Weather and Climate Extremes 1 (2013) 1–3

Contents lists available at ScienceDirect

Weather and Climate Extremes

journal homepage: www.elsevier.com/locate/wace

Editorial

Weather and Climate Extremes: Need for and importance of the journal

Natural disasters are a consequence of the interactions between the weather and climate extremes and the vulnerability of human and natural ecosystems to such extremes. There is adequate research evidence which shows that the frequency and magnitude of extreme events is on the rise. The destruction extreme events cause is a function of a society's capacity to anticipate, withstand, contain or absorb the force they bring. Hence there is a critical need to understand fully the nature of weather and climate extremes; the research approaches on a better understanding of the impacts of such extremes and of the vulnerability of human and natural ecosystems; the current research efforts to improve forecasts and early warning systems; and how we can better manage such extremes. *Weather and Climate Extremes* provides academics, decision makers, international development agencies, nongovernmental organizations and civil society with publications on these different issues in order to better cope with weather and climate extremes.

1. Introduction

Natural disasters are a consequence of the interactions between the weather and climate extremes and the vulnerability of human and natural ecosystems to such extremes. There is adequate research evidence which shows that the frequency and magnitude of extreme events is on the rise. According to WMO (2013), the world experienced unprecedented high-impact climate extremes during the 2001–2010 decade, which was the warmest since the start of modern measurements in 1850. The decade ending in 2010 was an unprecedented era of climate extremes, as evidenced by heat waves in Europe and Russia, droughts in the Amazon Basin, Australia and East Africa, and huge storms like Tropical Cyclone Nargis and Hurricane Katrina. Exposure and vulnerability to natural hazards is increasing as more people and physical assets are located in areas of high risk.

According to the data provided by the Centre for Research on the Epidemiology of Disasters (CRED), during the decade 2001–2010, more than 370,000 people died as a result of extreme weather and climate conditions, including heat waves, cold spells, drought, storms and floods, This was 20% higher than 1991–2000. Hurricane Sandy, which formed as a tropical depression on 22 October 2012, made landfall as a post-tropical cyclone near Atlantic City, New Jersey, with 130 km/h maximum sustained winds. Hurricane Sandy caused some $70 billion in direct damages and lost economic output in USA, making it the second-costliest cyclone to hit the USA since 1900. There were at least 147 direct deaths recorded across the Atlantic basin due to Sandy, with 72 of these fatalities occurring in the mid-Atlantic and north-eastern United States.

An unique survey of 139 National Meteorological and Hydrological Services and socio-economic data and analysis from several UN agencies and partners conducted by WMO concluded that floods were the most frequently experienced extreme events over the course of the decade (WMO, 2013). Eastern Europe was particularly affected in 2001 and 2005, India in 2005, Africa in 2008, Asia (notably Pakistan, where 2000 people died and 20 million were affected) in 2010, and Australia, also in 2010. Record rains in June 2013 in Uttarakhand in India caused devastating landslides and flooded rivers, trapping tens of thousands of people. The rains buried villages in silt and washed away roads, while raging rivers like the Ganges swept away homes on their banks. Nearly 6000 people were missing a month after flash floods. According to Munich Re (2013a), floods causing billions of dollars in losses dominate the natural catastrophe statistics for the first half-year 2013.

Droughts affect more people than any other kind of natural hazards owing to their large scale and long-lasting nature. The decade 2001–2010 saw droughts occur in all parts of the world. Some of the highest-impact and long-term droughts struck Australia (in 2002 and other years), East Africa (2004 and 2005, resulting in widespread loss of life) and the Amazon Basin (2010) with negative environmental impacts. In the Sahel, drought reduced cereal production by 26 percent in 2012 compared to 2011. Over 10 million people remain food insecure in the region and 1.4 million children are at risk of acute malnutrition. A prolonged dry season has resulted in widespread crop failure in 2013 across Namibia and the Namibian Government estimates that the 2013 harvest will produce 42% less than the 2012 harvest. An estimated 780,000 people—approximately one third of Namibia's entire population—are now classified as food insecure. Of these, 330,000 people are in need of urgent support, according to the Government of Namibia, which declared a state of emergency on 17 May 2013. Severe drought in 2013 plagued northeast Brazil and some areas have received no rain in more than a year as over 400,000 households face freshwater shortage.

