13

take risks. Samaras, however, did not have a motto and was known as cautious during storm chases. Their books present these characteristics through the use of attention-holding prose (Timmer) and exciting milestones (Samaras). For example, in *Into The Storm*, Timmer describes his experiences chasing the Manchester, South Dakota tornado on 24th June 2003 as ‘the payoff’ for all his ‘intense research and determination’. He also noted that other people in the chasing community regarded his tactics as aggressive, calling him ‘Need Glimmer’ when complaining that he sought fame for his chases and storm footage.⁴⁴

Samaras’ experience of the same tornado was vastly different. It was this storm during which he deployed a ‘turtle’ probe and measured one hundred millibar drop in the funnel. Although Samaras remained calm and collected upon retrieving his probe, it was a significant scientific achievement which had never been possible previously.⁴⁵ These comparisons present the opportunity to observe how one storm differed for each individual, showing how

The blurb on *Tornado Hunter* announces that Samaras chased tornadoes ‘to understand them, to predict them, and perhaps someday to stop them and save lives.’ *Into The Storm* carries a similar message with how the book will show readers ‘the science of weather: how it affects our lives... and how storm chasers and scientists are working together to gather data that will someday save lives.’ In this respect, both books represent the same mission but both chasers have a unique method of undertaking their work. Timmer’s motto is ‘NEVER stop chasing’, as is evident on his weather updates on social media.⁴³

As identified, Timmer is viewed as the more reckless of the two and is known to

⁴³ Timmer, R (2022): *Reed Timmer Extreme Meteorologist*, Facebook [ONLINE], available at: <<https://www.facebook.com/reedtimmer2.0>> (Accessed 03/03/2022).

⁴⁴ Timmer, R (2010): *Into The Storm*, 2nd edition, New American Library, New York, USA pp.128-138.

⁴⁵ Bechtel, S; Samaras, T (2009): *Tornado Hunter*, 1st edition, National Geographic Society, Washington DC, USA, pp.9-46.

they were perceived by the chaser community. In addition, while both storm chasers used science as the foundation of storm chasing, there existed an element of adrenaline also. A *Storm Track* forum user named Taylor Wright commented in 2014 that ‘I do believe [Timmer] is (or his exposure)... the cause of this new wave of extreme chasers whom risk their lives for footage. A lot of these “extreme chasers” don't know what they are doing, and it's only a matter of time until someone gets killed.’⁴⁶ Timmer is considered one of the most respected meteorologists and educates people about severe weather safety, and has encountered many severe weather events that few people have experienced.⁴⁷ Despite his perceived recklessness, his influence has reached many people with ambitions to pursue tornado science. While he is documented to take risks and by his own admission is aggressive with chasing tornadoes, his Dominator 3 vehicle, for example, is able to withstand high winds in the strongest tornadoes, according to the AccuWeather YouTube channel.⁴⁸ Timmer has strong protection against flying debris and high winds, meaning that he has the flexibility to be closer to tornadoes during chases. His work has inspired amateur storm chasers to undertake the activity, though other people within the community have expressed concern regarding this, as documented above with Wright’s *Storm Track* comment.

Samaras’ legacy has had a similar effect. Since his death in 2013, scientific projects have continued so that his work can be built upon. He not only studied tornadoes, but also lightning. In 2014, two individuals who were previously part of the extended TWISTEX team, Bruce Lee and Cathy Finley, used a supercomputer to simulate a supercell storm and tornado, attempting to understand tornado dynamics.⁴⁹ Samaras has inspired people to pursue a career in meteorology, including an individual named David Saurer, who stated in an obituary that Tim and his team ‘inspired me in more ways than ever as a forecaster since I’ve known them two years ago as part of Team TWISTEX’, and that ‘his inspiration carries with me before and now.’⁵⁰ In the same obituary thread, a woman named Karen added that

⁴⁶ Wright, T (2014): ‘Opinions regarding Reed Timmer from within the chasing community?’, *Storm Track* forum [ONLINE], available at: <<https://stormtrack.org/community/threads/opinions-regarding-reed-timmer-from-within-the-chaser-community.27630/page-2>> (Accessed 05/03/2022).

⁴⁷ Southern New England Weather Conference: ‘Extreme Tornado Research and Photography... The Real Life Version of the Movie “Twister”’ [PDF], available at: <<http://www.snewweatherconf.org/Abstracts/Timmer.pdf>> (Accessed 05/03/2022).

⁴⁸ AccuWeather (2018): *Dominator 3: A storm-chasing vehicle designed to handle the strongest of tornadoes* [ONLINE VIDEO], available at: <<https://www.youtube.com/watch?v=zNaBYBhTxIM>> (Accessed 05/03/2022).

⁴⁹ Hargrove, B (2018): *The Man Who Caught The Storm: The Life of Legendary Tornado Chaser Time Samaras*, 1st edition, Simon & Schuster Paperbacks, USA, pp.105-254.

⁵⁰ Saurer, D (2013): ‘Condolence and Memory Journal,’ *tributes* [ONLINE], available at: <<http://stevensandgrass.tributes.com/obituary/print/95929900>> (Accessed 07/03/2022).

Samaras' legacy 'will be all the lives he's saved throughout his career.' Samaras' work undoubtedly assisted in tornado safety and advice, providing people with life-saving information during tornado outbreaks. As displayed on the TWISTEX memorial page on Facebook, Samaras' final post ended with 'Stay weather savvy,' communicating that the general public should be aware of the weather conditions and act accordingly.⁵¹ In this way, his final post was able to inspire others to always be mindful of severe weather and take action when necessary; a representation of his careful and professional character.

Timmer's own tribute to TWISTEX mentioned that they 'continue to inspire us all' with the research that they completed.⁵² *Tornado Hunter* was another motivation for future weather scientists through its documentation of Samaras' achievements. Through its descriptions of Samaras' probe deployments to its adrenaline-fuelled descriptions of tornado chases, the book emphasises Samaras' role in scientific progression and pioneering, and represents the passion that Samaras and his team maintained in their endeavours. A reviewer named Dan said on the same *Goodreads* page that 'Samaras is a man with passion, and that comes through very clearly.' Although Bechtel wrote the book with Samaras and did not write it himself, Bechtel was able to communicate Samaras' conscientiousness and dedication throughout. In comparison, a slightly negative review by Rachel on the same *Goodreads* page complains that it was a 'pretty interesting (and slightly self-serving) look at tornadoes and tornado hunting'.⁵³ Her review indicates that although the book was written in an interesting fashion, for Rachel it emitted an almost self-complimentary perspective on Samaras' part. This is reminiscent of the *Into The Storm* review by Zora though to a lesser extent. Samaras was a self-taught engineer with exceptional skills, proven by his design and use of the 'turtle' probes. Despite his lack of meteorological credentials, he taught himself about severe weather throughout his life and engaged with it to understand tornadic development. It is important to understand that both individuals represent the contradictions of storm chasing and how the public perceives it, as they are scientists and risk-takers simultaneously.

The entertainment factor of storm chasing has been observed in *Storm Chasers* and both Timmer's and Samaras' books, as discussed. However, there exists an argument that

⁵¹ Samaras, T (2013): 'In Memory of Tim Samaras TWISTEX team,' *Facebook* [ONLINE], available at: <<https://www.facebook.com/InMemoryOfTimSamarasTwistexTeam/posts/stay-weather-savvy-he-warned-on-may-31st-up-to-a-point-he-was-he-stayed-in-his-c/676672112359599/>> (Accessed 07/03/2022).

⁵² Timmer, R (2021), 31st May, *Twitter*, available at: <<https://twitter.com/reedtimmeraccu/status/1399403177003425794?lang=en-GB>> (Accessed 07/03/2022).

⁵³ Rachel (2009): 'Tornado Hunter: Getting Inside the Most Violent Storms on Earth,' *Goodreads* [ONLINE], available at: <https://www.goodreads.com/book/show/2083243.Tornado_Hunter> (Accessed 03/02/2022).

these storm chasing documentaries, whether written or filmed, have a role in educating others. Also described previously, Timmer's approach to storm chasing is self-described as aggressive and risky, whereas Samaras was known for his cautious perspective. Despite representing opposing sides in terms of an entertainment versus education conflict, each chaser's *modus operandi* is actually similar in that they both encompass elements of both risk-taking and cautiousness. Timmer and Samaras publicly represent two different ideas of storm chasing: adventure and science. Both of these things have encouraged an uptick in chaser numbers over a period of time.

Firstly, it is well known that Timmer has a meteorology degree and uses his knowledge to educate others about severe weather. On the other hand, his reputation in storm chasing is unique in that the chasing community deems him reckless at times, such as the incident in his early chase days when he hid under an overpass during a tornado, which is strongly discouraged.⁵⁴ While using his Dominator vehicles to access tornadoes directly, he deploys probes in the tornado's path by methods such as releasing parachute probes. These consist of a larger probe being deployed into the tornado and releasing smaller sensors.⁵⁵ His work has a scientific basis and he has successfully collected data over time in order to better understand tornadoes. The Dominator vehicles also act as mobile weather stations so that, in the event of a tornado intercept, measurements can be taken from inside the tornado itself. In this way, Timmer has been able to gather knowledge of tornado dynamics and continues to this day. His role in *Storm Chasers* and *Tornado Chasers*, for example, provided the public with an alternative view. As previously discussed, Timmer is excitable and by his own admission, obsessed with severe weather. His pursuits have been documented via these TV shows and his YouTube channel to depict him as the most audacious of the two chasers. Due to this, and although Timmer has academic credentials as a professional meteorologist, his personality has been compared to Samaras regarding chasing practices. Contrastingly, one person said of him,

Timmer achieves some degree of relief from this dilemma by realizing that storm chasers do a public service by calling in reports that lead to more accurate tornado

⁵⁴ Masters, J (2011): 'Into the Storm: Violent Tornadoes, Killer Hurricanes, and Death-Defying Adventures in Extreme Weather,' Readings Book Reviews, *Bulletin of the American Meteorological Society*, Vol. 92, Issue 7, pp. 919-920.

⁵⁵ Timmer, R (2019): 25th September, *Twitter*, available at: <https://twitter.com/reedtimmeraccu/status/1176902074774241280> (Accessed 14/03/2022).

warnings, thus saving lives. He is also dedicated to collecting data for tornado research using video and instrumented chase vehicles.⁵⁶

Comments such as this demonstrate that Timmer and his colleagues play an important role in weather observation even from an amateur viewpoint. Relating to this hypothesis is Timmer's portrayal within different settings. While the TV shows and YouTube channel seek to educate others about the dangers of severe weather, there is an element of eye-catching anticipation to the titles. For example, on Timmer's YouTube videos the titles are always a mixture of capital letters to emphasise the exciting part, and lower case letters (*Figure 14*). Doing this allows watchers to immediately grasp the subject of the video and become interested via clickbait methods and eye-catching thumbnails. Timmer's YouTube channel has had 212,541,085 views as of April 2022, so it is very popular. Using this form of entertainment not only assists Timmer in raising awareness of what damage can be caused by tornadoes, but it also cultivates an image of the power and risks associated with nature.

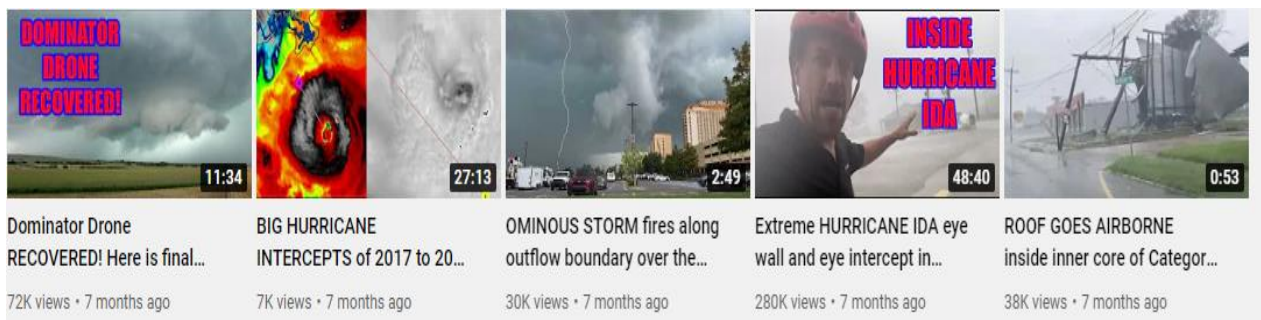


Figure 14 Timmer's YouTube videos are eye-catching and attention-grabbing.

Samaras, as the careful chaser of the two, had scientific objectives like Timmer. However, his calm public image juxtaposes Timmer's energetic persona. Yet Timmer's work also appears to entertain as well as inform, while Samaras' work was mainly of a reserved, data-based manner.

It is noticeable that storm chasing is a predominantly male activity, with an almost masculine need to conquer the female Mother Nature with scientific, photographic and thrill-seeking heroism. Within the US storm chasing community, there exists a 'macho' archetype for some storm chasers, which has foundations on hubris and arrogance. The power of nature is a common theme in storm chasing resulting from the fundamental human need to 'win'. This is evident in *Weather and the Mind* by John Goodwin, in which Dr. Zabriskie offers the

⁵⁶ Masters, J (2011): 'Into the Storm: Violent Tornadoes, Killer Hurricanes, and Death-Defying Adventures in Extreme Weather,' Readings Book Reviews, *Bulletin of the American Meteorological Society*, Vol. 92, Issue 7, pp. 919-920.

notion that human nature ‘has within it forces that are outside of the ego’s control that... feels events... in nature,’ and that regarding tornado chasing, ‘there’s always been... a kind of apotropaic notion that if you get in touch with something that is like what you fear, then you have some access to it.’⁵⁷ In this way, the superiority aspect of human nature is always dominant, supplying the view that man can overcome nature simply by chasing it to understand it. The female characterisation of nature is additionally related to Earth being the giver of life, thus being ‘maternal’.⁵⁸ On the other hand, this is a direct contrast to the destruction that is caused by violent storms, and this juxtaposition indicates positive and negative sides of storm chasing. Both Timmer and Samaras can be linked to the embodiment of American macho ideal, because their chases appear as a conflict between nature’s destruction and humans’ attempts to defend themselves against it. Also, American men are culturally expected to be strong and masculine, as per Western male stereotype. The idea of Mother Nature is also a direct contradiction to the nurturing qualities of a mother, so male storm chasers could be viewed as the strong, heroic defenders of American people against danger.

The careers of Timmer and Samaras illustrate a popular, and growing, appetite for celebrity storm chaser content. In addition to this, the contrasting models of storm chasing behaviour they model have arguably - along with filmic depictions, the subject of the next chapter - created a surge in amateur storm chasing in recent years that has prompted as much consternation as it has elation. Storm chase tours have also added to peoples’ perceptions of storm chasing, by tour companies’ emphasising how powerful and dangerous storms are. Weather tourism in the US is a more recent phenomenon driven by the growing interest in storm chasing, which has been caused by the aforementioned American TV shows, the film *Twister*, and regular updates on social media by American storm chasers themselves. On the other hand, it is argued that US weather tourism has caused issues for experienced storm chasers previously. For example, traffic congestion as a result of both people fleeing the tornado’s path and chaser convergence on the road has become a hindrance in recent years. Also, depictions of storm chasing have created problems for experienced chasers because of amateurism. A minority of amateur chasers have violated traffic rules, experienced problems with law enforcement as a result of various misdemeanours, and have placed themselves in

⁵⁷ Goodwin, J (2001): *Weather and the Mind*, Lichtenstein Creative Media, pp.14-16.

⁵⁸ Bromwich, R J; Richard, N; Ungar, O; Younger, M; Symons, M (2020): *Environmental Activism and the Maternal: Mothers and Mother Earth in Activism and Discourse*, Demeter Press, pp.9-18.

danger trying to obtain the best photograph or video. This has had a very negative effect on public perceptions of storm chasing in the past. The popular website for travel, *Tripadvisor*, even has a forum page dedicated to US storm chase tour discussions.⁵⁹

Additionally, the danger and unpredictability of tornadoes has been a problem when chasing these storms. The El Reno tornado of 2013 was unprecedented in both size and behaviour, catching many chasers out when pursuing it. Many chasers, Timmer being one of them, obtained footage and uploaded to YouTube. He also tried to gain meteorological data from the tornado with the Dominator, which sustained damage to its bonnet.⁶⁰ Samaras also attempted to intercept this tornado to deploy probes and measure weather data from inside the funnel as per his usual methods.⁶¹ While Timmer was able to observe the tornado without becoming a victim, Samaras and his team, TWISTEX, were killed. The risks relating to storm chasing were apparent that day not only because of an unpredictable tornado, but also because the storm chaser renowned for being careful had been killed by it. Although chaser numbers did not directly impact deaths associated with this tornado, the image below illustrates the number of chasers following this storm, although not all chasers on the storm were detected on this image (*Figure 15*). Therefore exact numbers are not known. The existence of US storm chase tours for entertainment and profit exacerbate the issues surrounding storm chasing ethics and safety, however. While scientists undertake weather analysis trips to study tornadoes, these chase tours- while used to educate the general public about severe storms- appear to earn money based on following storms which cause suffering and loss. Thus, there exists an increasing incompatibility between storm chasing for science and storm chasing for profit and entertainment.

⁵⁹ *Tripadvisor* (2013): 'Tornado/Storm Chasers... Which company to go with...???' *Tripadvisor: Oklahoma City forum* [ONLINE], available at: <https://www.tripadvisor.co.uk/ShowTopic-g51560-i521-k7010127-Tornado_Storm_Chasers_Which_company_to_go_with-Oklahoma_City_Oklahoma.html> (Accessed 14/03/2022).

