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The Anthropocene: genesis of a term and popularization in the press

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Abstract: The term Anthropocene first appeared in 2000 when scientists Paul Crutzen and Eugene Stoermer attempted to define the environmental effects of anthropic activities. Since then, it has become a widespread, but also controversial, term in the academic community. As environmental discourses increasingly permeate our lives, it has trespassed the borders of scholarly traditions, becoming acknowledged in popular culture. Bearing in mind the pivotal role the press has in the popularization, dissemination and consequent understanding of given topics, the aim of this paper is twofold. Firstly, it assesses the popularity of the term Anthropocene in online and printed newspapers around the world. Secondly, it examines the degree of scientificity of the articles included in our analysis to understand the type of discourses journalists are relying on in discussing the Anthropocene. Exploring these questions, through a corpus-based discourse analysis, enabled us to assess the weight of the term ‘Anthropocene’ in contemporary popular debates and its future horizons. The findings highlight a lack of a consistent discussion of the Anthropocene stemming not only from a poor scientific understanding of its ecological drives, but also from the lack of political awareness and a general unpreparedness to face the socio-environmental implications of the Age of Humankind.

Keywords: Anthropocene; corpus-based discourse analysis; ecological sciences; environmental humanities; newspapers

1 Introduction

What is the Anthropocene? In a purely scientific perspective, the Anthropocene is a proposed geological epoch aimed at indicating the transformative impact of human

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beings on the planet's ecosystem – a phenomenon particularly evident since the massive anthropic transformations occurred over the last centuries, such as the industrial revolution. However, over the last decades, this evocative word has conveyed several interpretations and conjured up contrasting emotions. As an example, one could regard the Anthropocene as the threshold to a new era of human exceptionalism, where the game-changing impact of humankind on the ecological equilibrium of the earth is fully explored and understood. Conversely, the Anthropocene effectively resumes the frantic bio-technological transformations that characterize our era and compels us to reflect upon our potential as a species, while exploring our limitations. It invests humans with the role of alpha dogs on the planet's food chain, celebrating their mighty skills, while at the same time generating apprehension toward ecological balances and species extinction. In a semantic sense, one could maintain that 'Anthropocene' is at the same time a praise to human-led progress, and angst at the implications that it entails. Anthropocene is therefore both a celebration of anthropocentrism and the jittery rejection of human exceptionalism.

While the definition of the term can be resumed in a few sentences, its significance is hard to grasp all at once, especially considering the multiple discourses and debates that academic scholarship and popular sources are propelling. The term Anthropocene was coined by chemist Paul Crutzen and biologist Eugene Stoermer (2000) in a short article entitled *The "Anthropocene"*. After enumerating the main scientific arguments behind this expression, they provocatively concluded that "it seems to us more than appropriate to emphasize the central role of mankind in geology and ecology by proposing to use the term 'anthropocene' for the current geological epoch" (2000: 17). While over the last two decades the Anthropocene hypothesis has generated numerous scientific controversies, the term has gained momentum in academic scholarship, becoming a consolidated concept in both scientific fields as well as in the humanities.

However, despite the success of the notion of Anthropocene in several academic contexts, no linguistic studies have analyzed the evolution of the term in popular discourse, for several reasons. First, in spite of its success in academic scholarship, the official recognition of the Anthropocene as a geological epoch is still an open debate.¹ In addition, while the term is receiving attention from other

¹ Formed in 2009, the Anthropocene Working Group (AWC) has produced several interdisciplinary scientific publications with the aim of creating a convincing argument for the Anthropocene as a legitimate geological epoch. However, as we write these lines (January 2021), the International Commission on Stratigraphy has not formally recognized it as a geological Epoch. Moreover, a recent subdivision of the Holocene in three different stages (Meghalayan, Northgrippian, and Greenlandian) has created further controversies around the Anthropocene hypothesis. The AWC is expected to provide a convincing counter-argument that should conjured up in 2021 a proposal to the ICS. For the most updated text drafted by the AWG see Zalasiewicz et al. (2019).

academic fields, it still seems to occupy a niche in popular discourse, at least in comparison with other environmentally related terms such as climate change and the greenhouse effect (Bevitori 2010; Carvalho 2007; Dayrell 2019; Zottola et al. 2019).

Against this backdrop, this contribution is grounded in two main research questions. First, it aims to assess the popularity of the term Anthropocene in the press, between 2000 and 2018. In other words, we determine whether it is possible to define the Anthropocene as a consolidate term in contemporary popular discourse. Second, it aims to ascertain the degree of scientificity of the articles included in our analysis to understand the type of discourses that the press is relying on in discussing the Anthropocene, e.g., scientific hard data, critical discourses, emotions. Is the press systematically turning to reliable scientific data in discussing the Anthropocene, or does it focus on other types of discourses? This exploration would allow us to evaluate the weight of the term ‘Anthropocene’ in contemporary popular debates and its future horizons.