2. Need for a journal on weather and climate extremes

The destruction extreme events cause is a function of a society's capacity to anticipate, withstand, contain or absorb the force they bring. Understanding and quantifying risks from extreme events such as droughts, storms and floods underpins

http://dx.doi.org/10.1016/j.wace.2013.08.002

informed decision-making for reducing the impacts of disasters and building socio-economic resilience. Hence there is a critical need to understand fully the nature of weather and climate extremes; the research approaches on a better understanding of the impacts of such extremes and of the vulnerability of human and natural ecosystems; the current research efforts to improve forecasts and early warning systems; and how we can better manage such extremes. The *Weather and Climate Extremes* provides academics, decision makers, international development agencies, nongovernmental organizations and civil society with publications on these different issues in order to better cope with weather and climate extremes.

3. Aims and scope of the journal

Weather and Climate Extremes provides academics, decision makers, international development agencies, nongovernmental organizations and civil society with publications on different aspects of research in weather and climate extremes, monitoring and early warning systems, assessment of vulnerability and impacts, developing and implementing intervention policies, effective risk management and adaptation practices to address local and regional needs and circumstances, engagement of local communities in the adoption of these practices to cope with extremes, and information and communication strategies. The journal encourages the submission of original research papers, comprehensive review articles, and short communications which address the following:

3.1. Weather and climate extremes

Many practical problems require knowledge of the behavior of extreme values. In particular, the infrastructures we depend upon for food, water, energy, shelter and transportation are sensitive to high or low values of meteorological variables (WMO, 2009). Long-term, high-quality and reliable climate records with a daily (or higher) time resolution are required for assessing changes in extremes. With the computational advances and software developed in recent years, the application of the statistical theory of extreme values to weather and climate has become relatively straightforward and is employed in the analysis of weather and climate extremes and their impacts. There is a growing demand for information on projected changes in extremes for local scale applications and more studies need to be conducted on the use of a combination of available downscaling techniques of global climate model projections using regional climate models (nested in the global models).

This section addresses the following key subjects:

Types of extremes.
Quality and quantity of data and data analysis.
Frequency, intensity, spatial extent, duration, and timing of extreme events.
Observed and projected changes in weather and climate extremes.

3.2. Research approaches

Given that extreme climate events have a negative impact on the well-being of populations and sustainable development, there is a need to improve climate risk management capabilities. This necessitates an efficient extreme weather and climate warning systems, based on the continuous monitoring and forecasting of climate anomalies.

The following key subjects are the focus of this section:

Atmospheric science (processes and modeling).
Short- and medium-range forecasts of weather extremes.
Seasonal forecasts of climate extremes.
Monitoring and early warning systems.
Modeling impacts of weather and climate extremes.
Statistical aspects of extremes.

3.3. Vulnerability and impacts of weather and climate extremes

Changes in extreme weather and climate events have significant impacts and are among the most serious challenges to society in coping with a changing climate. New scientific analyses of the impact of ongoing warming on extreme weather events and sea levels were published by IPCC (2012). Insurance statistics reveal that of the 905 documented loss events in 2012, 840 (93%) were weather-related, i.e. storms, floods and climatological events such as heat waves, cold waves, droughts and wildfires., after earthquakes (Munich Re, 2013b). The vulnerability of human population to weather and climate extremes is increasing as more people and more property are moving into areas prone to such extremes. For example, as of 2003, 153 million Americans lived in coastal counties—an increase of 33 million since 1980—and 3.7 million lived within a few feet of high tide. The cost of the storms and the damage and destruction that follows will grow, unless a much more resilient society is created.

This section addresses the following key subjects:

Natural physical environment.
Human systems eg., coastal settlements, mountain settlements, urbanization etc.
Ecosystems.
Temporal and spatial dynamics of exposure and vulnerability.
Observed and projected impacts in different socio-economic sectors.

3.4. Managing weather and climate extremes

In the light of the growing incidence of weather and climate extremes and the associated large socio-economic impacts, there is an urgent need for improved risk management. Integration of local knowledge with additional scientific and technical knowledge can improve risk management. Improved strategies such as sustainable land management, effective communications, implementation of local adaptation measures, mainstreaming risk management into policies and practices can help in coping with weather and climate extremes.

This section focuses on the following key subjects:

Traditional knowledge.
Preparedness planning.
Risk management.
Information and communication strategies.
Policies and practices for adaptation to weather and climate extremes.
Resilience to adverse impacts of extremes.
Issues and opportunities at the local, national and international levels.
Technological innovations and improved practices.
Reducing societal vulnerability to weather and climate extremes.
Case studies.

4. Conclusions

Managing the growing incidence of weather and climate extremes and minimizing their large socio-economic impacts

requires a better scientific understanding of the phenomena, improved research and implementation of strategies for better risk management. The journal encourages the submission of original research papers, comprehensive review articles, and short communications to promote such understanding and better coping mechanisms.

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Available online 8 August 2013