⁶⁰ Scully, S M (2021): 'Lessons from a Storm Chaser on How to Stay Safe in Tornado Alley,' *The Weather Channel* [ONLINE], available at: <<https://weather.com/safety/tornado/news/2020-06-14-lessons-from-a-storm-chaser-on-how-to-stay-safe-in-tornado-alley>> (Accessed 14/03/2022).

⁶¹ Henderson, J (2013): 'What We Chase,' *The American Scholar*, Volume 82, Issue 4, pp.18-25.

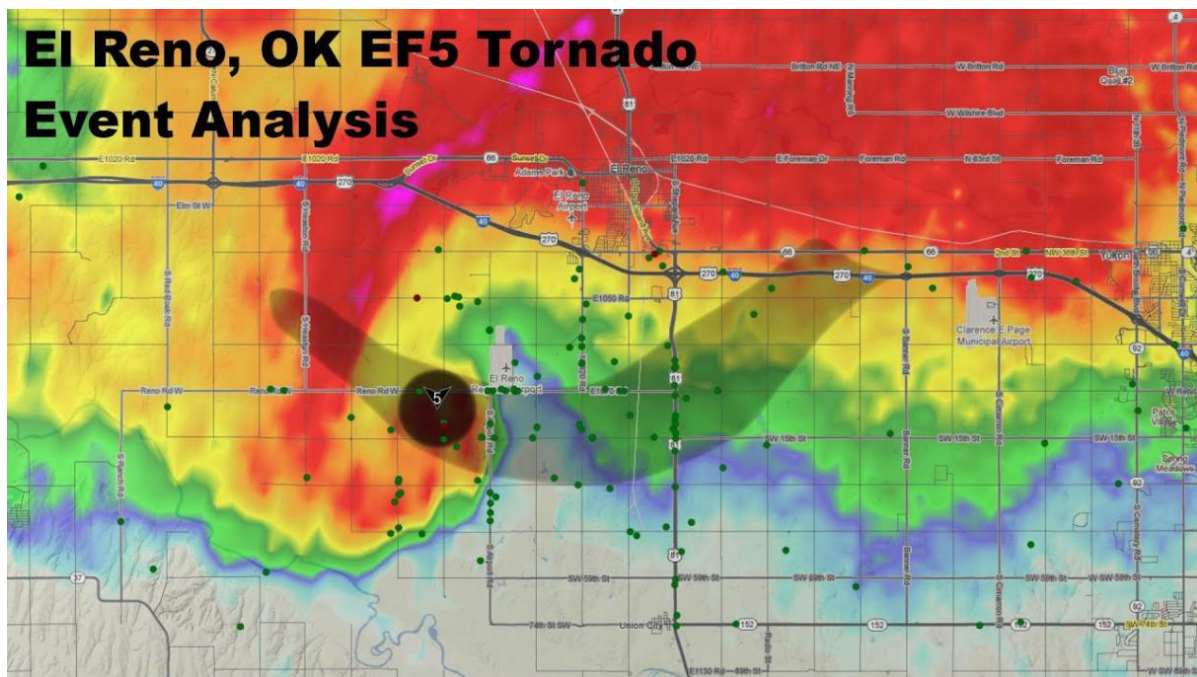


Figure 15 The El Reno tornado's damage path. At its widest it was 2.6 miles wide; the widest tornado on record. The green dots represent storm chasers moving around as they chased the tornado. The total number of storm chasers were not represented in this way and so there were more chasing this storm than has been depicted here. The red dots represent chasers impacted by the tornado. Talbot, S (2013): 'El Reno Tornado Analysis: Understanding a Chase Tragedy,' *YouTube* [VIDEO], available at: <https://www.youtube.com/watch?v=jVTs55W3Iag> (Accessed 14/03/2022).

Due to Samaras' death, people began to realise that even professionals were not invincible. This brought conflicting thoughts into the chasing community, in that tornadoes were meant to be taken seriously yet chasing requires a degree of perspective on common sense. It highlighted that storm chasing as entertainment was not always appropriate, nevertheless, it also demonstrates that storm chasing, despite its risks and consequences, will always contain an element of entertainment and education simultaneously. Storm chaser Dan Robinson, who was also impacted by the El Reno tornado but managed to escape, stated that 'the rational thing to do is learn from the tragedies so as to continue to enjoy the activities with an even greater degree of safety.'⁶² Furthermore, educating the public about tornado safety further enhances their ability to stay safe in severe weather episodes, which is especially important in tornado-prone locations in Tornado Alley. The incident also generated opinions on storm chasing as a recreational activity, though many existing chasers do so for recreational purposes. There have been conflicting opinions relating to weather tourism and how this impacts storm chasers, such as increased traffic, creating a casual dimension to storm chasing which counteracts the work of serious storm chasers, and making the activity

⁶² Robinson, D (2013): 'El Reno Tornado Incident Q&A,' *Storm Highway* [BLOG], available at: <https://stormhighway.com/blog2013/sept2713a.php> (Accessed 14/03/2022).

more dangerous overall by increased drivers on the roads in adverse conditions while the tornado was passing over vehicles.⁶³ It signifies that people should become more informed about tornadoes before pursuing them, although the El Reno tornado behaved atypically. Although many videos of this tornado event have been uploaded to YouTube, documenting this tornado can be considered an act of science rather than for entertainment due to its record-breaking nature. Not only was this tornado the widest on record, it changed direction, expanded in size, and increased its forward speed at the point when it killed TWISTEX.⁶⁴ The death of a popular and respected team was also a factor in lack of entertainment, because it was the first documented account of storm chasers being killed in the history of storm chasing itself.⁶⁵ It is difficult to find entertainment in such an unprecedented, unparalleled event. Despite TWISTEX's demise, the scientifically-minded chasers of today continue to research and collect data, ensuring that Samaras' legacy is not forgotten. Timmer continues to intercept and document tornadoes while providing online video forecasts/weather updates on his social media. Both chasers have influenced American storm chasing culture in their individual ways throughout their careers, and public perceptions of them have been conflicting at times, however their personal objectives have focused on public safety and enhanced warnings.

The emergence of newer generations of storm chasers introduces cultural changes, such as technological advancements used in modern chasing. This technology makes it easier than ever to capture the beauty of a storm while also demonstrating its power, as well as collecting data. This digital culture is helping storm chasing to evolve with the times, yet also helps to increase the amount of risk that people are willing to take; the more interaction on social media with exciting storm videos, for example, the more viewers will be impressed by the action. Though Timmer and Samaras have been involved in storm chasing roles on TV for entertainment purposes, and their work has featured much risk, their approaches to storm chasing are unique and their research has been valuable in studying the most violent storms on Earth.

⁶³ Kappell, J (2013): 'Storm chasing has gotten out of hand!', WDRB Weather Blogs [ONLINE], available at: <https://fox41blogs.typepad.com/wdrb_weather/2013/06/storm-chasing-has-gotten-out-of-hand.html> (Accessed 14/03/2022).

⁶⁴ Wurman, J; Kosiba, K, *et al* (2014): 'The Role of Multiple-Vortex Tornado Structure in Causing Storm Researcher Fatalities,' *Bulletin of the American Meteorological Society*, Vol.95, Issue 1, pp.31-45.

⁶⁵ Seimon, A; Allen, J T, *et al* (2016): 'Crowdsourcing the El Reno Tornado: A New Approach for Collation and Display of Storm Chaser Imagery for Scientific Applications,' *Bulletin of the American Meteorological Society*, Vol. 97, Issue 11, pp.2069-2084.

Chapter 3: Storm-chasing in popular culture - *Night of the Twisters, Into the Storm, and Twister*

This chapter explores how movie representations of tornadoes have contributed towards the rise in American storm chasing. The three films studied provide an insight into how storm chasing is depicted, how the entertainment value of the films encourages amateur storm chasing, and how the risks of doing so are escalated due to the influence on adrenaline-fuelled cinematic action. *Twister* (1996; dir. Jan de Bont), *Night of the Twisters* (1996; dir. Timothy Bond) and *Into the Storm* (2014; dir. Steven Quale) all explore resilience in the face of extreme circumstances, and how this impacts on the determination to continue studying severe weather. Persistence in studying tornadoes is necessary in order to understand them better in regards to public safety and knowledge. If this can be achieved, tornado-prone regions will be able to prepare better further in advance and understand the best course of action long-term. Despite this, as seen with Timmer and Samaras in *Storm Chasers*, the danger of storm chasing is dramatised within cinematic representations, creating the conflict between reality and fiction, and science and adventure. The disaster genre is intriguing in that it has a particular morbid appeal, and it is fascinating because of the genre's preoccupation with humanity's quest to overcome something bigger than it. Author Stephen Keane explores this theme in his book, *Disaster Movies: The Cinema of Catastrophe*. He suggests that 'they are said to be borne out of times of crisis... most of all disaster movies provide for solutions in the form of a representative group of characters making their way towards survival.'¹

This theme will be researched in this chapter for all three films. The fight for survival in tornado outbreaks directly reflects Keane's observations; in *Twister* there exists a particular need for the storm chasers to study tornadoes directly via a probe, which will enhance the tornado warning times and help the community before it is too late. In *Night of the Twisters*, a more community-centre film, it focuses on citizens' resilience and tenacity in the midst of tornado chaos, and in *Into The Storm*, an atypical storm system threatens the lives of community and storm chasers alike, with the main storm chaser giving his life in order to save others. The films thus play into the archetypes of the disaster film genre by their representations of the disaster paradigm.

¹ Keane, S (2006): *Disaster Movies: The Cinema of Catastrophe*, 2nd edition, Wallflower Press, London, pp.5-6.

Twister

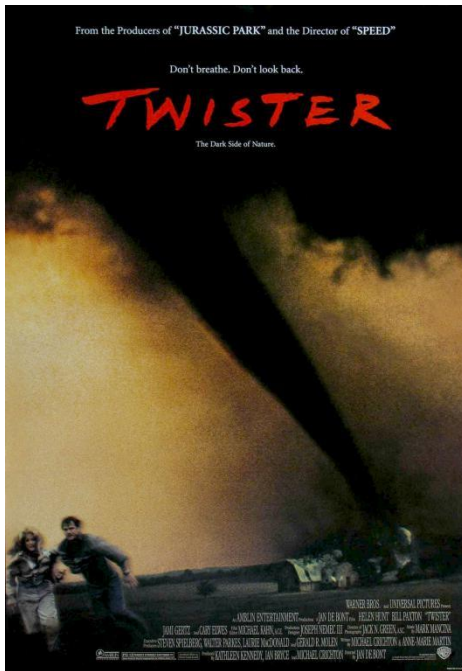


Figure 16

Twister was released in 1996, when storm chasing was not as prominent in American society. *Twister* has widely been credited with bringing storm chasing to mainstream attention and even with precipitating the explosion of storm chasing as a hobby; according to *National Geographic*, storm chasing has increased in popularity since *Twister* was released, and it has in fact become a ‘phenomenon.’² The BBC also stated that the number of US meteorology graduates increased 47% after *Twister* was released.³ In 1996, disaster films, such as *Independence Day* (dir. Roland Emmerich), *Outbreak* (dir. Wolfgang Petersen), and *Daylight* (dir. Rob Cohen) were becoming more prominent due to a growing concern about the environment, and also their relevance to human vulnerability and nature.⁴ As time progressed, social media and the internet paved the way for storm chasing to become further mainstream, in the form of video-sharing websites such as Timmer’s Tornadovideos.net. This, along with *Twister*, opened up storm chasing to the public as adventurous, exciting and daring. Although *Twister* is not scientifically accurate (and does not claim to be) in terms of tornado behaviour, scientists’ behaviour towards them, and the behaviour of severe weather preceding and during a tornado, it does portray tornadoes as a weather phenomenon to be conquered. Timmer states in his book that ‘*Twister*... has made tornadoes destructive’ and that it ‘romanticised weather in general and storm chasing in particular.’⁵ This suggests that *Twister* focuses on the powerful, dangerous aspect of nature which transcends human capability. Chaffin Mitchell, writing for AccuWeather, offers the view that

² *National Geographic* (2003): ‘Chasing Tornadoes,’ *National Geographic* [ONLINE], available at: <<https://www.nationalgeographic.com/environment/article/chasing-tornadoes>> (Accessed 07/04/2022).

³ Hughes, R; Luckhurst, T (2019): ‘Tornado chasers face storm as lawsuit hits close to home,’ *BBC News* [ONLINE], available at: <<https://www.bbc.co.uk/news/world-us-canada-47720417>> (Accessed 07/04/2022).

⁴ Kakoudaki, D (2011): ‘Representing politics in disaster films,’ *International Journal of Media and Cultural Politics*, Vol. 7, pp.349-356.

⁵ Timmer, R (2010): *Into The Storm*, 2nd edition, New American Library, New York, USA, p. 12.

Twister sparked many people's curiosity around storm chasing and meteorology when it arrived in theaters. And it also borrowed inspiration from methods meteorologists used in the 1970s for one of its main characters, a technology that never really took off... but is described by real-life storm chasers today as having been ahead of its time.⁶

Mitchell is talking about TOTO, the Totable Tornado Observatory. According to the National Oceanic and Atmospheric Administration (NOAA), its name was inspired by Dorothy's dog in *The Wizard of Oz*, which parallels the name of the *Dorothy* probe in *Twister*.⁷ NOAA also mentions that, although TOTO was retired in 1987, it inspired two screenwriters named Ann Marie Martin and Michael Crichton (who wrote *Jurassic Park*, another movie depicting man against nature) to produce a story which eventually became the film. Although this aspect of the film was based on reality, many parts were sensationalised and contained fictional representations of storm chasing, despite its popularity.

The film's opening scene is of an ominous sky turning darker with an eerie energy, immediately creating an atmosphere of tension and trepidation. By doing this, *Twister* already maintains the viewers' interest and fascinates them with the uncontrollable tornado. The film's advertisement and cover photograph (*Figure 16*) depicts a dark, fast-paced scene where two storm chasers are running from a destructive tornado. The contrast between violent nature and the vulnerability of humans on this image is stark, creating an idea of a fight for survival. This includes the tagline, which declares, 'The dark side of nature.' It suggests that the storm chasers are going to 'war' with a malign force which is more powerful and overwhelming, yet can be defeated with repeated attempts to understand and therefore almost subjugate it. *Twister* includes this hypothesis by following the storm chasers as they repeatedly attempt to gather data despite difficult circumstances. This is evident throughout all three films, which will be discussed in this chapter. Nature is represented as a strong, ominous force which cannot be controlled but can be studied, and reveals that the tornadoes are actually the central protagonists in the film due to their overpowering, dominating presence. They continue to thwart the teams' efforts by causing damage, creating blocks in

⁶ Mitchell, C (2021): '55- gallon drum inspired 'character' in one of all-time great weather movies,' *Accuweather* [ONLINE], available at: <<https://www.accuweather.com/en/severe-weather/twister-25-years-toto-inspired-dorothy/945075>> (Accessed 04/04/2022).

⁷ NOAA (2016): 'NOAA tornado scientists inspired 'Twister' creators 20 years ago,' *National Oceanic and Atmospheric Administration* [ONLINE], available at: <<https://www.noaa.gov/stories/noaa-tornado-scientists-inspired-twister-creators-20-years-ago>> (Accessed 04/04/2022).

the road, catching up with the Harding team while they hide under a wooden platform, and appearing as unyielding for scientific investigation. The teams' roles are dependent on the appearance of the tornadoes, and therefore the tornadoes distinguish themselves as integral characters with an unpredictable, remorseless aura. Editors Christof Mauch and Christian Pfister write in their book, *Natural Disasters, Cultural Responses*, that *Twister* portrays the relationship between man and nature and their interactions, and that the film is based on peoples' 'fantasies and fears that are bound up with natural disasters.'⁸ In other words, *Twister* enhances how tornadoes and storm chasing appeal to the imagination and peoples' perceptions.

The film itself depicts two teams of storm chasers, one concentrating on scientific research and the other being influenced by corporate monetary gains. A competition exists between the teams regarding tornado probes, whereby both teams aspire to deploy theirs before the other so that they can obtain valuable information. Their objectives differ; while Bill and Jo Harding's team (Bill Paxton and Helen Hunt) seek to gather scientific data with their probe *Dorothy* to better understand tornadoes and improve warning times, Jonas Miller (Cary Elwes) and his team are focused on being the first to deploy their probe, named *Dot.3* and very similar to *Dorothy*, for money. Miller's team is funded by a company, whereas the Harding team is self-funded. Bill mentions that Miller is 'only in it for the money, not the science... but he has no instincts.' This strongly insinuates that instinct is a fundamental necessity in storm chasing, and that without it there is no success. The competition between the teams also implies a conflict between the advancement of science, American competitiveness, and the capitalist agenda of society. It could metaphorically represent society in that positive research is always overshadowed by the struggle to find reliable (and ethical) funding, and that capitalism is the biggest danger- bigger than humans themselves. In addition, this hypothesis involves the danger aspect and relates to the adrenaline of pursuing money in a capitalist society. This has contributed towards the rise of storm chasing itself, in that many chasers have undertaken the activity as a paying career rather than a hobby, turning a recreational activity into a sustainable life path. *Twister* depicts this through its representations of competition, the race to achieve scientific breakthroughs first, and the requirement of funding for the Harding team to continue their research. Success in storm chasing, regarding the deployment of scientific instruments, is also not successful, as is seen

⁸ Mauch, C; Pfister, C (2009): *Natural Disasters, Cultural Responses: Case Studies Toward a Global Environmental History*, Lexington Books, Maryland, USA, pp.1-2.

in *Twister* several times before the end. The fact that the self-funded team manage to succeed is interesting, as it supports the point earlier in this chapter regarding instinct vs money. In the context of storm chasing in the film, Miller's repeated failures at deploying his probe represents a corporate team being unsuccessful, and reflects how passion supersedes money in success; a nod to the equality of opportunity aspect of the American Dream.