In Section 2, we explore some of the concepts related to the Anthropocene within the environmental sciences that are deemed useful to better contextualize the research. We also retrace previous studies carried out in the field of linguistics which center around environmental issues and their representation in the press. In Section 3, we introduce the *Anthropocene Corpus*, i.e., the dataset collected to carry out this research, and outline the methodological approach. Section 4 presents the analysis of the corpus focusing on (a) how the newspapers choose to discuss the term Anthropocene and (b) which discourses are associated with its causes and its consequences. Finally, Section 5 offers some concluding remarks and considers ideas on how to further this discussion.

2 Literature review

The article’s theoretical background is based on a critical review of the discourses on the Anthropocene produced by the so-called “ecological sciences”, that is, the heterogeneous set of disciplines analyzing the “relationships between organisms and their environments”.² This begins with Crutzen and Stoermer’s (2000) first mention of the term Anthropocene, in an article published for IGBP’s magazine *Global Change Newsletter*. It was the first scientific research to attribute multiple ecological transformations of the biosphere to human action, placing humankind at the core of environmental debates. The major effects included unprecedented increases of urbanization, the massive release of SO₂ gases as the result of massive

2 <https://www.thefreedictionary.com/Ecological+science>.

coal and oil burning, the increase of synthetically fixed nitrogen, the massive utilization of water resources and their geochemical alteration, the increase of greenhouse gasses in the atmosphere such as CO₂ (30%) and CH₄ (more than 100%), and the rise of mechanized human predation as expressed by the fishing industry (Crutzen and Stoermer 2000: 17). The analysis of the effects of human actions on the planet led the authors to the formulation of the concept of Anthropocene as reported above (p. 17).

While this definition constitutes the first evidence of the term in scientific literature, it should not be forgotten that ecological scientists in other parts of the world had already drawn similar conclusions. As an example, the term “Anthroposphere,” was widely adopted by Chinese scientists since the 1990s (Syvitski 2012: 14). Before them, in 1922, Russian geologist Aleksei Pavlov described the state of the world as an “Anthropogenic system (period) or Anthropocene.” This mindful definition allegedly influenced geochemist Vladimir Vernadsky’s idea of *Noönsphere* – that is the combination of human cognition and the biosphere (Lewis and Maslin 2015: 173). Remarkably, Vernadsky’s concept of *Noönsphere* was a major inspiration for Crutzen and Stoermer (2000: 17), who explicitly referenced him in their article as one of the first geologists to recognize the increasing power of humankind as part of the biosphere.

A further relevant influence on Crutzen and Stoermer’s (2000) Anthropocene hypothesis, was a 1997 article entitled *Human Domination of Earth’s Ecosystems*, written by a research team led by Peter M. Vitousek. The text provided a comprehensive bio-geological analysis on the role of human actions in transforming our planet, reaching conclusions in line with Crutzen and Stoermer (Vitousek et al. 1997). In light of this vast literary corpus, it would be rather inaccurate to attribute the sole authorship of the Anthropocene to Crutzen and Stoermer (2000). Yet, there is no doubt that their research paved the way to a more detailed exploration of the ecological features characterizing the Anthropocene, generating debates and different hypotheses by members of the scientific community.

The main challenge for scientists researching the Anthropocene concerns the need to gather relevant scientific data assessing the magnitude of human actions on our planet – a process that requires the adoption of different techniques to assess environmental impacts, while at the same time creating a unified interpretation that clearly connects ecological change to human action. This has determined the need to carry out collaborative efforts between different scientific fields. The most relevant figures involved in the study of the Anthropocene include internationally renowned chemists such as Paul Crutzen (2002) and Will Steffen et al. (2007), geologists such as Jan Zalasiewicz (2008), James Syvitski (2012), Whitney Autin and John Holbrook (2012); geoclimatologists such as Simon Lewis

and Mark Maslin (2015); as well as geographers such as Erle Ellis (2010) and environmental historians such as John McNeill (McNeill and Engelke 2016).

Most of the scientists mentioned above belong to the so-called ‘Anthropocene Working Group’ – an interdisciplinary think-tank that is nowadays attempting to create a case for the Anthropocene as a recognized Geological Epoch, situated right after the Holocene. In its scientific analysis, the group agrees in utilizing carbon dioxide emissions as the most distinguishing feature of the Anthropocene (Steffen et al. 2007, 2011; Zalasiewicz et al. 2008, 2019). A dominant view promoted by the Anthropocene Group frames the Anthropocene as a very recent phenomenon, attributing its beginnings to the Industrial Revolution – more specifically to James Watt’s invention of the Steam Engine in 1784 (Crutzen 2002: 23). However, it also attributes the most evident phase with the so-called “Great Acceleration”, a phenomenon began in 1945 with the strong demographic increase of the world’s population as a consequence of bio-technological innovations such as fertilizers, nuclear energy and carbon cycling energy machineries (McNeill and Engelke 2016). Another scientific perspective on periodization that is worth mentioning is constituted by Lewis and Maslin’s (2015) Columbian Exchange hypothesis, attributing major socioeconomic and ecological changes to the European colonization of the American Continent.