While *Twister* has encouraged this popularity in storm chasing for science, it has also paved the way for adventure-seeking, as demonstrated by the up-tempo music by composers such as Mark Mancina, who produces scores. His score *The Sky* is played alongside the scene where Bill is assessing the sky and saying 'We're going green.' It creates the feeling of ominous anticipation and builds tension with the audience. This provides the viewer with a thrilling perspective and inspires people to want to pursue storms themselves. The cheering and laughing of the Harding team, such as when they are travelling to a storm and driving down a long road while music plays loudly, shows a contrast between the seriousness of their work and the 'thrill of the hunt', as Miller describes his job. The music in certain parts is diegetic, meaning that the music is relevant to the accompanying scene. One example in *Twister* is when the Harding team is en route to their target area and the score *Into The Storm* by Mancina is playing. Another example is when they are on their way to another storm and the song "Oklahoma" by Roger and Hammerstein in their musical of the same name, is playing, with the lyrics 'when the winds come sweeping down the plain.' This reflects their location, the openness of American landscape, and also the indication of stormy weather to come – and suggests that the team revel in hunting storms across the vastness and dangers of the American Midwest.

Bill is also known as 'The Extreme' by his colleagues, reflecting Timmer's own nickname in reality as an 'extreme' meteorologist. In addition, films like *Twister* portrayed danger as 'fun', as described by Dusty (Philip Seymour Hoffman) when he declares to Melissa (Jami Gertz) that 'this is the fun part, sweetheart.' Author Tom Shone wrote a very similar view in his book, *Blockbuster*, about how films such as *Twister* present storm chasing as fun and 'an ambassador for the audience's sense of excitement.'⁹ This enhances the viewers' interest in storm chasing by interpreting it as amusement, which further increases the risks. Niles Goldstein, author of the book *Eight Questions of Faith*, remarks that

⁹ Shone, T (2004): *Blockbuster: How Hollywood Learned to Stop Worrying and Love the Summer*, Free Press, New York, pp.244-245.

it was [*Twister*] that brought storm chasers into the view of popular culture for the first time. How did the movie portray them? As scientists and nerds, eccentrics and thrill seekers. Who, other than an outlier or a madman, would want to aggressively pursue unpredictable forces of nature..?¹⁰

The ongoing safety issues continue in the film, however, when the two chasers find themselves on a road with trees and power lines either side; this would be considered extremely dangerous by real storm chasers and would not be attempted. This is because tornadoes are difficult to access when a treeline is blocking the view, and chasers can become killed or injured by an unseen approaching tornado and flying debris. Power lines are also avoided due to the risk of electrocution if they collapse. In reality, experienced storm chasers and those who take the activity seriously create escape routes, in the event of an unpredictable situation such as the tornado changing directions towards them. In *Twister*, this is not observed and instead Bill and Jo take huge risks. For example, they go into a field with a large, powerful tornado in order to deploy *Dorothy*, however this would not be possible in reality due to a large tornado's surrounding circulation, flying debris, and inflow. They also hide in a barn and tie themselves onto pipes with belts while the tornado moves over them. Storm chasers would not take this type of risk reality due to the intense pressure drop in a tornado, flying debris, and high winds; ultimately people in those conditions would likely be killed. Finally, in the film, the Harding team drives directly through rain and hail- the area known as the 'Bear's cage'- to reach a tornado, something which is highly discouraged in reality due to the fact that tornadoes often hide behind high precipitation cores.

The thrill-seeking agenda of the film and its extraordinary depiction of American storm chasing is reflected in the risky behaviours undertaken by its characters, which directly contravene many of the established norms of storm chasing as a serious, scientific occupation. This is echoed in scenes such as when Bill and Jo drive into a rut at the edge of a field to directly intercept a tornado. This is despite the fact that the producers of *Twister* consulted with the NOAA National Severe Storms Laboratory to make it as realistic as possible.¹¹ The lack of realistic tornado representation in *Twister*, on the other hand, counteracts these efforts and forfeits accuracy for entertainment: ironic, considering that

¹⁰ Goldstein, N E (2015): *Eight Questions of Faith: Biblical Challenges That Guide and Ground Our Lives*, University of Nebraska Press, Nebraska, Chapter 5, 'A Definition of Madness,' pp.87-109.

¹¹ NOAA (2016): 'NOAA tornado scientists inspired 'Twister' creators 20 years ago,' *National Oceanic and Atmospheric Administration* [ONLINE], available at: <<https://www.noaa.gov/stories/noaa-tornado-scientists-inspired-twister-creators-20-years-ago>> (Accessed 07/04/2022).

many people were influenced to storm chase after its release. Therefore, the film itself seemed to aim towards those who had little knowledge of storm chasing and were encouraged to view the activity as venturesome. As it is an American film, it is aimed at members of the American public who seek to find adventure, and internationally could have also encouraged people to travel to the US for storms there. Relating to this is the depiction of the American landscape as a colossal, rugged expanse full of ominous possibilities as well as beauty. This contributes towards people discovering the awe and majesty of America.

As will be discussed in Chapter 4, the advent of social media has added to this by providing a plethora of videos/live streams, or storm chaser updates regularly. With storm chasers documenting their trips across states and whether their chases are a success or a ‘bust’ (unsuccessful), regular people are given an insight into what storm chasing actually is and how it works. What both the film and reality do not show are the disadvantages, such as travel time, travel cost, motel costs, bad food while travelling, long waits, and non-events when storms fail to produce tornadoes. *The Movie Scene* has reviewed *Twister* as ‘an enjoyable action movie which relies on its special effects and scenes of frantic activity to keep you entertained’ and that ‘the action is visually impressive and the CGI creation of storms, tornados and twisters is enjoyable. It is the visual impressiveness of “Twister” which draws you into the movie and keeps you watching.’¹² In *Twister*’s release year, 1996, the *New York Times* mentioned that: ‘Somehow "Twister" stays as uptempo and exuberant as a roller-coaster ride, neatly avoiding the idea of real danger. The idea that tornadoes actually cause death and destruction is invoked only selectively...’¹³ This reinforces the point made earlier concerning the film, that it was created for an audience less knowledgeable of the true dangers bound up in storm chasing.

These situations are created in *Twister* for adventure, influencing the viewer’s opinions on risks and tornadoes themselves. By creating these action-packed situations, it has cultivated a view that storm chasing is exciting and extremely risky, which has encouraged regular, inexperienced people to storm chase over time. In reality, professionals have expressed mixed views about *Twister*. A geographer named William Monfredo proposes that ‘Misrepresentations and unsafe field practices resonated deeply... Unlike movies, the mantra

¹² *The Movie Scene* (2022): ‘Twister (1996): Paxton on a Tornado Hunt,’ *The Movie Scene* [ONLINE], available at: <<https://www.themoviescene.co.uk/reviews/twister/twister.html>> (Accessed 03/04/2022).

¹³ Maslin, J (1996): ‘FILM REVIEW; Dorothy and Toto Had It Easier,’ *The New York Times* [ONLINE], available at: <<https://www.nytimes.com/1996/05/10/movies/film-review-dorothy-and-toto-had-it-easier.html>> (Accessed 07/04/2022).

for... chasing should be 'safety first.'¹⁴ His opinion supports the earlier point regarding the unrealistic lack of safety considerations in the film, compared to reality where most tornado chasers have escape plans and rules. Such interpretations link to how the film and similar disaster movies relate to how people want to view something, in this instance, the exhilaration of storm chasing adrenaline in Tornado Alley. In this way, *Twister* has encouraged a rise in storm chasing due to its focus on exciting action, which appeals to those looking for adventure.

David Robertson maintains a similar viewpoint, stating that films like *Twister* 'tend to sensationalise the activity' and that 'storm chasing... is growing in popularity as a recreational pursuit.'¹⁵ He adds that much of this attention to storm chasing can be attributed to *Twister*. As discussed in this chapter, cinematic representations such as these have created issues for storm chasers, such as increased traffic, people not knowing what they are doing, dangerous intercepts by adventure seekers, and a rise in amateurism. The risky nature of the Harding team is reminiscent of Timmer's reputation in storm chasing, in that he is undaunted by taking chances that others would not consider. Also, some parallels exist with Bill and Samaras, with the determination to deploy the probe successfully against the odds. Both Samaras and Timmer, as described in Chapter 3, represent the intense, dangerous world of tornado hunting in America, and their tenacious attitudes are similar to those of Bill and Jo. The Royal Meteorological Society says that the film 'promoted massive interest in storm chasing' but acknowledges that it represents a 'distorted' version of the activity.¹⁶ Otherwise, within the chasing community, Roger Edwards and Tim Vasquez noted that *Twister* represents an 'outrageous fantasy,' because the storm chasers in the film were stereotypically thrill-seeking and daring, which is not the case for many chasers in reality.¹⁷

Testament to the film's popularity as an adventure/disaster film is its continuing cultural legacy. While storm chasers have an ambivalent relationship with the film, it continues to have a dedicated fanbase within and beyond storm chasing circles. As a result of its popularity, a museum dedicated to *Twister* exists in Wakita, Oklahoma, the city in which

¹⁴ Monfredo, W (2010): 'Twisted Film, or: How I Learned to Stop the Movie and Teach the Truth,' *Journal of Geography*, Vol. 109, Issue 3, abstract.

¹⁵ Robertson, D (1999): 'Beyond *Twister*: A Geography of Recreational Storm Chasing on the Southern Plains,' *Geographical Review*, Vol. 89, Issue 4, abstract.

¹⁶ Czuchnicki, C (2018): 'A History of Storm Chasing,' *Met Matters*, *Royal Meteorological Society* [ONLINE], available at: <www.rmets.org/metmatters/history-storm-chasing> (Accessed 05/04/2022).

¹⁷ Edwards, R; Vasquez, T (2000): 'The Online Storm Chasing FAQ,' *Storm Track* [ONLINE], available at: <<https://stormtrack.org/library/faq/>> (Accessed 05/04/2022).

the film is primarily based. It also has its own Facebook page.¹⁸ The *Twister* Movie Museum includes props that were used, such as one of the *Dorothy* probes and *Dot.3*, a *Twister* pin-ball machine, and much merchandise. Some storm chase tours take their guests to the museum if they are travelling close by, and so the film has created an ongoing commercial industry. Moreover, 27 years after the release of the film, merchandise- such as a signed screenplay script, shirts, posters and pin badges, is still widely available on the internet. In fact, when the male protagonist Bill Paxton died in 2017, storm chasers used the Spotter Network's GPS to coordinate chasers and spell out Paxton's initials on the map, as seen with *Figure 17*. He also has a tribute page on Facebook.

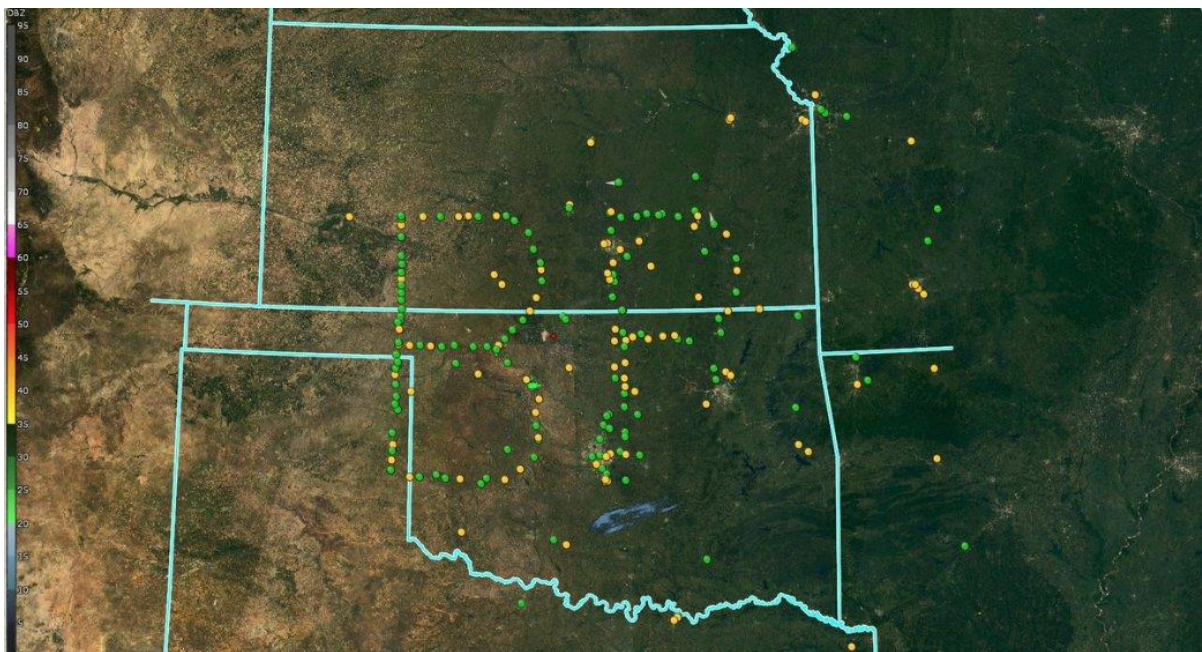


Figure 17 Image obtained via <https://twitter.com/variety/status/835958910540378112> on 05/04/2022.

This is despite Paxton not actually being a storm chaser in reality, and hints at the impact that *Twister* has had on the community. This shows that *Twister* had more than just an influence on career trajectories and hobbies; it also affected storm chasers' perceptions of fictional counterparts. Paxton's character Bill embodies the "right" sort of storm chaser - more specifically his qualities, such as being passionate, knowledgeable, persistent, risky, yet respectful of the tornado's power.

¹⁸ Twister The Movie Museum (2022), 'Twister The Movie Museum' [Facebook], available at: https://www.facebook.com/twisterthemoviemuseum/about/?ref=page_internal (Accessed 05/04/2022).

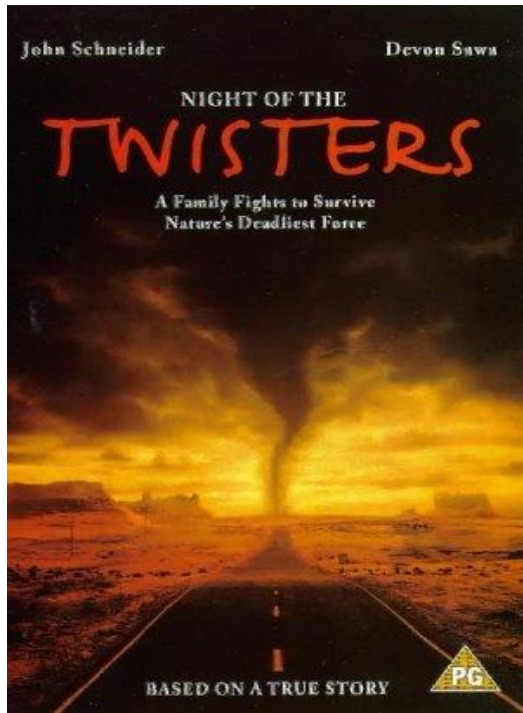


Figure 18

Night of the Twisters

Night of the Twisters, a low-budget disaster/adventure film, was also released in 1996, and is loosely based on a true event. According to the fictional book based on real events, the tornado outbreak in Long Island, Nebraska on the 3rd June 1980 included seven tornadoes, which injured over 130 people and killed five others.¹⁹ It is evident that the film's cover photograph (Figure 18) is very similar to that of *Twister*'s in colours, composition and drama (both films were released in 1996 so this and other similarities may not be a coincidence).

In this case, however, there is a road leading to the tornado, which suggests either an escape route or a willingness to face nature's destruction in order to survive. The film's alternative cover (Figure 19) is extremely similar

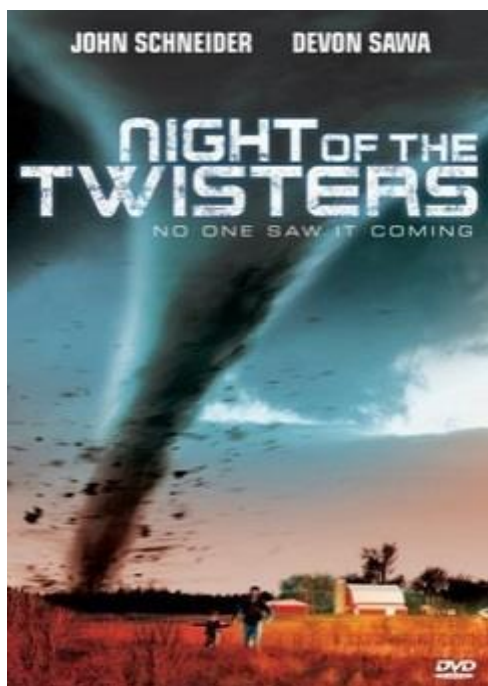


Figure 19

to that of *Into The Storm*. It focuses on the destructive nature of tornadoes and also contains people running, echoing *Twister*'s film cover. As discussed in the *Twister* section, the tornado presents itself in these films as the antagonist, emphasised further by the placement of the tornado on the photo. The people running are small, rather insignificant additions, proving that the tornado is an adversary that requires defeating. It suggests that all three films contain an element of nature vs humans, focusing on American vulnerability when attempting to survive against colossal power. Within the film itself, two teenage boys fight for survival during a night of repeated tornado activity. It begins with a similar

introduction to *Twister*, though in this case it involves a rural family in Grand Island,

¹⁹ Ruckman I (2003): *Night of the Twisters*, Harper Collins, reprint edition.