2.1 The perspective of the environmental humanities

While the scientific background underlying the Anthropocene is a valuable basis for our study, there is no doubt that the discourses produced by ecological scientists over the last decades have contributed to the creation of a hegemonic discourse about the Anthropocene as an exclusive domain of the hard sciences (Steffen et al. 2007: 619). The notion of ecological scientists being considered as the sole repositories of knowledge is a troubling discourse, as it implies that the solution to the ecological issues brought by the Anthropocene can only be resolved by an enlightened scientific community. The implications of this discourse are particularly problematic, as the construction of a narrative of the Anthropocene uniquely centered on scientific discourses would adopt a language inaccessible to most public opinion, thus diminishing the role of the social sciences. Perhaps more importantly, as acknowledged by historian Dipesh Chakrabarty (2009: 2), the adoption of a similar discourse could lead to a distorted narrative on the ecological crisis of the Anthropocene that places the blame on humankind as a coherent whole without taking into account the structural economic inequalities that have characterized the rise of modernity.

A valid answer to the issues presented by the mainstream scientific discourse has been produced by the emerging humanistic field of the environmental humanities. Just as much as the ecological sciences, this emerging disciplinary field fully endorses the scientific data behind the Anthropocene theory, but also produces challenging critical reflections on its political implications. An example is the book *The Shock of the Anthropocene* (2017), by Christophe Bonneuil and Jean-Baptiste Fressoz, which provocatively questions some of the ideological assumptions of the Anthropocene, looking at its political premises, as well as its economic mechanisms and cultural constructions propelled by the rise of capitalism. As maintained by the authors, a history of the Anthropocene should critically discuss scientific findings, placing them in a broader context considering the political and economic choices at the core of the current environmental crisis (p. 19–20). This perspective echoes Jason Moore’s (2015: 86) analysis of the socio-environmental implications of the Anthropocene, which has resulted in uncontrolled capital accumulation, leading to the provocative definition of “capitalocene”.

The adoption of these sources adds complexity to the discourses on the Anthropocene, allowing to bridge important gaps that the ecological sciences have struggled to fulfill. While it is essential to analyze scientific data in order to understand the main ecological imaginary underlying the Anthropocene, a linguistic analysis on the popularization of the term in popular sources needs to take into account the complex socio-economic, political and ecological implications with which this term is associated. As the term continues to gain momentum in both popular and academic discourse, it would be virtually impossible for the press not to draw from both the scientific mainstream narratives of the Anthropocene and from the critical reflections posed by other academic disciplines such as the environmental humanities.³

2.2 Environmental discourses in the press

The press can be considered one of the popular sources on which the scientific community has consistently relied on for the dissemination of scientific content. In point of fact, this medium has been proven to be particularly relevant to investigate the representation and formulation of environmental discourses.

Dayrell (2019) examines the discourses around climate change in Brazilian newspapers across a time span of 10 years. Among other things, the author finds that the Brazilian press stresses the fact that climate change is a consequence of

³ For an updated perspective on the Anthropocene’s multidisciplinary reach see Thomas et al. (2020).

human activities (p. 154). This is reinforced by the reference to burning of fossil fuel and deforestation. She concludes that the Brazilian press also accentuates the importance of sustainability and sustainable development. Bevitori (2010) proposes a corpus-assisted study on the press in the UK and the USA, where she concludes that while the two countries rely on similar domains, such as science, taking action, engaging responsibility and the threat of climate change, they then realize the discourses in different ways, i.e., framing climate change within a discourse of “causer” versus “caused entity”.

Although not focusing on the press, it is worth mentioning here that one of the first scholars to tackle environmental issues was Hajer (1995), examining the discourses around acid rain policies. Hajer aims at retracing the history of the use of the term ‘acid rain’ in public policy while discussing the function of discourse representations in the shaping of reality.

Applying a number of different methodological approaches, the press has been an invaluable source for the analysis of environmental issues and their popularization. Carvalho and Burgess (2005) look at newspaper articles in the UK and the language used around representing climate change as a risk and a threat to society. On the discourse surrounding environmental issues, drawing on critical discourse theories and social semiotic, Richard (2009) examines the UK and USA media to investigate the extent to which ecological issues have become integrated within broader society thanks to its coverage. The author demonstrates that the discourses presented in the media tend to divert the attention of the audience away from the idea that the earth is undergoing a destructive process due to pollution and other negative environmental issues. Additionally, Boykoff (2011) examines US newspapers to determine the main actors involved in speaking about climate change. His findings highlight that scientific research, ecological events, journalist norms and socio/political forces are combined together to shape the discourses surrounding climate change. Bednarek and Caple (2010) focus on Australian newspapers and analyze a new kind of news reports, multisemiotic news stories. The authors analyze evaluative meaning in the headings, images, and captions. They identify a clash between the humorous effect of the images used and the seriousness of the events reported and reflect on whether this can be seen as good or bad practice.

In sum, the literature on environmental issues has nowadays become extensive (see also Stibbe 2021), which is proof of the topic’s increasing social value.

3 *The Anthropocene Corpus: data collection and analytical approach*

For the purpose of our analysis a corpus of newspaper articles was collected, referred to as the Anthropocene Corpus (AC). Articles published between January 1st 2000 and June 30th 2018 and containing the term ‘Anthropocene’ were downloaded through the online platform LexisNexis.⁴ The year 2000 was chosen to start data collection as it was the year in which the Anthropocene was first referenced in an academic paper (Crutzen and Stoermer 2000). In an attempt to cover the discourses surrounding the Anthropocene in both the western and eastern part of the world, while limiting the research to English, we included news reports from Australia, India, the United Kingdom (UK) and the United States of America (USA). The newspapers included in the data collection were based on a function available on LexisNexis which groups together the major newspapers of each of the chosen countries. This function was not available for India; in this case we included all English language newspapers available.

The articles were downloaded, duplicates and different editions of the same article, tv/radio/theatre schedules, book reviews, tv guides, film reviews were eliminated. Of the articles only the headline, byline, date of publication and body copy were kept. The data was divided into four sub-corpora according to the country of publication. Table 1 exemplifies the final outcomes of corpus collection.

From a purely linguistic perspective our analysis can be positioned within the framework of corpus-based discourse analysis (CBDA) (Baker et al. 2008). CBDA lies at the intersection between critical discourse analysis (CDA) and corpus linguistics (CL) and can be defined as a systematic top-down framework of analysis which moves back and forth between qualitative and quantitative analysis. Baker et al. (2008) suggest the framework includes nine steps which allow to first grasp information about the background and context and later formulates informed

Table 1: Anthropocene corpus.

Country	No. of articles	Word tokens
Australia	114	96,788
India	88	65,987
UK	356	344,520
USA	172	187,493
Total	717	694,788

⁴ <https://www.lexisnexis.com>.

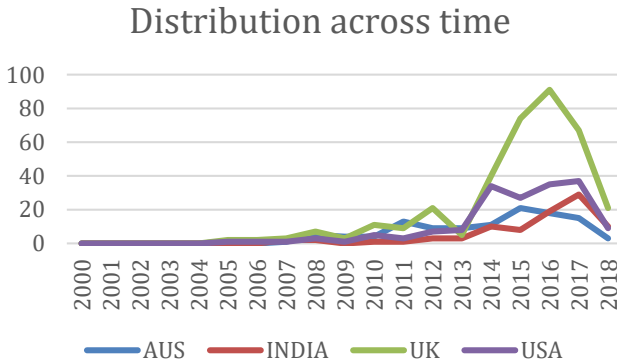
research questions. The background knowledge also permits making informed decisions with regards to corpus building and sources of investigation.

The Anthropocene corpus was analyzed using the software Sketch Engine⁵ (Kilgarriff et al. 2014). The four datasets were analyzed both separately and as a whole. Using the frequency tool, we began by analyzing the frequency of occurrence of our search term. In other words, to have a clear view of the presence and distribution of the term Anthropocene and highlight the countries in which discussion around it is more predominant, we zoomed in on a list of all the words occurring in the corpus displayed in an orderly fashion according to their frequency (most occurring to least occurring). Frequency can be visualized in its normalized (or relative) score, that is to say, by calculating the presence of each token in the corpus per million words (usually the preferred parameter, but lower parameters can be used depending on the size of the corpus). This is useful when comparing results from datasets that are not similar in size (McEnery and Hardie 2011: 49–50), as the sub-corpora in this analysis.

Relying on the interdisciplinary core of this research, an exploration of the literature review led to the identification of a list of issues that scientists label as the causes of the Anthropocene that were later searched within the corpus (see Section 3). The presence and representation of these issues aided the investigation of the degree of scientificity in the articles. “[T]he significance of word frequency also demands qualitative interpretation depending on context” (Kirk 2009: 33); for this reason, we furthered the investigation through a concordance analysis. Concordances play a key role in unveiling the context in which these terms are inserted, and thus the type of linguistic patterns which accompany them. A concordance analysis is carried out through the creation of a concordance list, i.e., “[...] a list of all the occurrences of a particular search term in a corpus, presented within the context they occur in” (Baker 2006: 71). This allows for an in-depth analysis of the context in which the term is presented.

The choice to investigate newspapers and the popularization of the concept of Anthropocene mainly stems from the fact that the media influences “knowledge, beliefs, values, social relations [and] social identities” (Fairclough 1995: 2). The language used in the media reveals a lot about attitudes and affairs in society and creates stereotypes and biases in culture (Bell 1991: 3–5). In this sense, our methodology, CBDA, has been increasingly applied to the study of news discourse. The advantages of such application can be identified both ways: while the press represents an optimal source for the investigation of the externalizations of ideologies and acts as a mirror of society, the quantitative perspective offered by CL enables to tackle large amounts of news data from a qualitative perspective.