Nebraska, in the afternoon, and a meteorologist named Bob (David Ferry) who warns them of an oncoming tornado. The family retreats into their storm shelter as the family did in *Twister*, while Bob is relieved that they have managed to reach safety. Throughout the film, Bob is the meteorological hero, sharing important information with the main character Dan (Devon Sawa)'s mother and also sharing weather information via a news channel inside a shelter later in the film.

His role is of both science (collecting data) and humanitarianism (helping those affected, sharing information when required, being able to take charge in severe weather). His evaluation of the storm system central to the film is also scientific; he shares that there are 'rogue weather patterns' and that the storms are not behaving typically regarding usual storm movement and genesis. Due to the unprecedented nature of the storms, the film represents the terror of the real life event, providing a viewpoint into how lives are impacted by tornadoes each year. The civilian aspect of tornado impact can also be seen in *Twister* with Bill's girlfriend Melissa, who is horrified by Bill's tornado chasing actions. As with Bill Harding's team in *Twister*, Bob relies on his instincts while documenting the severe weather, and although he trusts data, he disagrees with his superior meteorologist about the weather's behaviour because he is out in the field studying it, rather than working from a laboratory like his colleague.

The Hatch family, comprising of Laura (Lori Hallier; Dan's mother), Dan's stepfather Jack (John Schneider), Dan, and his baby brother Ryan (Alex and Thomas Lastewka), also live in Grand Island. While not a central part to the story, Dan and his friend Arthur (Amos Crawley) are seen before the storms begin, playing with a Native American object called a Bull Roarer, used to predict rain. Its distinctive sound is identical to the sound of an approaching tornado later (the fact that, in reality, tornadoes sound nothing like this is neither here nor there). Dan's attitude at the beginning is almost blasé in that he says, 'Just because you know something's going to happen, doesn't mean you can prevent it from happening.' It almost provides a fatalistic perspective for Dan Hatch, as though he is prepared to accept that nature is the dominant entity and he is powerless. Despite this, he is shown to prepare for severe weather when necessary, showing a resilience which is obvious with Americans living in Tornado Alley in reality. Although this film does not depict any storm chasing, it does echo *Twister* in terms of unpredictability and human vulnerability, contrasting with Dan's persistence in overcoming obstacles.

Much like, and perhaps even more so than *Twister*, *Night of the Twisters* is unrealistic from a scientific point of view. These cinematic choices have been made to cultivate anticipation in the viewers, as though waiting for the danger and disaster. The lack of realism also relates to the family-orientated nature of the film, aimed at non-scientific audiences. The small errors are linked to public beliefs at the time. For example, it was common practice in the 1990s to open all windows of the house to equalise pressure and prevent extensive damage, which is shown in the film. However, later studies proved that it is actually not necessary; both internal and external pressure differences were not large enough to cause any significant problems, and it would actually exacerbate any issues by letting wind and debris blow into the house. In addition, the Hatch family, Bob and Laura's sister Jenny (Jhene Erwin) hide under an overpass while a tornado passes over them. This is highly discouraged by storm chasers and meteorologists, as the space under the bridge can act as a wind tunnel and cause further damage/injuries/death. Later in the film, Bob is seen discussing the dangers of driving in vehicles during a tornado, stating that most tornado fatalities involve people driving during a tornadic event. However, he has no option but to drive to find shelter with the Hatch family later because their house has been destroyed, which he is reluctant about. Vehicles are considered to be the most unsafe form of shelter in these events, despite the fact that storm chasers themselves drive to tornadoes and chase them. During tornado outbreaks, people attempt to flee in their vehicles and cause traffic congestion, sometimes in the path of the tornado. Between 1900 and 1998, it was recorded that out of 15,047 tornado-related deaths, 270 were confirmed to have occurred while the people were in vehicles.²⁰ Interestingly, the number of in-vehicle tornado deaths fell from 17% in the 1970s, with the number being 10% in the 1990s.²¹ This was most likely due to increased education relating to tornado safety. The film supports this theory, with Bob's insistence on finding shelter in buildings rather than vehicles, and his notifying others of the dangers of driving when tornadoes are occurring.

Night of the Twisters focuses more on the effects of severe weather on the community, rather than documenting a storm chase team's adventures like *Twister* and *Into the Storm*. It also focuses more on perseverance in the form of assisting others, helping to arrange medical treatment, and helping each other to shelter. In this sense it is more 'real',

²⁰ Hammer, B O; Schmidlin, T W (2000): 'Vehicle-occupant deaths caused by tornadoes in the United States, 1900-1998,' *Global Environmental Change Part B Environmental Hazards*, Vol.2, Issue 3, abstract, pp.105-118.

²¹ Schmidlin, T W; Hammer, B; Ono, Y; King, P S; Miller, L S; Thumann, G (2002): 'Reply,' *Bulletin of the American Meteorological Society*, Vol.83, No.12, pp.1837-1838.

because it represents how it feels to be affected by tornadoes instead of experiencing the thrill of chasing them. *TV Guide* offered the opinion that ‘the film works at creating a portrait of ordinary people, rather than Hollywood stars, caught in a crisis situation.’²² This film contrast provides a wider perspective and shows that there are two different approaches to severe weather. Although Bob’s role is to study tornadoes as an employee of the Kansas State Tornado Center, the film’s main focus is on severe storms’ impact on regular people. While the adrenaline factor still exists, there is much less excitement and more vulnerability. It is also more about becoming a strong community while experiencing adversity, providing a more central view on living with tornadoes in the US. The strength through adversity corresponds to the classic American narrative of being resilient when enduring troubled times, which is indicated throughout their Declaration of Independence regarding their fight for freedom from previous oppression. For example, it is stated that ‘all experience hath shewn, that mankind are more disposed to suffer, while evils are sufferable, than to right themselves.’²³ Despite this, the films depict an American spirit inclined to overcome obstacles and be dominant in their approach to difficulties

In this sense, it is evident that Tornado Alley residents, while still maintaining awareness of tornado significance regarding human vulnerability, have become more resigned to them. From a socio-cultural perspective, society has learned to adapt to climatological dangers through technology development, education about severe weather hazards, and knowledge of safety procedures during a tornado outbreak.²⁴ According to researcher Ashley Allen in 2020, ‘residents of states such as Oklahoma develop distinctive sociocultural relationships to extreme weather... as it relates to residents’ relationships with risk... Facing these risks is seen as a practice in endurance that many... believe they were built to face.’²⁵ This is seen in *Night of the Twisters* in Dan’s persistence to overcome the circumstances, and also the community’s resilience when faced with multiple tornadoes. For example, people help each other to safety and they reassure each other, while Dan and his family relentlessly search for each other despite ongoing tornado activity. The endurance

²² *TV Guide* (1996): ‘The Night of the Twisters Review,’ *TV Guide* [ONLINE], available at: <<https://www.tvguide.com/movies/the-night-of-the-twisters/review/2000124401/>> (Accessed 07/04/2022).

²³ United States Government, *Declaration of Independence: A Transcription*, National Archives [ONLINE], available at: <<https://www.archives.gov/founding-docs/declaration-transcript>> (Accessed 11/05/2022).

²⁴ Donner, W R (2007): ‘The Political Ecology of Disaster: An Analysis of Factors Influencing U.S. Tornado Fatalities and Injuries, 1998-2000,’ *Demography*, Duke University Press, Vol.44, No.3, pp.669-670.

²⁵ Allen, A (2020): ‘Memory, risk, and regional identity: Assessing the socio-cultural impacts of tornadoes in Oklahoma, USA,’ *Sociology*, abstract.

aspect of citizens in the film is reminiscent of Tornado Alley residents in reality, who continue to live in tornado-prone areas and built shelters in lieu of relocating. This is also seen in *Into The Storm*, which will be discussed in the relevant section below.

Another socio-cultural phenomenon, seen in all three films, is that storm chasing is represented as a predominantly white male endeavour, as discussed in Chapter 2 with Timmer and Samaras. Although there are female storm chasers in *Twister* and a female meteorologist in *Into The Storm*, there is only Bob in *Night of the Twisters*, and his superior in the meteorology laboratory is also a white man. The storm chaser magazine *Storm Track* discussed this lack of ethnic and gender diversity, with one storm chaser named Gabe Garfield saying, ‘I definitely believe a lot of it is related to culture... I think people go in the direction of location/culture/talent, with an emphasis on location. I imagine I wouldn't have wanted to become a meteorologist (I am myself a white/Latino mix) if I had not grown up in Oklahoma.’²⁶ On the same thread, Glen Romine suggests that ‘The field of Meteorology is dominated by male Caucasians, chasing even more so... It's pretty tough to find diverse role models in this field.’ This concept has not been explored in depth, yet it is interesting to note the lack of diversity in *Twister* and *Night of the Twisters* (*Into the Storm*, as will be discussed later, does include a higher ratio of gender and ethnic representations, relating to the more diversity-aware culture of recent times). Therefore, the lack of diversity in the film can be attributed to the socio-cultural conditions of the time, not storm chasing itself.

Critically, *Night of the Twisters* was received generally negatively. On *Rotten Tomatoes*, a popular review website, one user named Tim S opined that ‘... it's not entirely terrible... I know the movie was based on a book, but this was clearly rushed into production based on the success of the movie *Twister*.’²⁷ This is despite *Night of the Twisters* being released before *Twister* (February 1996 and July 1996 respectively). Its budget is unspecified but is significantly lower than *Twister*'s Hollywood budget of \$92 million. It was also made for a family TV channel in comparison with *Twister*'s blockbuster reception, and therefore the action scenes were family-appropriate and not over-distressing. *Night of the Twisters*' impact on storm chasing is not known, though

²⁶ Garfield, G (2005): ‘Where are the African/Asian chasers?’, *Storm Track* [ONLINE], available at: <<https://stormtrack.org/community/threads/where-are-the-african-asian-chasers.4084/>> (Accessed 08/04/2022).

²⁷ Tim S (2013): ‘Night of the Twisters review,’ *Rotten Tomatoes* [ONLINE], available at: <https://www.rottentomatoes.com/m/the_night_of_the_twisters/reviews?type=user&intcmp=rt-scorecard_audience-score-reviews> (Accessed 07/04/2022).

Timmer mentioned that he watched it as a child and it was his favourite film.²⁸ This suggests that it may have had an impact on Timmer's overall interest in storm chasing later. On the other hand, the impact of *Night of the Twisters* on storm chasing has been relatively non-existent, due to the success of *Twister* in 1996. In fact, reviewers have declared that it actually almost replicates *Twister* by stating that the film is 'a family-oriented *Twister* knockoff.'²⁹ Due to the more citizen-focused nature of the film and the lack of active storm chasing thrills, it was viewed as a more family-friendly disaster film, rather than an adventure-packed adrenaline rush. Conversely, the portrayal of the high-energy, man vs nature angle of *Twister* and *Into the Storm* has provided an exciting viewpoint of storm chasing. Thus, *Night of the Twisters* is not directly responsible for an increase in storm chasing, but the tornado disaster film genre has had a significant impact overall.

Into The Storm

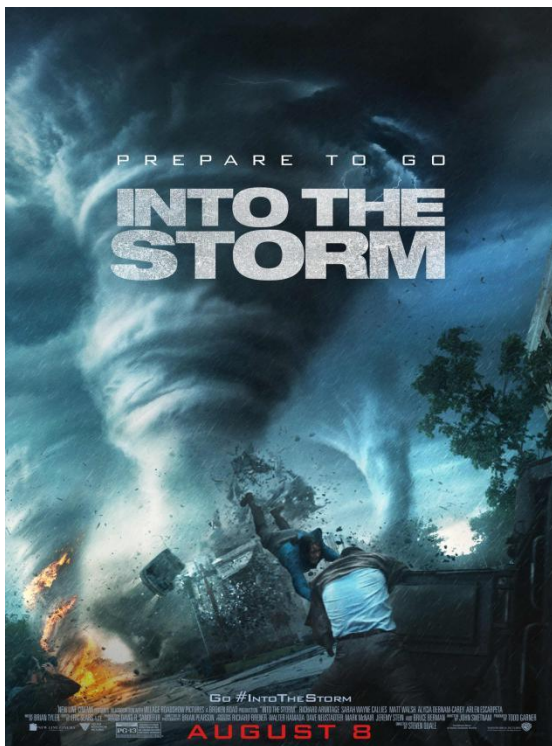


Figure 20

As a contrast with the previous two films, *Into The Storm* was released in 2014, when CGI technology and storm safety knowledge was much improved. The film has more similarities with *Twister* because it depicts a team of storm chasers, though in this case they are chasing storms for money and 'the ultimate shot' rather than science. They have employed a meteorologist to assist them in reaching the storms most likely to produce a tornado, however this is not always successful.

As the cover image shows, the tornado is again the central focus, though in this case there are multiple funnels and more destruction (Figure 20). The people on the image are again

to the side and being directly impacted, showing that nature is the stronger of the two sides.

²⁸ Timmer, R (2014): 'A Storm Chaser Fact-Checks a Disaster Blockbuster,' *Outside* [ONLINE], available at: <<https://www.outsideonline.com/culture/books-media/storm-chaser-fact-checks-disaster-blockbuster/>> (Accessed 08/04/2022).

²⁹ DeWerth, R, 'Night of the Twisters,' *Letterboxd* [ONLINE], available at: <<https://letterboxd.com/film/night-of-the-twisters/>> (Accessed 08/04/2022).

The image is very similar to that of another contemporaneous disaster film, *The Day After Tomorrow* (2012). This suggests that tornadoes are almost apocalyptic, that their representations in disaster films correlates to climate catastrophe. Since tornadoes are one of the most destructive weather phenomena on Earth relating to their damage per area, their appearance in weather disaster movies emphasises the devastating force of nature. In order to accentuate the catastrophic power of tornadoes, *Into The Storm* includes many of them so that their intensity can be appreciated in full force by the audience. While films such as these distort the scientific processes behind natural disasters, it is to build suspense and create a sense of foreboding.³⁰ In *Into the Storm* this occurs immensely within the plot; an unprecedented storm produces a record number of tornadoes simultaneously, and larger tornadoes hit big cities via a shift in climatological behaviour. This theme is similar to that of *Night of the Twisters* due to the nature of the unpredictable storm and its unexpected tornado numbers.

The plot of *Into The Storm* follows the following three scenarios: Professional US storm chasers who, despite having extensive knowledge are more interested in obtaining the best video rather than scientific data; a group of uneducated adrenaline junkies with no equipment and a battered vehicle, chasing tornadoes for social media popularity; and the community, represented by a high school on graduation day directly impacted by a strong tornado. While the official team pursues storms in an armoured vehicle named Titus, very similar to Timmer's Dominator and another armoured vehicle in reality named TIV (Tornado Intercept Vehicle), the unknowledgeable group of men continue to chase without an appropriate vehicle and with no meteorological standing. This in fact is comparable with reality, in that there is an abundance of unofficial storm chasers following storms in a competitive manner for videos. As mentioned previously in Chapter 3, this has been an issue for existing professionals, who have found that storm chaser traffic has increase significantly. In turn, it can present dangers to storm chasing with the rise in amateurism. *Into The Storm* glorifies this aspect of storm chasing by showing the amateur team's stupidity in a casual, foolhardy manner. In various scenes they are shown undertaking dangerous stunts, such as driving a quadbike over a flaming pool in a garden, or driving a battered old truck after the Titus to chase tornadoes due to the Titus' TV popularity. These videos are for social media to gain followers. Yet this team does not end up hurt, even at the end of the film when they are

³⁰ Perkowitz, S (2007): *Hollywood Science: Movies, Science, and the End of the World*, Columbia University Press, New York, Chapter 4, pp.89-90.

stuck upside down in a tree after being relocated by a tornado. Instead, they are shown laughing, joking and speaking about how their camera is still recording, thus still only caring about their internet fame. In contrast, one of the official chase team members is killed when a tornado is shrouded in fire, which presents the dangers that tornadoes can bring, but is also evocative of the real-life demise of the TWISTEX team. Although TWISTEX died in a different manner, the extraordinary nature of the storm coupled with the closeness of the team for research purposes, is similar to the situation in *Into The Storm* when a professional is killed yet amateur chasers are unharmed.

While this could seem like a sensationalist representation of the TWISTEX tragedy, it actually spotlights the unpredictable and ungovernable nature of tornadoes. In this way, without taking into account roles of the chasers and the unique situations, *Into The Storm* depicts the negative side of storm chasing, therefore creating a balanced viewpoint from both sides. Intriguingly, the leader of the storm chasing team, named Pete (Matt Walsh), insists his videos are used to save lives one day. He then dies in the tornado, having saved all other people sheltering in the storm drain. In this way, he has forfeited his narcissism for science and changes his storm chasing ambitions, and this further underpins the idea that both sides of the storm chasing field are represented in a comparative manner. Viewers can then observe the dangerous aspect of the activity and also the casual, careless attitude of some people while chasing.