5 <http://www.sketchengine.eu>.



Graph 1: Distribution across time.

4 Data analysis

The data shows (see Graph 1) that the term Anthropocene follows four different distribution patterns. In this initial exploration the four sub-corpora were analyzed separately.

As Table 2 highlights, a common pattern is the absolute absence of the word Anthropocene from newspapers until 2004. There are few results in 2005 but the presence of the topic remains incredibly low until 2010, when for the first time more than 10 articles were published in the UK. The number of articles retrieved per country each year increases as we get closer to the present, indicating a growing awareness and interest towards this topic. Despite this, the overall number of articles that make up the AC is relatively low if we consider the time span of data collection (18 years). The United Kingdom seems to be the most prolific country in this sense, followed by the USA, Australia and then India (see Table 2).

Having acknowledged the presence of the term in the corpus, we considered the type of representation associated with it, which shapes the understanding of the concept. Using “word-sketch”, a colligation-based tool provided by Sketch Engine, we identified the major linguistic patterns surrounding the term Anthropocene. Colligation can be defined as a type of collocation that involves relationship at the grammatical level rather than the lexical level (Baker et al. 2006: 36). More specifically, the word-sketch groups collocates which belong to the same word family and have the same function.

Investigating all the results emerging from the word-sketch is beyond the scope of this analysis, but a more in-depth illustration of a selected number of these terms might shed some light on the general representation of the Anthropocene in the AC.

Table 2: Distribution across sub corpora.

Year	AUS	INDIA	UK	USA
2000	0	0	0	0
2001	0	0	0	0
2002	0	0	0	0
2003	0	0	0	0
2004	0	0	0	0
2005	1	0	2	1
2006	0	0	2	1
2007	1	2	3	1
2008	5	2	7	3
2009	4	0	3	1
2010	4	1	11	5
2011	13	1	9	3
2012	9	3	21	7
2013	9	3	5	8
2014	11	10	40	34
2015	21	8	74	27
2016	18	19	91	35
2017	15	29	67	37
2018	3	10	21	9
Total	114	88	356	172

Table 3 shows the collocates taken into consideration for the analysis. In this phase of the analysis the data was considered as a whole.

The first category groups together some of the most co-occurring nouns modified by Anthropocene. Of the five words that are considered here four refer to time spans, covering four very different time ranges. The MacMillan Dictionary of English establishes an *era* to be a large division of geologic time usually shorter

Table 3: Word-sketch of Anthropocene.

Word category	Collocates
<i>Nouns modified by Anthropocene</i>	era, epoch, age, period, idea
<i>Adjective predicates of Anthropocene</i>	permanent, real
<i>Verb with Anthropocene as subject</i>	begin, become, manage, pose, mark, represent, be, refer, start, include
<i>Verb with Anthropocene as object</i>	define, enter, name, recognize, coin, declare, formulate, characterize, design, consider, see

than an eon (1 billion years), a *period* a division of geologic time longer than an epoch and included within an era, an *epoch* a division of geologic time less than a period and greater than an age, while an *age* a division of geologic time that is usually shorter than an epoch. The following examples taken from the AC show the way in which these terms are used within the press.

- (1) The Anthropocene is the name of a proposed geological **epoch**⁶ that may soon enter the official Geologic Time Scale. (*Daily Mail* 11/03/2015)
- (2) Taking a look at the state of the Earth in the Anthropocene, this **era** of human-induced global environmental change, goes some way towards revealing the consequences of our Western rejection of feelings and emotions. (*The Armidale Express* 30/05/2018)
- (3) This is the Anthropocene, the **age** when humans risk extinction by their impact on the earth's environment. (*Hindustan Times* 22/11/2017)
- (4) A proposed term for the current geological **period**, "Anthropocene" spotlights mankind's recent enormous influence on its environment. (*The Washington Post* 8/12/2017)

The four nouns are used by the press interchangeably in the definition of the Anthropocene. The use of these nouns in relation to the term Anthropocene might aid the reader in understanding that the Anthropocene is a span of time but will at the same time confuse them by the incoherence of the definitions. Similarly, Zottola et al. (2019) determine that the incoherence in the use of terminology is one of the causes that prevent the correct popularization of the issues related to nitrogen pollution. Additionally, as the newspapers included in the AC are mainstream publications and not necessarily scientific papers, the average reader will not be familiar with the specific terminology, thus making the understanding of concepts even more difficult. All in all, if the Anthropocene is defined as a span of time, whether it is done using the correct label or not, what the reader learns is that the Anthropocene exists. This is supported by the category of *adjective predicates of Anthropocene*, which includes the adjectives **permanent** and **real**. The press is representing the Anthropocene as something real that is happening now, given that the International Commission on Stratigraphy has not yet decided whether this term will be officially in use or not, this finding is unexpected. This conclusion goes against one of the representations suggested by the category *nouns modified by Anthropocene*. The noun, **idea**, in fact, suggests something that is still at an

⁶ Bold in examples added for emphasis.

embryonic stage, something more abstract than concrete. The incongruence between the representations suggested by the two categories and within the same category appears to be very inaccurate and superficial, leading to confusion more than clarity.