Into The Storm also implies that the urge to obtain better and better footage transcends the fear factor, as though storm chasing is a competition rather than an important job. This tallies with the experience of storm chaser Jennifer Brindley, who mentioned that she ‘has to fight fear to get the shot’ but that ‘there’s a misconception... that chasers are adrenaline junkies.’³¹ The title of the film itself, in addition, suggests a confrontation, in that storm chasers are required to face the tornado rather than escape it, and also suggests that tornadoes can be ultimately harnessed by humans given the correct tools. This discrepancy between the film and reality illustrates how there are different opinions about storm chasing as a hobby, career, or sport. In the film, the better the footage, the more money could be earned by using platforms such as YouTube as a sharing medium. The amateur team in the film hope for fame as a result of their footage, while in *Titus*, there are cameras pointed in every direction to get the ‘ultimate’ shot of a tornado’s centre. The increase in technological

³¹ Jones, L (2016): ‘Capturing the Storm,’ *Creative Nonfiction*, no.58, p.39-46.

advancement in this century is a contributing factor, since the rise of YouTube, Facebook and other social media have made storm chasing not only more accessible, but also increase public interest. Yet, the better technology represented in *Into The Storm*, such as more sophisticated radar systems and weather update software, enables the scientists of the storm chasing environment to better study tornadoes for future prediction improvements. Even with the latest technology, tornadoes are still unpredictable, and the film excellently emphasises this with the defenceless protagonists and their fight to survive. As discussed, this is also apparent in the other two films, even though their technology was less advanced. It suggests an inability to overcome the power of nature. Further to this, the hazards the main team has to experience is another instance of nature's dominance. The team in *Titus* is regularly confronted by downed trees, debris, live electricity cables, and a water leak. As with *Twister*, escape routes are not planned and the storm chasers could easily become stuck in the path of an oncoming tornado. This shows that despite technological evolution and continued efforts to understand it better, nature is still superior, that it is more able to outwit storm chasers by its unpredictability, suggesting that nature itself is a sentient entity capable of cunning action.

Regarding the inaccuracies in *Into The Storm*, storm chasers themselves have asked on *Storm Track* whether they think the film will inspire new, reckless storm chasers. The general consensus was no, primarily based on the lack of realism, and the fact that contemporary weather knowledge is far greater than in the 1990s. One chaser, James Caruso, states that there is 'a lot more general awareness of storm chasing now... and the overall prevalence of social media...'³² Caruso also says that *Into The Storm* is 'not a faithful representation of chasing by any means' and provides an opinion on the absurdity of the survivors getting into buses to escape after the high school is damaged. As mentioned in the *Night of the Twisters* section, it is not advised to escape from tornadoes in vehicles due to the dangers involved, with flying debris and traffic congestion as examples. Another US storm chaser on the thread, Dave C, believed it would be a 'disaster movie, not a chase movie,' and so was not expecting any realism. Later, he says that the film will not 'add another swell to chaser ranks' due to its mediocre reflection of storm chasing. By this evaluation, due to the extensive knowledge of severe weather today that did not exist in the 1990s, new chasers being influenced by this film are not likely to emerge unless of a younger generation, since

³² Caruso, J (2014): 'Is anyone else worried that "Into The Storm" will once again breathe in a new era of young, reckless, idiotic chasers?' *Storm Track* [ONLINE], available at: <https://stormtrack.org/community/threads/into-the-storm-movie-was-is-anyone-else-worried-that.27646/page-2#post-322018> (Accessed 09/04/2022).

the film is more modern and includes social media, risk-taking for online credibility, and mobile phones. Natural disaster films, since they represent humanity's preoccupation with overcoming nature's fury, play a part in the appeal of risk and danger. This appeal has, as mentioned earlier, contributed to American storm chasing culture by encouraging people to pursue tornadoes, sometimes without relevant skills or experience. Their role in storm chasing itself, particularly *Twister*, has been to dramatise nature to extreme proportions, portraying it as an exciting and adrenaline-fuelled adventure.

Finally, severe weather films reflect the importance of keeping people informed about the danger involved. For example, in *Into The Storm*, the modern technology provides people with the opportunity to inform each other of imminent dangers, although there are limitations such as interrupted satellite signals for mobile phones. Social media, on the other hand, is an extremely efficient way of sharing information, not only for close-up videos such as those taken in *Into The Storm*, but also weather reports from professional meteorologists, news agencies, and storm chasers. Doing this presents the public with opportunities to seek shelter and protect themselves before the storm arrives. *Twister* does suggest a compatibility between risk and science, as shown when the team repeatedly risks their lives to deploy a probe in the tornado's path so that warning times can be improved. It also relates to the earlier point regarding heroism; their scientifically-driven work and also Harding's quest to get as close to a tornado as possible to avenge her father, speak to the heroism aspect of storm chasing. Both *Twister* and *Night of The Twisters* underscore human vulnerability and nature's overwhelming mightiness, encouraging the viewer to interpret tornadoes as uncontrollable forces worthy of daring scientific research.

In Chapter 4, this will be analysed to determine how social media in particular provides methods of communication to assist the general public with weather safety, storm chasers with educating others about tornadoes and severe storms, meteorologists with sharing severe weather information, and amateur weather enthusiasts/photographers/videographers with ways to share their videos and images. How social media affects storm chasing as an activity will also be explored, as well as what the possible outcomes for storm chasing will be in the future.

Chapter 4: How social media changed American storm chasing culture through the use of Facebook, Twitter, YouTube, and blogs, and how social media has influenced how storm chasing may change in the future

In addition to film representations of American storm chasing, social media exists as a relatively new worldwide communication medium, virtual communities which present storm chasers with a way to share their experiences. It represents a form of evolution in storm chasing, allowing storm chasers to describe and demonstrate their activities live. An interesting idea is that storm chasing is a quest for control; they are difficult to understand and therefore humans are wary of them, yet they are also captivated by them. This is represented in the form of photos and videos on social media platforms. This chapter explores the role of social media in the storm chasing arena, in particular Facebook, YouTube, Twitter, and blogs. The research includes sources from American social media accounts such as Live Storm Chasers, Reed Timmer, and Hank Schyma, to investigate their role as storm chasers online. Social media is used widely to convey much information, which has a place in the weather community as a method of communication and emphasising the positives and negatives of the activity. In addition, this chapter will research the future of storm chasing and how it will be impacted by contemporary American storm chasing culture. Although storm chasing is undertaken by hundreds of chasers each year, there are climatological implications which possibly create an even more dangerous characteristic to the activity.

Platforms such as YouTube and Facebook are efficient ways of sharing the latest information and ideas. In the US storm chasing community, social media represents a way through which to share important real-time weather updates during severe weather so that people can act accordingly. Firstly, climate change is occurring and the weather is affected. Tornado Alley itself seems to be relocating slightly, though this is debated and scientists argue that it is not based on conclusive data. Yet, journal article author Zuohao Cao *et al* opine that, based on their research, they have been able to ‘identify...tornado activity in the new Tornado Alley that were not identified previously.’¹ The authors note that ‘the spatial

¹ Cao, Z; Cai, H; Zhang, G J (2021): ‘Geographical Shift and Environment Change of U.S. Tornado Activities in a Warming Climate,’ *Atmosphere*, Vol. 12, no. 567, pp.1-17.

variability of tornado activities associated with large scale environment conditions remains highly uncertain,' meaning that it is not possible to currently associate tornado location variations with climate change. Despite this, events such as the 2013 El Reno tornado were once considered 1-in-100 year events; large tornadoes are happening more frequently and closer to urbanisation. With tornadoes being unpredictable under normal circumstances, it is possible that climate change will affect the frequency, dimensions and movement of tornadoes as time progresses. This means that social media is an important communication platform in order to fully inform people of possible meteorological anomalies in the future.

Moreover, social media provides the public a view of individual chasers not only as their professional personas, but also their private lives outside of their career. Not only do scientific teams create their own social media accounts, but there are people who create content for a particular channel, those who characterise themselves as professional or amateur storm chasers, and those who do not characterise themselves as storm chasers but capture footage of storms or weather events through amateur recordings from home. All of these people share their personal experiences on social media and it creates a larger perspective when trying to study American meteorological phenomena. These varying interpretations of storm chasing as an activity present a convoluted view of who can be classified as a storm chaser. For example, photographers who follow storms for artistic purposes relating to their work can be classified as storm chasers, despite the stereotype that storm chasers are intrinsically scientific. The sharing of photographs or information has complicated the role of storm chasing because with contemporary technology, anyone can follow storms and collect data.

Storm chasers can share their experiences via the use of multiple accounts, for example, a personal account vs a professional, written-for-public-perusal account. For the American storm chasing community, doing this ensures that storm chasers can keep their private lives separate from their more exposed life as public figures. Social media also presents a way through which storm chasers can emphasise the excitement and adventure that exists in their lives, as well as the wonder of nature, thrill of the chase, awe-inspiring videography and photography, and meteorological data-sharing. This culminates in a well-documented, public perspective of storm chasing culture in the US, although internet storm chasing culture is still a very select community which many people do not engage in. Despite this, the boundaries of storm chasing are becoming more open to regular people due to the aforementioned modern technological availabilities.

The suggestion of licensing to prevent recklessness in storm chasing is an interesting concept which will be investigated further. Also, with the American Constitution cited as a reason why storm chasers should not be strictly licensed, this could potentially create a conflict between the scientific/serious side of the storm chasing community and the amateur, recreational side: with more storm chasers tracking a particular storm than previous decades due to technological advances, is the future of American storm chasing going to become more regulated and focused on more scientific endeavours? Alternatively, will the liberty factor of American culture, which is defined in the Declaration of Independence and is a fundamental feature of American society- allow storm chasing to remain available to all? With storm chasers' reliance on social media to convey their safety and weather narratives, how does it affect their ability to do so on a network saturated with people undertaking dangerous activities for approval? Finally, how does storm chasing separate itself from this in order to represent itself as a serious pursuit of weather knowledge?

Facebook is a popular medium for sharing storm updates and videos, with a vast number of US storm chasers regularly updating their newsfeed. These include Hank Schyma (5154 followers as of 06/12/2022), Reed Timmer's personal account (33854 followers as of 06/12/2022), Brandon Sullivan (3148 followers as of 06/12/2022), and Sean Schofer (2460 followers as of 06/12/2022). Timmer has the highest number of followers based on his success as both a TV personality and a skilled meteorologist, with his Facebook timeline being inundated with weather updates, videos, forecasts, and personal posts about his life. There are also severe weather-specific, non-professional and professional Facebook groups and pages, which are titled in eye-catching ways such as 'Severe Weather World', 'USA Severe Weather Network', and '!!SEVERE WEATHER WARNINGS AND ALERTS!!' This assists in drawing people towards the power and awe-inspiring dominance of severe weather, declaring that it is something important to pay attention to. Author Maria Korpijaakko provides the viewpoint that people are currently more connected and that social media has become an important socio-cultural communication device.² In 2018, around 2 billion users were regularly interacting on Facebook.³ With this many users on the platform, at its most fundamental level, Facebook, as well as other social media platforms, informs and notifies users about severe weather and its consequences.

² Korpijaakko, M L (2015): 'Why People Use Facebook: The Pros and Cons Associated with its Use,' *Cracking Facebook: The Importance of Understanding Technology-Based Communication*, Brill, pp.15-32.

³ Karppi, T (2018): 'Log In,' *Disconnect: Facebook's Affective Bonds*, University of Minnesota Press, pp.1-24.

The reasons behind Facebook's popularity in storm chasing relate to informing and educating people of imminent danger, and also to promote live streams of storm chases to share the anticipation and excitement. With Facebook being one of the biggest social media platforms on the internet with members' ability to 'follow' people, storm chasers have utilised the website as a way through which to share important information and tornado activity. The role of Facebook relates to this popularity, in addition to the fact that storm chasers can showcase their storm chasing skills via video and photographs. With US storm chasing becoming more mainstream because of social media's public role in popularising it, the live streams allow people to access the thrill of the chase without having to leave the safety of their homes. In this way, Facebook provides weather enthusiasts with a front-row view of a storm chase without being in danger. This can also be said of *Storm Chasers*, discussed in Chapter 2, however in this instance it is live and people are able to view the build-up to the chase in addition to the chase itself. The live stream is rarely edited to present only the exciting or action-packed parts, making live-streaming more accessible and real. Although the storm chasers are underneath severe storms themselves to obtain these close perspectives, their work allows followers to safely and remotely engage with the storm as a phenomenon and learn about weather.

Regular Facebook updates via the 'timeline' or 'newsfeed' also assist with educating followers on the dangers of severe weather. When storm chasers share weather warnings, they provide people with current information which encourages people to find shelter. This is a positive influence because it has the potential to save lives, and is part of a larger matrix of information-sharing, which proceeds to act as a warning system during occasions of extreme weather. As *Figure 21* shows, a view of Timmer's timeline, his many followers can view his live streams and regular weather updates:

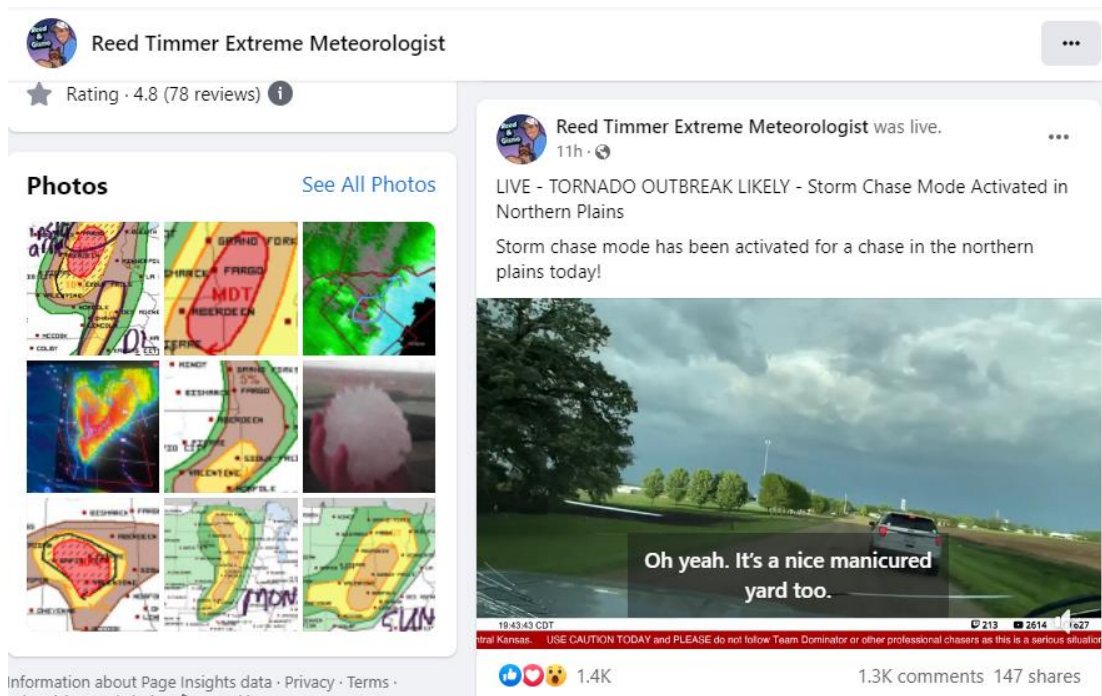


Figure 21 (screenshot taken 29/05/2022 from Reed Timmer's Facebook timeline)

His live streams do not just show the storm, but the events leading up to the chase, which provides a sense of anticipation, and excitement. It keeps viewers interested and presents storm chasing as dramatic, almost eerie in expectation. His forecasts, while technical and full of meteorological phrases, warn his followers of potential or definite severe weather to come, and he regularly updates his social media when the weather predictions are updated. In this way, he is helping the public to remain safe and knowledgeable, and due to the vast number of people using Facebook, he is reaching many of them and helping people prepare by providing safety advice during storms.

Alternatively, American storm chasing representations on Facebook can encourage people to chase severe storms themselves, even when they have limited knowledge on the subject. This can be unintentional on the part of the poster, because many only intend to provide information, but this inspiration can cause significant issues such as traffic congestion/excessive chaser convergence at a storm (seen at the El Reno storm of 2013), emergency situations whereby people become trapped in their vehicles on muddy roads, and lack of knowledge on how to safely escape a tornado's path. Facebook presents storm chasing as an adventure through the users' representations of the activity, with exclamations and words such as 'extreme' 'insane' and 'monster' (seen on Reed Timmer's Facebook profile). As a result, people can possibly become enticed by the thought of experiencing severe weather via dangerous pursuits. Regular storm chaser updates on Facebook can create

the idea of nature as an enemy to be conquered; a power which is beyond human capabilities but can be chased and documented to save peoples' lives, and defeat nature as though it is tamed. Author Mike Smith states that 'innovations in meteorology... are saving countless lives...', so technological developments are indeed influencing this desire for control and understanding.⁴ This can be extended to social media because, as widely-used platforms on a heavily-trafficked internet, much information can be shared to acknowledge storm chasers' role in conquering the weather.

Facebook storm chasers sometimes have multiple profiles, one for personal use and one to represent their professional persona. Timmer is an example; he has a personal account which simply states 'public figure' (a chosen designation by the Timmer for his page) to indicate that he is well known, and also a professional profile titled 'Reed Timmer: Extreme Meteorologist.' These different accounts represent the person vs public perception, in that there is a human, more relatable side to a professional storm chaser in this case instead of simply the TV personality he is known for. According to author D.E. Wittkower, this division of public and private relates to what the social media profile owner wishes to be visible and extroverted, and also what is deemed more private and introverted.⁵ Although Wittkower's theory is aged, given that social media is continuously evolving, his comments regarding visibility hold true; people share the most appealing aspects of their life and make themselves appear exciting online. Publicly, they are interesting and engaging, whereas their private personas can be much different. In the context of popular storm chasers, their public persona is the visible, exciting side, along with the financial gain from such endeavours if that is the intention. Otherwise, the private Facebook accounts relate to their more friend/family-orientated life. Social media has therefore allowed storm chasers to show that they are regular people outside of how they are perceived in popular culture, yet simultaneously allows them to continue their work in severe weather on a public forum.

In addition, individuals also upload their own amateur videos or live streams, from a home environment, a place of employment or from a vehicle, for example. Adding these videos to the existing professional videography in these groups provides weather scientists with data to investigate specific weather phenomena, such as a particularly violent tornado.

⁴ Smith, M (2010): *Warnings: The True Story of How Science Tamed the Weather*, 1st edition, Greenleaf Book Group LLC, Austin, Texas, pp.8-10.

⁵ Wittkower, D.E. (2010): *Facebook and Philosophy: What's On Your Mind?*, 1st edition, Open Court Publishing, USA, p.5-6.

Authors Julia Leyda and Diane Negra state that ‘the computer-generated graphics’ of meteorologists’ investigations are ‘juxtaposed with... domestic security systems, home video, and mobile phone cameras to provide the visual appearance of... surveillance and monitoring.’⁶ This surveillance, shared on Facebook, can enhance a storm chaser’s overall view of an event with different angles, positions, and locations, providing them with a 3D-like collection of data which will help weather scientists investigate the storm. Therefore, additional videos of severe storms on Facebook can allow meteorologists to try to understand the fundamentals of tornado development. Facebook is valuable in this way, as well as providing written posts that detail events as they unfold or after they have happened. Piecing these videos and posts together is an extremely useful way through which to understand events minute by minute, thus providing scientists with more useful data. The videos may be sold to news outlets, who then broadcast them, or alternatively storm chasers upload their videos to YouTube for as a more accessible route. Scientific storm chase teams usually have both instrumentation and cameras to record tornado activity, thus assisting their research with multiple data collections, while amateurs with only a smartphone cannot gather scientific meteorological data.

Videos or written updates from a tornado shelter show a subjective account of a particular event, humanising the experience rather than leaving a camera to film unaided from a tripod. This creates the necessity to focus on human preservation, in that it is important to study these events so that communities can be adequately protected. According to one example, the National Weather Service Cleveland, there is also a way on Facebook to allow people to report a severe weather event. This particular weather service has different social media pages to do so (see *Figure 22*).

Using Facebook in this way demonstrates that social media is not only a method used for global communication, but also a way for American severe weather organisations to liaise with members of the public and gather first-hand accounts. This also maintains an element of safety, where the relevant emergency services can intervene if necessary and keep communities safe, and so more organisations can work together in extreme weather events. Doing this ensures that, through the convenient and easy use of Facebook, procedures can be implemented to prevent deaths or injuries in the future. Storm chasers, meteorologists, and

⁶ Leyda, J; Negra, D (2015): *Severe Weather and Global Media*, 1st edition, Routledge, New York, p.64-99.

weather organisations can use this shared data to increasingly understand how and why tornadoes form, and analyse the damage to determine the tornado’s strength and wind speeds.

This will then assist in improving the technology to warn and protect the general populace from dangerous weather situations. Facebook, like other social media, can be utilised to encourage reckless behaviour, but on the other hand Facebook can assist with making storm chasing safer. Ergo, it creates a contradictory tension within the perceptions of storm chasing itself.

We Want Your Storm Reports!

Sharing your severe weather reports can provide vital information to help improve our ability to warn the public. You can report severe weather on either of our social media pages! Just post to our wall, make a comment on a post, or tweet what you see! When you send a report include *what you saw, when it occurred, your location, and any pictures that you may have taken!*

<p>Wind</p> <ul style="list-style-type: none"> • Large branches down • Uprooted trees • Damage to buildings • Power lines down 		<p>Funnel Clouds or Tornadoes</p> <ul style="list-style-type: none"> • Report immediately with picture(s) • Significant tree damage • Damage to buildings • Location of damage • Location and direction of tornado 	
	<p>Hail</p> <ul style="list-style-type: none"> • Measure the hail stone • Reference it to size <ul style="list-style-type: none"> • Penny, Quarter, etc. • Do not say "marble-sized" • The picture to the left is a great example of 1" or "quarter-sized" hail 		<p>Flooding</p> <ul style="list-style-type: none"> • Water depth • Impassable roadways • Disabled vehicles • Water into buildings • Flowing or standing water

National Weather Service – Cleveland

www.weather.gov/cleveland | US National Weather Service Cleveland OH | @NWSCLE

Figure 22 National Weather Service, ‘Report Severe Weather on Facebook and Twitter,’ *National Weather Service Cleveland* [ONLINE], available at: <https://www.weather.gov/cle/SocialMedia_Public_Reports> (Accessed 29/05/2022).

Twitter is another platform which allows people to share their weather updates.⁷ Its role in the recent increase of storm chasing is based upon the same reasons as Facebook: The availability of technology and the means to share amateur and professional updates/videos. Although Twitter had, until 2023, a 280-character limit, it allows users to attach images or videos, and users tend to number their posts in order if the number of characters exceeds the limit for a single post. In addition, Twitter allows users to stream videos live, so storm

⁷ At the time of writing (July 2023), Twitter was undergoing a rebrand as “X”; as the implications and success of this rebrand are not yet clear I will continue to refer to the platform in question by its original name.

chasers are able to document their chases over Twitter as they are happening. Twitter can also link to a person's Facebook account, so if a user posts on Twitter, it will also automatically post to Facebook also. These factors help if a member of the public has one platform but not the other, and this assists with weather warnings reaching the public. Posts can be from amateur storm chasers to scientific field researchers, which provides the storm chasing community with a way through which to research tornadoes in a more detailed fashion. As with Facebook, there exists a way to use imagery and videography to enhance knowledge on storm systems, by collecting all data together to form a bigger picture and therefore creating a thorough perspective of an extreme weather event.⁸



Figure 23

Live Storm Chasers, an American severe weather group on social media, uses its Twitter account to document their chases in the TIV 2, a Tornado Intercept Vehicle designed to withstand tornadic winds. They currently have 26.7k followers and their introductory biography states, 'Official Account of Live Storm Chasers! Breaking Weather, Live Videos, & More! NOAA

Weather-Ready Nation Ambassador! TIV 2 - Tornado Intercept Vehicle Team!'⁹ The use of exclamation marks seek to increase the visibility of the post, in that it makes it appear more interesting and exhilarating to watch. Their profile is also eye-catching and its posts promise excitement, with very similar wording to the YouTube videos of Timmer (*Figure 23*).

⁸ Seimon, A; Allen, J T; Seimon, T A; Talbot, S J; Hoadley, D K (2016): 'Crowdsourcing the El Reno 2013 Tornado: A New Approach for Collation and Display of Storm Chaser Imagery for Scientific Applications,' *Bulletin of the American Meteorological Society*, Vol.97, No.11, pp.2070-2071.

⁹ Live Storm Chasers (2022), *Twitter* [ONLINE], available at: https://twitter.com/LiveStormChaser?ref_src=twsrc%5Egoogle%7Ctwcamp%5Eserp%7Ctwgr%5Eauthor (Accessed 31/05/2022).

Photographs such as this represent the beauty and power of nature, which is enticing to people who are photographers, weather enthusiasts, or adrenaline-seekers. Images are usually edited to enhance certain parts of the image and contrast the sky against the rest of the image. Doing this brings the sky into the main focus and presents it as the dominating factor, therefore emphasising the storm's role as the muse in weather photography. The fact that this is so demonstrates that weather photography is in fact an art, with the sky ever-changing and dynamic to create different moods. In *Figure 23*, the contrast between the lighter side of sky and the storm further emphasises the storm's literally central role in the image, and the small humans in the foreground serve to show how overpowering nature is. This is discussed in Chapter 3 when investigating how storms and people on film covers relate to the powerful, dominating nature of the storm.

In addition, the fact that Live Storm Chasers have not used scientific language in the caption points towards their intended audience- those who storm chase themselves, and regular viewers who have an interest in severe weather. This has potentially caused an increase in chasing, not only through social media but by the increase of available technology for a typical person in recent times, because the images represent a danger that no human can overcome; the storm itself is something to both respect and attempt to control. Although it is not possible to determine how many chasers attend a particular storm, since most are not connected to tracking networks, one storm chaser named Warren Faidley has estimated that on a storm such as the 2013 El Reno tornado, there could be 'as many as 200 hardcore chasers and maybe another 200+ locals who are actively chasing... You also have chasers who can only chase for a few weeks out of the year... but [they] don't always contribute to a local event count.'¹⁰ According to journal article writer Anthony Laubach, 'egos played a role' because veteran storm chasers were being rivalled by newer ones, creating a sense of resentment.¹¹ With newer technology being introduced into the chasing community, this could potentially become a more significant issue.

Sharing these images and videos on platforms such as Twitter could increase the number of chasers due to the entertainment factor, and viewing storm chasing as a money-making activity by selling videos to local news agencies. Further to this, some people remain at home and watch the live-streams, something known as 'armchair chasing,' meaning that

¹⁰ Faidley, W (2021): 'Number of Chasers,' *Storm Track* [ONLINE], available at:

<<https://stormtrack.org/community/threads/number-of-chasers.31705/>> (Accessed 31/05/2022).

¹¹ Laubach, A (2016): 'Tragedy and Ethics in Storm Chasing,' Southern Illinois University Carbondale, pp.1-36.

they watch the storm chases without becoming directly involved. This means that social media has not only created a way for people to follow storms directly through images and video.

Also, some people chase storms simply to photograph them, making a career from their photography. Photogenic storm scenes such as the Live Storm Chasers view above can attract photographers such as David Mayhew, who has his own website <https://davidmayhewphotography.com/storm-chasing/>. Mayhew describes his hobby as ‘seeing nature at its most beautiful. Each storm is unique, providing new and diverse photo opportunities. The goal of a chase for me is therefore to be witness to spectacular skies and not necessarily to see a tornado...’¹² It indicates that some storm chasers are more interested in the aesthetic qualities of the storm itself and not necessarily its associated damage, though the act of storm chasing itself is still dangerous. Mayhew adds that people should ‘not attempt storm chasing unless you know what you are doing or are with someone experienced, high tech equipment alone is not enough to be a chaser.’ It suggests that Mayhew considers amateur storm chasing as risky because the lack of experience of some chasers is potentially more dangerous than the act of chasing itself. Despite this, photographic representations of storms increase the overall number of chasers, and there is an abundance of weather photographers present on Twitter to further show the beauty of the atmosphere. Videographers, storm spotters or simply weather enthusiasts add to the number and create a large view of severe weather through multiple disciplines. This cultivates a broader perspective when studying specific storm events, as mentioned previously with Facebook.

Other social media platforms offer unique perspectives on storm chasing, one example being YouTube. YouTube is different in that it is a video-sharing medium which focuses mainly on the highlights of storm chases, though full live-streams do exist. With over 2 billion people using the platform every month, it is an excellent way of sharing videos and information, and it is the second most popular social media platform after Facebook.¹³ The role of YouTube in US storm chasing is very useful, with many chasers sharing videos on their profiles of chases, weather forecasts, educational weather videos, and videos which are designed to catch the audience’s attention with clickbait titles and thumbnails. The different

¹² Mayhew, D (2022): *David Mayhew Photography*, ‘Storm Chasing’ [ONLINE], available at: <<https://davidmayhewphotography.com/storm-chasing/>> (Accessed 27/06/2022).

¹³ GMI Blogger (2022): ‘YouTube User Statistics 2022,’ GMI [ONLINE], available at: <<https://www.globalmediainsight.com/blog/youtube-users-statistics/>> (Accessed 19/06/2022).

types of videos ensure that storm chasers can use YouTube for different purposes, such as adrenaline-seeking, information-sharing, and meteorological/scientific developments. Storm chasers such as Reed Timmer and Hank Schyma post regular video updates on their YouTube channels, portraying their individual perspectives of storm chasing. Contemporary technology, such as the smart phone, has advantages such as being compact for travelling, possessing high-quality photographic and videographic cameras and microphones, and having direct upload-to-YouTube capabilities.¹⁴ This is also true for Facebook and Twitter as all can be updated instantly. Presenting different videos by several people provides viewers with unique chasing styles ranging from weather enthusiasm and adrenaline, to adventure and science. Videos on YouTube are extremely popular, for example, Live Storm Chasers have 10.8k subscribers and have achieved over 2 million views in total. Their description states that they ‘are a social weather news network’ and that their objective is to ‘work together with our creators, help get their videos discovered and go viral while we monetize and promote it worldwide across our platform.’¹⁵ This aim provides them with an opportunity to gain financial benefits from their endeavours, as well as promoting severe weather excitement and safety across the world, despite not specifying weather education specifically. The international promotion educates global communities about the dangers and attraction of severe storms, though Live Storm Chasers is a research team using an armoured vehicle with safety considerations, so it cannot be definitively indicated that they encourage recreational storm chasing.

Some storm chasers post them to educate others about weather safety, what not to do in weather emergencies, and the damage that severe weather can cause to homes and nature. Hank Schyma, the case study for this section, is a regular uploader with 998 thousand subscribers and over 311 million views in total. His description reads, ‘Nature with a twist! Here you'll find the most beautiful collection of storm footage in existence. Tornadoes, lightning, supercells and all facets of severe thunderstorms are presented in cinematic and educational fashion.’¹⁶ As this introduction suggests, he uses his channel to both entertain and educate, and he uploads videos which show his storm chases. He emphasises ‘beautiful’ because while storms are deadly and carelessly destructive, their appearance is ethereal and

¹⁴ Strangelove, M (2010): ‘Home Movies in a Global Village,’ *Watching YouTube: Extraordinary Videos by Ordinary People*, University of Toronto Press, pp.22-24.

¹⁵ Live Storm Chasers (2022): ‘Live Storm Chasers’ *YouTube* channel [ONLINE], available at: <<https://www.youtube.com/c/LiveStormChasers>> (Accessed 28/05/2022).

¹⁶ Schyma, H (2022): ‘Pecos Hank’ *YouTube* channel [ONLINE], available at: <<https://www.youtube.com/c/PecosHank/about>> (Accessed 18/06/2022).



SCARIEST TORNADO EVER !!!

7,940,708 views. 134K DISLIKE SHARE DOWNLOAD CLIP SAVE ...

Pecos Hank SUBSCRIBED

Figure 24 (from Pecos Hank's YouTube channel, accessed 31/05/2022)

stunning; a direct contradiction between appearance and ability. Schyma's videos are unique in that they also switch between views so that you can see the tornado damage in that particular area after the storm has passed. One of his videos with this feature, titled 'SCARIEST TORNADO EVER!!!' shows the following scenes of the same location, before and after a tornado has been through:



Figure 25 (from Pecos Hank's YouTube channel, accessed 31/05/2022).

The clickbait technique on the title presents the video as something that needs to be seen, something that is incredibly exciting and almost unbelievable. 'Clickbait' is a method used by video posters for more interactions and maximising views, creating a successful video-sharing opportunity.¹⁷ For social media chasers like Schyma, it is an extremely useful method of conveying information because it creates a sense of awe relating to the power of tornadoes, and also emphasises the real dangers of them. It also helps Schyma obtain more views on his videos. According to author Stuart Cunningham, social media entertainment relies on 'authenticity and community', and that in order for a YouTube video to work for a wider audience.¹⁸ Cunningham also notes that online content has 'generated new forms of screen aesthetics,' which Schyma does well by using comparisons of video stills from before and after the storm. Juxtaposing these images also shows how storm chasing is a risky activity, that tornadoes are a phenomenon to take seriously due to their destructive nature.

¹⁷ Lischka, J A (2021): 'Clickbait news and algorithm curation: A game theory framework of the relation between journalism, users, and platforms,' *New Media and Society*, Abstract, page unspecified.

¹⁸ Cunningham, S (2019): *Social Media Entertainment: The New Intersection of Hollywood and Silicon Valley*, NYU Press, pp.149-155.

The video emphasises tornado damage so that the viewers can observe the reality of living in a tornado-prone area, and how devastating they actually are. Schyma narrates over his videos during editing, providing explanations and educational comments on the video's contents. His videos also highlight the negative side of storm chasing, including seeing homes destroyed, and storm chasers sometimes find people who have been injured or killed. Therefore, storm chasing as a hobby or career is not always adventure and excitement; there is the reminder of human mortality and frailty too. It suggests that there exists an element of morbid voyeurism involved with the audience, because viewing disaster and destruction is a way to engage with this mortality.

Some storm chasers upload interactive videos of storm chases, such as when they deploy a probe. The camera is situated within the probe itself and viewers can manipulate the video so that it can face any direction in a 360° view. Storm chasers do this so that people can see inside of tornadoes, while the chasers themselves can gather potentially valuable data on tornadoes' interiors. An added advantage is that this can be done remotely so that no storm chaser is in danger. One video example is by an American storm chasing channel named



Figure 26 (obtained from CONVEX YouTube channel, accessed 01/06/2022)

CONVEX, who deploy a probe with a camera inside and record a tornado passing.¹⁹ The footage shows a dark mass of cloud, with at first relatively calm weather, and then rain splashing on the probe and wind blowing strongly. The video also shows the drama of an approaching tornado, the ominous build-up, and the calm before the storm. Providing a 360° view gives the viewer situational awareness of a storm surrounding a tornado and not just the tornado itself, providing a larger idea of atmospheric energy and power.