The other categories of collocates are all verbs which have Anthropocene either as object or subject. This extensive list of verbs suggests that a large variety of actions are being performed around the noun Anthropocene. Most of the terms in the category *verb with Anthropocene as object* mainly frame the Anthropocene as a new concept that needs to be introduced and explained (e.g., define, name, recognize, coin, declare, formulate, characterize). On a similar note, the verbal processes (associated to verbs such as: begin, become, mark, start, include) in which the Anthropocene is the subject suggest that the mechanism by which a definition to this topic is being formulated is, currently, at its starting point, not completely defined yet, or new.

4.1 Causes of the Anthropocene

A preliminary investigation into the scientific literature about the Anthropocene revealed a specific set of causes associated with this phenomenon that we define as human-made natural issues (illustrated in Table 4). The corpus was searched in order to identify their presence.

Some of the environmental issues identified by scientists as the main drives towards a new geologic epoch are never mentioned in the press (see Table 4). As far as natural issues are concerned, what emerges from this search is that the Anthropocene is generally described in relation to those concepts which are

Table 4: Causes of the Anthropocene – natural issues.

Causes	AUS	INDIA	USA	UK
Biodiversity loss	3	3	2	18
Climate change	175	109	167	411
City growth	0	0	0	2
CO ₂ emissions	4	2	2	11
Ice caps melting	0	0	0	0
Methane cycle	0	0	0	0
Nitrogen cycle	1	0	2	9
Ocean acidification	7	7	16	21
Overpopulation (demographic growth)	0	0	1	9
Phosphate cycle	0	0	0	0
Plastic production	0	0	0	6

already familiar to a lay audience; in fact, the most occurrences are found for “biodiversity loss” “climate change”, “CO₂ emission” and “ocean acidification”. The peculiarity of these concepts is that the terms are understandable even for a reader who lacks a scientific background. The other causes, associated to more complex or specialized notions, are never mentioned within the corpus.

Given the frequency of “climate change” among the causes mentioned in the corpus, we performed a qualitative analysis of the context of occurrence via a concordance analysis of the phrase.

The context provides unexpected information related to the framing of climate change and the Anthropocene. In fact, the concordance analysis highlights how the four countries present different views. The examples below report on the general patterns each sub-corpus presents.

- (5) Ironically, some States in India have also grappled with **heatwaves** and **drought**, and the coming of an above-average **monsoon** was meant to be succour. In the mysterious and startling ways of climate change, we have the added dimensions of the Anthropocene which affect more than the climate. Human activity – such as bad decisions linked to the opening or shutting of water sluice gates, or building over water canals (reminiscent of the 2015 Chennai floods), or encroaching on rivers like Mumbai’s Mithi – has changed the way we receive water and rainfall. (*The Hindu* 3/08/2016)
- (6) Many Australians may still be unaware that climate change is a **bipartisan national security issue**. This was cemented only in the latest Defence white paper that, building on the 2009 and 2013 (Labor) iterations, identifies climate change as a “**major challenge**” to **Australia’s national security**. [...] The US Department of Defence recently released its most comprehensive climate policy yet, the “Climate Change Adaptation and Resilience Directive”, in preparation for the coming impacts of climate change. Understanding how climate change is unfolding in different countries and regions in terms of rate of change, exact locations and specific impacts lies at the heart of security planning in this new epoch of the Anthropocene. (*Canberra Times* 8/04/2016)
- (7) One of their central contentions is that we are no longer living in the Holocene, but in a new geological era they refer to as the Capitalocene – the currently fashionable term “Anthropocene”, they argue, suggests that our current state of ecological emergency is merely the result of humans doing what humans do, whereas the reality is that it **flows out** of the specific historical phenomenon **of capitalism**. As a term, then, Capitalocene is

designed to nudge us away from evolutionary determinism, and from a sense of collective culpability for climate change, towards an understanding of the way in which **the destruction of nature has largely been the result of an economic system organised around a minority class and its pursuit of profit.** (*The Guardian* 14/06/2018)

- (8) If you are a denier of global climate change and that man has anything to do with it, and you think that Glenn Beck and Rush Limbaugh are science gods, you won't like this column. Now, read on ... Eocene, Oligocene, Miocene, Holocene – the names denote pieces of geologic time in what's called the Cenozoic era. **Now we're in what scientists call the Anthropocene, an epoch that began in the 18th century when man attained the ability to affect Earth's biosphere for good or ill.** (*The Tampa Tribune* 19/02/2008)

Examples 5 through 8 show the main semantic patterns that each country associates with climate change and the Anthropocene. The 109 occurrences of “climate change” in the Indian sub-corpus can be traced to 34 articles (30% of the total articles in the Indian sub-corpus). The press in India presents the most scientific-related type of discourse in the articles about the Anthropocene (see Example 5). In fact, 76% of the articles analyzed related the discussion to environmental issues explaining and providing evidence of the change witnessed by the country, supported by quotes and interviews with scientists.