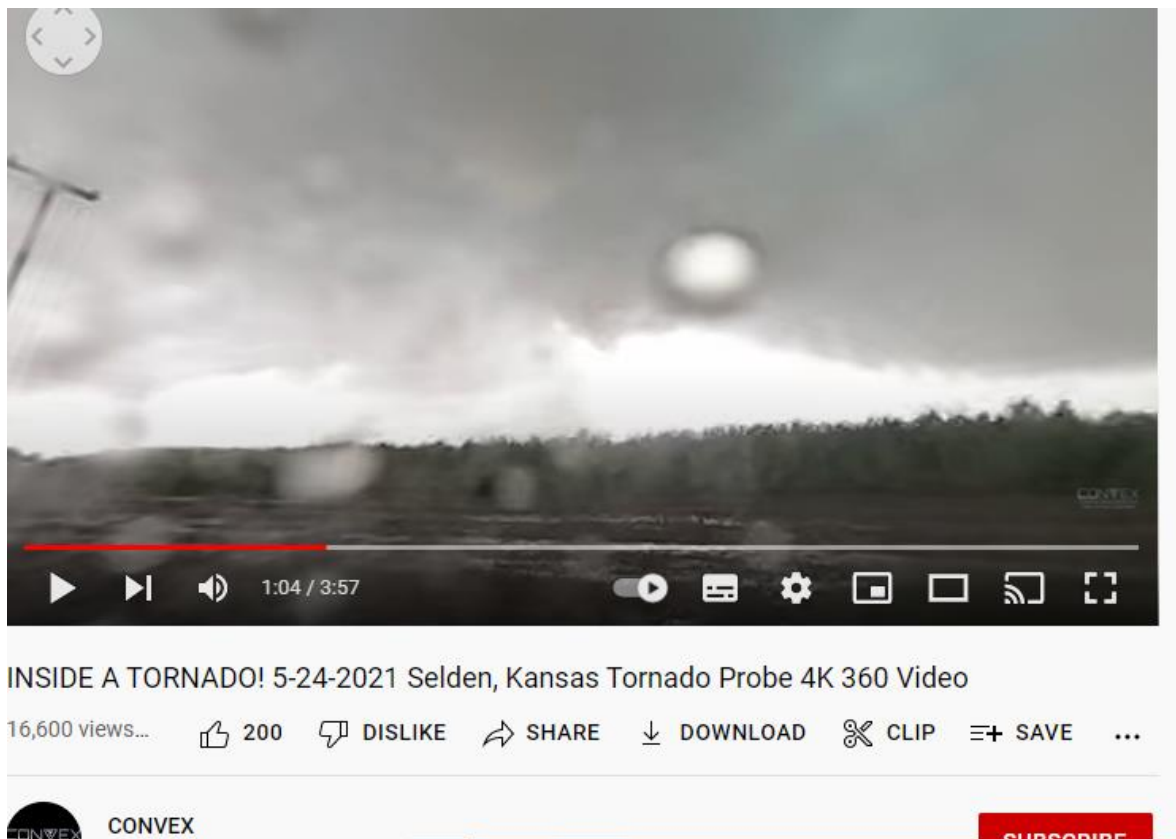


Figure 27 (obtained from CONVEX YouTube channel, accessed 01/06/2022).

Videos such as this underscore that fact that nature as atmospheric energy is objective, as an uncaring force which is oblivious to the power it possesses. On the other hand, the way that nature is defined in the video is more subjective due to the focus being on not only the storm but the damage it causes also. There is the contrast between seeing the storm from afar and seeing its effects close up, giving it a more human perspective in the video. YouTube therefore projects the idea of nature as something to be conscious about and something to prepare for, yet it also presents tornadoes as the common adversary, making nature seem more subjective to viewers. This adds an extra layer to the videos because not

¹⁹ CONVEX (2021): 'INSIDE A TORNADO! 5-24-2021 Selden, Kansas Tornado Probe 4K 360 Video, *YouTube* [ONLINE], available at: <<https://www.youtube.com/watch?v=R4TUsxRUMuQ&t=172s>> (Accessed 01/06/2022).

only do storm chasers attempt to educate people of severe weather and its consequences, the videos also serve as a way through which to see the full power of the storms, encouraging people to embrace preparedness through using storm shelters, keeping updated with weather reports, and listening to what meteorologists and storm chasers are advising over the internet.

The possibility of encouraging people to see the storms for themselves is another potential consequence of the videos, enticed by the risky nature of them. Furthermore, author Ron Eyerman, when talking about Hurricane Katrina, describes it ‘as exotic, as different’ and added that creating this image was ‘central to calling attention to the storm as a meaningful danger to a national audience.’²⁰ Storm chasers do this with tornadoes via YouTube by creating a public video-sharing channel, which acts as an important communication medium for the American public. The storm as a ‘meaningful danger’ is related to the incredible risks associated with it, and YouTube videos convey this message through the lens of storm chasing accounts and adventures. Storms in videography almost represent a character, an overwhelming source of fear and trepidation. The image of a looming storm approaching on video encapsulates this by showing the effects of severe storms on the environment and people, as demonstrated on Schyma’s videos and how they are construed.

Storm chaser blogs are an additional popular method of online communication, documenting the individual’s experiences with chasing severe storms. Social media sites such as Facebook are considered more modern communication approaches, whereas blogging is more old-fashioned. One such blog on the website Sky Diary Productions, by Pennsylvania native Chris Kridler, documents the life of a female storm chaser. Kridler is a storm chaser, author, and photographer, publishing several storm chasing novels and being featured in meteorological magazines such as *The Journal of Meteorology*. She has also appeared on documentaries with National Geographic, The History Channel, and The Weather Channel. She has also gained awards for her documentaries and videos.²¹ The fact she is female means that she is a minority within the community, but is no less important regarding data-gathering and representing storm chasing as a multifaceted activity.

The blog was established in 1997 as a way to document her storm chasing adventures, and she posts several times a month. Kridler documents the difficulties of both reaching

²⁰ Eyerman, R (2015): *Is This America? Katrina as Cultural Trauma*, 1st edition, University of Texas Press, Chapter 3, p.52-58.

²¹ Kridler, C (2022): ‘Bio’ *Sky Diary Productions* [ONLINE], available at: <https://www.chriskridler.com/category/stormchasing/> (Accessed 28/06/2022).

storms, and the changing weather models which reflect less favourable conditions for storms. She mentions that she and her chasing colleague ‘had a wonderful chase expedition last year, with lots of beautiful storms, funny moments and all the things that come with an intense few weeks on the road. There were so many beautiful storms this past year. If we get half as many, it’ll be a good year ... but I always hope for more! As well as a safe and healthy trip.’²² This suggests that the chasers are mesmerised by the storms and their incredible beauty, yet they understand the dangers associated with storm chasing. On the other hand, Kridler calls these chases ‘adventures’, giving their vocation a more adrenaline-fuelled aura. Kridler mainly focuses on photography to document storms, displaying the enhanced energy in the atmosphere, ranging from lightning to looming storm clouds. As Figure 11 shows, the effects of the lighting and colours on the storm make it look mighty and monolithic, and its immense size creates a sense of awe and vulnerability. The almost-ethereal appearance hints at a feeling of powerlessness regarding humans vs nature. Also, some people chase storms simply to photograph them, making a career from their photography. Photogenic storm scenes such as the Live Storm Chasers view above can attract photographers such as David Mayhew, who has his own website <https://davidmayhewphotography.com/storm-chasing/>. Mayhew describes his hobby as ‘seeing nature at its most beautiful. Each storm is unique, providing new and diverse photo opportunities. The goal of a chase for me is therefore to be witness to spectacular skies and not necessarily to see a tornado...’²³ It indicates that some storm chasers are more interested in the aesthetic qualities of the storm itself and not necessarily its associated damage, though the act of storm chasing itself is still dangerous. Mayhew adds that people should ‘not attempt storm chasing unless you know what you are doing or are with someone experienced, high tech equipment alone is not enough to be a chaser.’ It suggests that Mayhew considers amateur storm chasing as risky because the lack of experience of some chasers is potentially more dangerous than the act of chasing itself. Despite this, photographic representations of storms increase the overall number of chasers, and there is an abundance of weather photographers present on Twitter to further show the beauty of the atmosphere. Videographers, storm spotters or simply weather enthusiasts add to the number and create a large view of severe weather through multiple disciplines. This

²² Kridler, C (2022): ‘Storm Chase Blog,’ *Sky Diary Productions* [ONLINE], available at: <<https://www.chriskridler.com/category/stormchasing/>> (Accessed 01/06/2022).

²³ Mayhew, D (2022): *David Mayhew Photography*, ‘Storm Chasing’ [ONLINE], available at: <<https://davidmayhewphotography.com/storm-chasing/>> (Accessed 27/06/2022).

cultivates a broader perspective when studying specific storm events, as mentioned previously with Facebook.



Figure 28

Much of art history, in this instance, Romantic, presents a similar perspective of the weather in paintings, such as the 1835 *Wanderer in the Storm* painting by Julius von Leybold (1806-1874)

(Figure 28). The painting details an atmosphere highly dominated by stormy weather, with darkness and trees overshadowing a lone human figure as with storm chasing photos and film posters. These comparisons emphasise nature's role in the lives of collective humanity, in that people are powerless in the middle of strong weather. The painting shows this by depicting a person battling against the wind underneath a roiling sky, which as mentioned is presented in this way on the film covers studied in Chapter 3. Another painting example is *Seashore in Moonlight* created in 1836 by Caspar David Friedrich (1774-1840) (Figure 29).



Figure 29

In this painting, the clouds are heavy and dark, creating a sense of apprehension. Again, the sky is overwhelmed by an unstable atmosphere, with the ground below exposed and vulnerable, like the person in the previous painting. This vulnerability is what may appeal to storm chasers; they seek to overcome a large force which has always overpowered them. The

painting's role in romanticising stormy skies is another appeal, providing the ethereal and

otherworldly appearance discussed previously. This, combined with a sense of adventure and curiosity about tornadoes or storms in general, could entice people to chase. The old-fashioned artistic representations act like the modern photographs taken today, by presenting nature's reputation as an incredible force, managed through the use of artistic media (paints and photographs), and highlighting its most spectacular manifestations. This links to the Sublime by representing the unearthliness of weather, and how it is something so beautiful yet completely formidable.



My storm-chasing partner [Alethea Kontis](#) and I had a wonderful chase expedition last year, with lots of beautiful storms, funny moments and all the things that come with an intense few weeks on the road.

There were so many beautiful storms this past year. If we get half as many, it'll be a good year ... but I always hope for more! As well as a safe and healthy trip.

Figure 30

As storm chases in the US are not typically a one-day affair and can last a week or two, the freedom of chasing is another idea which may encourage amateur storm chasing. Blogs are generally used to portray a storm

chaser's experiences during the chase season, rather than used to post updates with weather forecasts and other similar things. The focus on storm chasing as a fun and exhilarating journey is portrayed through photographs or videos as with other social media platforms, though blogs act more like diaries in that they provide information on unsuccessful experiences, not just positive ones. It also means that the blog is more centred around Kridler's life rather than the storm, though the storm itself remains a prominent character.

In addition, documenting storm chasing experiences in this way is a very personal method of conveying information, with a person's thoughts and emotions being the dominant feature. For example, in Kridler's blog, she describes her frustration at missing chases during the pandemic in 2020, saying, 'Storm chasing is always my prime font of images, my biggest inspiration, and not going to the Plains in 2020 (while doing the responsible thing during the plague) really hurt.' She also describes how storm chasing uses much time, stating that

‘Storm chasing can be gruelling. Sure, it sounds like a vacation. And it’s definitely a break from the routine of regular life, as the whims of nature guide you to your next destination on the open road. But the constant driving means there’s very little rest.’ These comments describe both the positives and negatives of storm chasing, easily described through subjective prose, and giving readers an insight into the highs and lows of storm chasing itself. It presents a more balanced view of the activity, rather than focusing on videos or posts which only show the best, most exciting parts. Blogs are therefore useful because of this; they reflect storm chasing through the lens of an enthusiast and do not necessarily encourage people to chase storms themselves, despite the descriptions of beautiful scenes and amazing storms.

Kridler is unique in that she is a female storm chaser in a predominantly male establishment. A journal article author named Carmen Stavrositu and her colleague S. Shyam Sundar have offered that ‘ This repeated self-expression, in the process of which the blogger develops a voice of her own that is also visible to others, is likely to empower the individual user.’²⁴ Being incorporated into a stereotypically male activity means that there can exist a sense of empowerment, creating an online forum through which to advocate gender equality in particular areas. There is a feminist aspect to this, giving women a prominent place in the storm chasing community by demonstrating that they are just as passionate and competent. It demonstrates that there is a place for women in a mainly male community, and shows how storm chasing can transcend gender expectations.

Kridler documents other occurrences in her life outside of storm chasing, such as space launches and visits to different places, which provides readers with the fact that storm chasers have lives outside of their weather activities. This relates to the domestication of storm chasing in that it can be construed as a job, external to the storm chaser’s actual day-to-day life. This works in the opposite way to shows like *Storm Chasers* because the show only depicts excitement and drama, with little shown of the storm chasers’ personalities outside the realm of weather extremes. Also, it means that blogging differs from YouTube and Twitter because they only focus on the exciting parts and not necessarily other aspects of a chaser’s life. Blogs present an individual as more relatable to the layperson, with long descriptions and even educational explanations of weather with photographs. For example, Kridler mentions on the 17th May 2021 that she had a day of ‘seeing Mother Nature’s magic

²⁴ Stavrositu, C; Sundar, S S (2012): ‘Does Blogging Empower Women? Exploring the Role of Agency and Community,’ *Journal of Computer-Mediated Communication*, Vol.17, Issue 4, pp.369-386.



Figure 31

in action,’ where they saw a small LP (low precipitation) supercell become dominant, and also that the storm resembled a UFO in appearance because of the spinning nature of the severe storm (supercells rotate). One of her photographs, displaying the storm with this characteristic, shows the sky overwhelmed with a lowering, menacing storm, which appears to hover over the land as if contemplating where to affect first. The wide open space of the Texas landscape shows the vast size of the storm and the contrasting colours present it as an ominous dark mass capable of much destruction (*Figure 31*).

Doing this portrays storm chasing as both an interesting, educational endeavour while maintaining the view that there is much risk involved. The ‘Mother Nature’s magic’ comment emphasises the enticing feature of storm chasing because it insinuates that, although there is the aforementioned risk involved, there is a large element of awe and surprise also for something that appears almost supernatural. Another image example of this, *Figure 32*, features the same storm structure described earlier, but more defined, and from a different angle to display the storm’s lower portion.

As with social media, there is a problem with how storm chasing is perceived. Although weather blogs can be educational, readers can still be influenced to chase through

the exciting accounts and beautiful photographs. Anthony Laubach, who is a storm chaser and journal article author, mentions that

... experienced chasers sharing their forecasts in blogs allowed for anyone to read forecasts and learn. The goal of this... was to help better educate up and coming weather enthusiasts... But what ended up coming about was people were using this information to leech on to other chasers... Now, a person with no chasing experience just needed to know how to drive a car and follow social media sites and they were now seeing tornadoes with as much regularity as the veterans of dozens of years.²⁵

The advancement of technology such as blogs has allowed people to become involved in a dangerous activity with little training, as Laubach describes, and this has a negative effect on the storm chasing community's reputation. Although Kridler's blog does not intend to do this, the photographs of violent storms and various weather phenomena could potentially transform readers' ideas about storm chasing and create an adventure-filled representation of it. Thus, blogging has influenced storm chasing as Facebook, Twitter and YouTube have, by presenting storm chasing as an activity that is both risky and beautiful.



Figure 32

²⁵ Laubach, A (2016): *Tragedy and Ethics in Storm Chasing*, Southern Illinois University Carbondale, pp.18-28.

The number of American storm chasers present on platforms such as Facebook and YouTube has provided followers with an abundance of storm chasing media, from videos, written updates, and weather forecasts/warnings. Due to the fact that storm chasing is considered a sport by some, many storm chasers undertake the activity to feel adrenaline and risk, and then upload their footage to the internet for an audience. Their videos highlight the drama of the chase, in addition to the power of nature and the anticipation of possible tornado formation. Some chasers endeavour to be as near to the tornado as possible to gain footage that they can then sell, share online, or use for scientific research. As a result, storm chasing has become more accessible to the layperson and has educated the public about weather safety. Furthermore, storm chaser Tony Laubach opines that the general public are actually more successful in gaining storm footage, as they live in densely populated areas which are impacted by tornadoes every year. He states that one change in storm chasing involves

the extreme saturation of video shot by the general public. More people with more cameras means there are more dramatic shots available than a storm chaser would typically get... Storm chasers are often focused on staying with a storm... Members of the general public are planted in these [busy, urban] areas, some of which are taking direct impacts. These individuals... tend to capture much more dramatic footage... that chasers would likely not put themselves in positions to get.²⁶

Due to this, and the abundance of portable technology such as mobile phones and cameras, the general public is, in many circumstances, able to intercept storms without having to travel to another state or city. Despite storm chasers not putting themselves into the dangerous positions described by Tony Laubach above, some storm chasers taking further risks for social media. By making storm chasing more available to the general public on social media, storm chasing has become more of a sport and adventure-seeking endeavour, rather than a predominantly scientific activity. Live-streaming- the act of recording storm chases live and broadcasting them on the internet- has also become popular in recent times, primarily because it demonstrates the life of a storm chaser and the excitement of the chase. Live-streams, videos which provide viewers with a current view of events, are appealing to audiences because of the potential for exciting things to be recorded and viewed as they are occurring. They record any incidents that may arise as a result of storm chasing, such as vehicles being impacted by strong

²⁶ Laubach, T (2018): 'Storm Chasing in the 21st Century,' *Gateway Journalism Review*, Vol.47, Issue 349. pp.18-28.

winds or large hail, tornadoes passing close by, or debris flying around in the vicinity. Also, a member named *rapidcharger* of the forum *RadioReference* adds the opinion that ‘One has to distinguish between those that are... more interested in launching some sort of scientific instrument into the tornado, and those who are out looking for an adrenaline rush and want to put videos on their YouTube channel, and those who are filming for profit.’²⁷ This person added that ‘many respected scientists have conceded that there is no hope of ever achieving any substantial advance warning of where a tornado is going to strike. There's just too many variables.’ Therefore, storm chasing is possibly only ever going to be useful for documenting tornadoes from the outside, but trying to understand the internal dynamics and structures is going to be an unreachable achievement if technology does not evolve enough to do so. This opinion supports the idea that storm chasing is a pursuit for control; humans fear situations that are fundamentally unpredictable, so in the context of storm chasing, chasers search for a method through which to harness and forecast tornadoes, even if they are difficult to understand.

Another interpretation is storm chasing as an extreme sport. *Storm Track* commenter Warren Faidley reminds others on the forum that extreme sports tend to be partially regulated and do not necessarily involve a wider danger to the public, unlike storm chasing which involves driving on public roads and adhering to traffic laws.²⁸ One of the first known storm chasers Charles Doswell also mentions that ‘I realize that we live in a free country and you are quite free to behave in any manner you wish, irrespective of any rules and recommendations I might want to impose... I can't prevent anyone from taking whatever risks they want, but *they should recognize that by taking high-end risks, they're implicitly encouraging others to do the same.*’²⁹ The unpredictability of tornadoes means that storm chasing has a strong element of danger associated with it, and so achieving a close encounter and surviving has been a method through which for thrill-seekers to emphasise the danger aspect.

²⁷ *Rapidcharger*, ‘Storm Chasers- The Good, The Bad, and the Ugly,’ *RadioReference* [ONLINE], available at: <<https://forums.radioreference.com/threads/storm-chasers-the-good-the-bad-and-the-ugly.267983/>> (Accessed 07/06/2022).

²⁸ Faidley, W (2019): ‘How does storm chasing compare to other high-risk activities?’ *Storm Track* [ONLINE], available at: <<https://stormtrack.org/community/threads/how-does-storm-chasing-compare-to-other-high-risk-activities.30926/>> (Accessed 28/05/2022).

²⁹ Doswell, C (2017): ‘Storm Chasing with Safety, Courtesy, and Responsibility,’ [ONLINE ESSAY], available at: <http://www.flame.org/~cdoswell/chasesums/Chase_safety.html> (Accessed 27/05/2022).

Conclusion

Severe weather has always enraptured the minds of those who are determined to understand its dynamics and meteorological processes. The US, with its annual occurrence of severe weather, is able to continuously study their turbulent atmosphere and undertake dangerous endeavours so that communities can protect themselves. Americans' relationship with nature and its severity can be associated with their quest to defeat or tame the uncontrollable. The atmosphere and its threatening phenomena appeal to the adrenaline-fuelled and risk-taking aspect of human nature by providing a way for people to engage with their fear. Tornadoes are the ultimate monster in that they are extremely destructive, uncontrollable, and cause millions of dollars' worth of damage each year. They are also still not fully understood, and this drives on the desire to chase and observe them. With the relentless pursuit happening every storm season, storm chasers can gather more and more information relating to tornadogenesis, building up a larger picture of both their and the parent storm's dynamics. The data that storm chasers collect is also important because it can be used to create the storm on a simulator, attempting to recreate the storm system and its tornado-generating capabilities. This research continues. In addition, the data can assist with developing better warning systems, especially when tornadoes are fully understood in the future.

With storm chasing emerging in popular culture, it was inevitable that it would encourage more people to chase tornadoes and possibly even pursue meteorology as a career. The enticement of danger and risk for scientific gain is relevant because it can be viewed as a noble cause, one which would help the community. Tornadoes in films have increased this viewpoint because films portray storm chasers as obsessive, reckless, determined, yet scientifically intelligent. The inclusion of danger and science portrays storm chasing as an exciting adrenaline rush with added photographic/videographic evidence. Contemporary American culture shows this through the use of social media by storm chasers, and also autobiographical accounts. Films demonstrate an unrealistic perception of chasing tornadoes because in reality, storm chasers would not directly drive into a tornado or cause themselves to become stuck in the path of one, especially if the tornado is violent. However, films such as *Twister* and *Into The Storm*, while decades apart, both interpret storm chasing as immediate action and activity. In reality, many storms do not produce tornadoes, there is much waiting, it can take weeks of travelling during a typical storm season, the distances

travelled can be huge, and it can cost large amounts of money. The reality of storm chasing is therefore very different to the constant adventure that the films depict. Tornadoes also do not form or dissipate as movies demonstrate; they do not just appear and then disappear instantly. Other inaccuracies include storm structure, lack of travelling, risk-taking which would not occur in reality, tornado and storm chaser behaviour when formed, and every storm generating a tornado. These were not shown accurately in the films and would have added a realistic element to the chasing experience, since rain-wrapped tornadoes are especially dangerous; chasers cannot see the tornado, what it is doing, and how distant it is. Films provide an exciting and almost fearless version of storm chasing, which can influence people to attempt it themselves.

Autobiographical books by storm chasers paint a more authentic perspective of storm chasing. While the adventure is still evident, books such as *Into The Storm* by Reed Timmer and *Tornado Hunter* by Tim Samaras provide a clearer, more realistic view through the eyes of real tornado chasers. They demonstrate that there is a lot of disappointment, a lot of witnessed destruction, a lot of waiting, and constant weather model/visual observations. There is much reliance on modern technology, something which was not seen in *Twister* due to the decade it was produced, but is conspicuous in *Into The Storm*. Not only does this prove how advancements in technology have improved the abilities of storm chasers, it also represents that real storm chasing is a lot more complex than films generally show. Reliance on technology has given storm chasers a better idea of how to approach research into storms, despite that tornadoes are unpredictable in their nature and can create issues for even seasoned storm chasers. This occurred in the El Reno 2013 tornado, which displayed behavioural changes that could not be predicted, and caused danger to several storm chasers. The current inability to predict tornadoes as they occur, and how they behave as though they are living beings, is the foundation of tornado research in present times. In books written by storm chasers, this is demonstrated by the use of probes, parallel to film representations. It also relates to the technological advances in contemporary meteorology. Samaras' probe, the 'Turtle', was the first of its kind and also measured the first pressure drop within a tornado funnel, a milestone which helped to advance tornado research in to how it currently stands. While this is very similar to how it was achieved in *Twister* despite the different probe designs, reality's version of storm chasing does not correspond with Hollywood's interpretation as mentioned. Film's portrayal of severe weather can lead to inexperienced people attempting to follow tornadoes, thus creating a traffic/danger/reputation problem for

the experienced chasers immersing themselves in research/their hobby. While films try to represent storm chasing as immediate activity and excitement, storm chasers in reality have to endure amateur chaser behaviour. This can reflect badly on the more knowledgeable people in the field, as is exhibited with the suggestion of licensing to prevent future incidents of foolhardiness.

An additional, contemporaneous element of storm chasing, alongside new technology and books, is social media. It presents storm chasers with the ability to provide real-time experiences and video of chases, and updates their followers on relevant information pertaining to imminent weather activity. The social media discussed in this thesis include Facebook, Twitter, YouTube, and weather blogs. Facebook and Twitter can be used to regularly update on a storm chaser's location and activities, and can include photographs and video. YouTube primarily shares videos and can be used for important analyses of particular weather events. The videos can also be live, giving followers a visual version of the written statuses on Facebook and Twitter. Blogs are more centred around storytelling, almost akin to an online diary, describing events after they have happened and providing readers with a more in-depth interpretation of events. All of these social media services together represent unique ways for storm chasers to express their views, share interesting videos, share weather alerts/watches/warnings, and give followers a genuine version of what storm chasing actually is. Social media as a communication device acts as both a positive technological resource to warn the community, as well as a scientifically necessary medium for photographic/videographic evidence. Consequently, social media acts as another method of weather investigation pulling together experiences and perspectives, in order to coalesce science and storm chasing knowledge into a bigger picture. Social media therefore has a role in the collective attempt to understand such violent storms.

The future of storm chasing is speculative. Social media will continue to keep weather enthusiasts updated on developing theories or technology, while the study of severe storms will continue to shed light on tornadogenesis and climate concerns. Author Joanna Burger says that global warming has increased frequency and severity of storms that are associated with flooding, increasing the risk to urban, coastal populations,' and that the most vulnerable people, in terms of financial and social vulnerability, are the most at-risk demographic.¹

¹ Burger, J (2017): 'Perceptions of severe storms, climate change, ecological structures and resiliency three years post-hurricane *Sandy* in New Jersey,' *Urban Ecosyst*, Vol.20, abstract, pp.1261-1275.

Burger's statement offers the viewpoint that in the future, storm chasing may become riskier due to the effects of climatological fluctuations. The question of licensing for storm chasing has been raised, mainly to prevent amateur recklessness and a decline in the reputation of storm chasing itself. Should licensing become a reality, it means that storm chasing would become regulated and would be subject to local laws. This juxtaposes the liberties inherent in American culture, and the necessity to protect communities/individuals from harm.

The future of storm chasing is in fact debatable. Some storm chasers declare that licensing, which will be discussed imminently, will not become necessary due to American views on freedom. According to the journal *Contexts*, 'freedom is one of America's most cherished values,' and is 'by far America's most important political value, ranked behind only world peace and familial security in the nation's hierarchy of values.'² However, the article does note that 'The perception of high levels of freedom is not a universal experience—its sociological realisation is contingent upon one's material resources.' This means that freedom is only true if people have the financial resources to take advantage of it. This could extend to licensing because should it become a necessary regulation in the future, there might not be enough funds for storm chasers to afford either the licensing or the chasing after obtaining a licence, which could then present issues for the non-scientific, non-sponsored chasing community. There is also the suggestion that there would be no way of policing licensing regulations should they come into effect. Licensing has been suggested as a way to prevent dangerous amateurism, and there has been increasing concern that if weather events continue to become more severe, licensing will be inevitable for the safety of storm chasers. With climate change becoming more of a concern, it is likely that, as temperatures rise, there will be an increase in storm activity and possibly more severe storms also. Should storms increase in severity, it could affect urban planning, such as towns that were rarely hit by tornadoes suddenly becoming a regular target. It would mean that adjustments would have to be made in order to keep citizens safe, for example, building sturdier homes with storm shelters, and building more storm shelters in general.

Meteorologists and storm spotters are essential in the prediction and detection of severe weather, so their work is considered important. On the other hand, amateur storm chasers have arisen from many backgrounds, from photography, videography, being weather

² Patterson, O; Fosse, E (2019): 'Stability and Change in Americans' Perception of Freedom,' *Contexts*, Summer 2019 Issue, page unspecified.

enthusiasts, or simply adrenaline junkies. The argument exists that strict licensing would directly contravene the American symbolism of freedom, but then the opposite argument suggests that lives need to be protected from the elements. A meteorologist named Paul Douglas commented that:

Often scores, even hundreds of chasers would converge on the same cell... It's a free country - you're obviously free to drive when and where you want, and I certainly don't want that to change, but something has to be done to avoid another tragedy like the one... that killed... 3 professional tornado researchers Tim Samaras, his son, and intercept partner.³

This indicates that freedom in the US, more specifically freedom underscored by The Constitution, is paramount when Americans consider how to approach recreational practicalities. For example, the mention of a 'free country' and his reluctance to change signifies that Douglas appreciates the rights of his country. Nevertheless, he has acquiesced the fact that there needs to be action to prevent further tragedies like TWISTEX. Douglas' comments also suggest that the fate of TWISTEX was avoidable, that they had the free will to study tornadoes at close range yet it was a preventable event. Freedom to make choices can come at a potentially deadly price, but restricting the freedom to make these choices is against American cultural norms.

Furthermore, increased fuel prices/shortages in the future could inhibit the ability to storm chase for hundreds of miles, preventing many regular storm chasers from continuing in the future. Should this become a problem, it is possible that more people will rely on live streams of storms and storm chasing companies, unless they storm chase for a paying career. Samaras mentions in his book *Tornado Hunter* that the future of storm chasing is primarily concerned with tornado dynamics and tornado genesis, mentioning that it is nearly impossible to collect data from these elusive forces of nature.⁴

³ Gregladen (2013): 'How three storm chasers died, and what to do about it,' *ScienceBlogs* [ONLINE], available at: <<https://scienceblogs.com/gregladen/2013/06/03/how-three-storm-chasers-died-and-what-to-do-about-it>> (Accessed 25/05/2022).

⁴ Samaras, T (2009): *Tornado Hunter*, 1st edition, National Geographic Society, Washington DC, USA, pp.11-12.

Social media's impact on storm chasing and the way social media is used are often conflicting with each other. The positive sides include this broader perspective, as well as providing members of the public with emergency weather information so that they can act accordingly. Other positives include live updates, linking the social media accounts, live streaming to show what storm chasing is like, highlighting the dangers of storm chasing, and sharing the data collected during chases. Negative aspects of social media in storm chasing include storm chasing being viewed as a challenge to undertake for adrenaline seekers, and the sites not being accessible in severe weather if internet connections are lost. It is important that social media continues to be utilised as a weather safety tool in the 21st Century, as global warming threats increase and more generations join the social media age. This means that, as tornadoes continue to be studied and followed, Americans can remain up to date about living with severe weather.

When considering the American attributes of all the above chapters, the link between all of these relates to the Americanism of severe storms, which are a consequence of a particular weather phenomenon unique to Tornado Alley. As explained, the specific conditions that emerge every Spring, where cold air meets warm air and produces wind shear, represent the American climate and the way that Americans have both capitalised and learned from storm chasing. With the popularity of social media communication, Americans have been able to create an international interest and have attracted weather enthusiasts from other countries. As a result, when storm chasing is considered, people automatically think of tornadoes in the American plains, rather than tornadoes in the UK, for example. All chapters convey the idea that the whole storm chasing community is based on overwhelmingly American research, recreational pursuits, and money-making opportunities, again relating to the American Dream ideal. Culturally, storm chasing speaks to the quintessentially American idea of liberty and equality; they believe in their ability to conquer and overcome the storm.

Finally, the future of American storm chasing will also be affected by further instances of global health risks. Whether their motives are scientific, commercial, spiritual, or something else entirely, storm chasers as a community rely on the ability to travel and communicate during storm season. Unsurprisingly, the global COVID-19 pandemic disrupted and endangered storm chasing and raised difficult questions about the future of the activity. ChaserCon and indeed many individual chases were cancelled throughout 2020 and beyond, and storm chasers improvised solutions and workarounds to maintain their interest in and proximity to extreme weather events. According to Accuweather,

The life and location of a professional storm chaser can change every week, depending on where the next major weather event occurs. With different forms of observable weather in any number of states, much of the storm chaser's life is spent on the road, driving for hours or days to capture a few minutes of nature's breathtaking power. But like the rest of the world, the impacts of the COVID-19 pandemic have turned that life upside down.⁵

Adding to this, Accuweather states that ‘since states began pushing social distancing policies and stay-at-home orders, every aspect of a storm chasing trip has been affected, even at the gas pump and the drive-through,’ and that ‘not all elements of storm chasing are replicable or possible to pull off this season, such as storm chasing tours or classes involving field projects.’ According to the article, even the necessity of having to clean everything used at a fuel station or public toilet impacted storm chasers in 2020 because they had to be self-sufficient and cautious about meeting people more than was necessary. Even a storm chaser’s vehicle being towed off a muddy road could have had potentially risky consequences due to the social distancing aspect. In this way, storm chasing was affected quite significantly during the pandemic, with chasers not being able to properly enjoy their purpose without new health and safety considerations. Others affected included other members of the weather community, including meteorologists, and university lecturers who had to teach over the internet. These logistical issues caused loss of money and an erosion or reshaping of community, and due to the fact that most storm chasing tours could not run, the companies which owned the tours could not generate an income in this way either. Considering that in normal circumstances many storm chasing tourists arrive from other countries, *Accuweather* continues, ‘with the current travel bans enacted by many nations around the world, getting to the United States in the first place would be unlikely for most.’ Although the situation has recovered since the pandemic has waned in intensity, it is an interesting subject to consider for the future if such an event should occur again. With the development of technology to study different areas of weather science, there may be fewer problems in the future if travel is not possible, therefore assuaging any financial or logistical issues regarding storm chasing itself.

⁵ *Accuweather* (2020): ‘How Covid-19 has turned the world of storm chasing upside down,’ *Accuweather* [ONLINE], available at: <<https://www.accuweather.com/en/severe-weather/how-covid-19-has-turned-the-world-of-storm-chasing-upside-down/722708>> (Accessed 16/08/2022).

The storm chasing community thus has uncertainties regarding the future of the pastime, which points towards a possibly evolved storm chasing concept in the future. The idea of a new era of storm chasing is a fascinating hypothesis, and along with advancing technology may cultivate a more scientifically progressive enterprise. Pandemics may emerge again, and the Coronavirus pandemic affected the storm chasing community moderately, as discussed in an earlier chapter. The risk of pandemics may be a consideration for the future of American storm chasing, meaning that adjustments may have to be made to protect storm chasers from direct contact with others if another pandemic occurs. In the US, Coronavirus affected how storm chasers could meet, ChaserCon, social distancing, and hygiene. While this would have had a significant impact if social media did not exist, it is still relatively important for some storm chasers to meet with others to share experiences and information. During a pandemic of the future, social media will possibly replace the need for storm chasers to be around each other, as they can communicate from a distance online. With the current reliance on Wi-Fi or data in contemporary culture, it would not be much of a problem for this to happen. On the other hand, a pandemic would potentially limit global storm chasers from travelling to the US, including for storm chase tours. This means that an economical impact in US storm chasing, as with the Coronavirus pandemic, would be inevitable, which would then create financial complications for some chasers or storm tour companies. Although this is concerning, it is something which will need to be considered for the future, alongside environmental factors (climate change resulting in stronger storms in some US states), potential licensing (meaning that amateur storm chasers without meteorological credentials may struggle to participate across the US), and also if/how storm chasing takes precedence in the future American culture.

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