The Australian press presents 175 occurrences of the phrase “climate change”, distributed across 64 different articles (56% of the total articles in the Australian sub-corpus). The press in Australia seems to frame the issue of climate change and the Anthropocene within a very different discourse (see Example 6). Here in fact, the issue is described as a political one, related to national security, and the strongest element that emerges from these articles is fear. As the articles clarify, Australia is currently not the country which produces the largest amount of pollution and the alarmism around the issue is mainly based on ideological reasons as we read in *Innisfail Advocate* “Alan Finkel, Australia's chief scientist, has admitted that Australia's effect on 'climate change' is 'virtually nothing'. The three biggest emitters of 'carbon pollution' are India, China and the US and they're not planning any 'Paris' reductions. It seems we're exporting our remaining manufacturing jobs and crippling our economy for purely ideological reasons.” (15/07/2017). This pattern occurs in the sub-corpus 29% of the times.

The UK press presents 411 occurrences of “climate change” spread throughout 171 articles (48% of the total articles of the British sub-corpus). The British press frames climate change and the Anthropocene as an issue related to economic

matters. Example 7 exemplifies the discourse pattern constructed in the articles, which describes the Anthropocene as happening because of capitalism and of choices made thinking about economic profit rather than ecological balance. This specific discourse pattern appears in 38% of the articles analyzed.

The last example (8) is taken from the sub-corpus of newspapers published in the United States. Here, we have 167 occurrences of “climate change” (49% of the 83 articles in the USA sub-corpus). These articles, as Example 8 shows, mainly aim at describing the concept of Anthropocene and explaining the issues related to it in a more accessible and less scientific way, juxtaposed to the pattern found for the Indian sub-corpus. This discursive construction is found in 61% of the articles analyzed.

4.2 Consequences of the Anthropocene

Lastly, we also looked into the representation of the consequences that the press foresees concerning the aftermath of the beginning of the Anthropocene. Table 5 summarizes the results retrieved from a frequency analysis of the four sub-corpora. The items identified as consequences of the Anthropocene were then searched through the concordance tool to confirm their meaning and usage in context.

The overall account of the Anthropocene’s consequences displays a rather negative vision, with a prevalence of terms pointing to an unfavorable outcome, e.g., “catastrophe”, “crises”, “collapse”, “irreversible” and “extinction”. Unsurprisingly, the results are homogenous across the countries, although with due proportions in terms of quantity. Perhaps more interestingly, the word “crisis” appears several times in each country (114 for UK, 49 for Australia, 18 for the USA,

Table 5: Consequences of the Anthropocene.

Consequences	AUS	INDIA	UK	USA
Catastrophe	8	3	53	25
Crisis (crises)	39	11	114	18
Collapse	17	10	47	23
Environmental/Ecological crisis	2/1	0/0	7/0	0/1
Equilibrium/Ecological balance/Balance of nature/ Harmony	1/0/0/	1/0/0/	1/0/1/	0/2/0/
Extinction	71	32	274	96
Feedback loops	0	5	3	0
Human/Our survival	1/0	0/1	0/5	1
Irreversible	3	4	26	3
Resilience	2	3	12	8

11 for India), with a few or no occurrences with regard to environmental or ecological crisis (seven for UK, three for Australia, two for USA and zero for India).

Conversely, positive expressions hinting at a possible bright future for humanity in the Anthropocene epoch are scarce or non-existent. Words such as “equilibrium”, “ecological balance”, “balance of nature” and “harmony” appear very rarely (a total of only 13 times overall), hinting at a quite pessimist vision of the future. More common is the use of the scientific expression “resilience”, although it is only used with a positive connotation 25 times. Accordingly, the expression “human survival”, or “our survival” almost does not appear. This could mean that either human survival is still not questioned by the sources, or strong pessimism towards the changes brought by Anthropocene is hinted at.

The pessimistic depiction of the Anthropocene is also confirmed when looking at possible solutions reported by the articles, whose contents are fragmented and unclear. Interestingly, all the sources seem to assert the need to develop innovation (58 occurrences) and sustainability (88 occurrences), in order to achieve sustainable development (26 occurrences). Yet, in terms of practical solutions, the options are not many and none of the sub-corpora presents consistent results. In terms of technological fixes as a solution, the development of new technologies and geo-engineering account for only 30 occurrences. //use occurrences rather than results throughout – results should refer to findings// Similarly, preservation and environmental conservation account for only 20 occurrences, while activism, environmentalism, environmental movements and environmental activists add up to a total of 46 occurrences. Some importance is given to education (53 results), although only three mentions are explicitly concerned with environmental education (two in the US and one in India). Importance is also given to the role of political negotiations with the words politics and negotiations amounting to a total of 86 occurrences, more specific terms such as environmental justice and social justice are scarce (only four overall, zero in Australia).

5 Discussion and conclusion

This research has investigated the presence of the term Anthropocene in the English language press in four different countries – Australia, India, the United Kingdom and the United States. The results shed some light on the choices made by the journalists in discussing the environmental issues associated with the Age of Humankind. The results presented here demonstrate that the press is indeed attempting to popularize the concept of the Anthropocene and to acknowledge the advent of this new epoch. This is especially evident considering the verbal patterns that surround the term, which points to the fact that its meaning is still not

consolidated – hence the need to explain the term and underline its use. These patterns also corroborate the relatively young age of the term, especially in relation to its usage. In fact, the press mostly discusses the concept by explaining the ecological effects associated with it, as well as the different theories formulated over the last years.

The analysis of the nominal patterns that surround the term also indicates that the definitions of the Anthropocene produced by the sources are not always coherent with one another, displaying doubts and ambiguity on its meaning. Often the newspapers analyzed do not explore the matter in-depth, using the specific terminology inconsistently and incorrectly. While this could be explained by a need of the press to sensationalize its discourse in order to increase readership, the ultimate result is the diffusion of incorrect or vague information – quite the opposite of what the media should aim for. Related to this is the fact that the scientific explanations provided by the texts are always superficial and related to concepts which have already undergone a process of popularization in the past years, *climate change* being the most illustrious example. This indicates that the press is not primarily interested in informing the readership, at least not as much as it is interested in engaging with essential emotions, relying on consolidated popular knowledge. Perhaps more importantly, the potential ecological causes of the Anthropocene are also explained superficially, and again, in most cases they are related to concepts already well acknowledged in popular discourse. This idea is particularly reinforced by the almost scarcity of scientific terms. As an example, the expression “feedback loops” – a central topic for ecological studies – is only mentioned eight times in the whole AC (five times in the Indian press and three times in the British one).

Overall, this study has revealed that the term Anthropocene is alive and well aside from academic discourse. However, the four countries analyzed unexpectedly provide four different representations of the Anthropocene. These are not connected to one another, but equally not primarily concerned with discussing the main environmental shortcomings of the Anthropocene. The scientific inconsistency of popular discourses associated with the Anthropocene should not solely be regarded as the attempt to promote eye-catching discussions aimed at increasing readership. Rather, a similar shortfall in content needs to be associated with the ideological context encompassing this discussion.

While an in-depth analysis of the politically related concepts associated with this term would deserve a separate research effort, some considerations can also be raised at this stage. In fact, it is rather evident that the lack of a consistent discussion of the Anthropocene does not solely stem from a poor scientific understanding of its ecological drives, but also by the lack of political awareness and a

general unpreparedness to face the socio-environmental implications of the Age of Humankind. This confirms Bonneuil and Fressoz's (2017: xi) idea that,

the Anthropocene label, proposed in the 2000s by specialists in Earth system sciences, is an essential tool for understanding what is happening to us. This is not just an environmental crisis, but a geological revolution of human origin. We should not act as astonished ingénues who suddenly discover they are transforming the planet: the entrepreneurs of the industrial revolution who brought us into the Anthropocene actively willed this new epoch and shaped it.

In light of these considerations, it would be perhaps reductive to maintain that the popular sources analyzed in this study are simply depicting a negative representation of the Anthropocene. Rather, the results demonstrate the substantial unpreparedness of popular discourses in promoting compelling discussions on the main underlying arguments of the Anthropocene, or in comprehending the game-changing potential effects of a new geological era, unprecedentedly influenced by humankind's "telluric forces". The implications of this study are therefore equally unsatisfactory and potentially alarming. While future scientific assessments will be increasingly more consistent in assessing the geological and biochemical implications of the Anthropocene, the inconsistency of popular discourse could potentially exacerbate social and political responses to increasingly tangible environmental threats, unless the dissemination of a consistent scientific and socio-political understanding becomes the priority. As a result, this research effort could contribute to creating awareness on such a central discussion concerning the future of humankind and the earth as a whole. In this sense, we believe that future research would benefit from an expansion of the corpus to other countries, either belonging to the English-speaking world (e.g., Canada and Nigeria), but also to non-English speaking arenas (e.g., China and Russia), thus providing more comprehensive cross-cultural and multilingual comparisons. Equally, future research could attempt to assess the ways in which these discourses might be impacted (or not) by the potential official recognition of the Anthropocene by the International Commission on Stratigraphy. After all, if our future on this planet – as well as that of countless other species – is indissolubly related to our capacity to create game-changing policies for the ecological issues brought by the Age of Humankind, these will need to be supported by convincing public discourses which should be able to elicit positive responses, while at the same time substantially enhancing our ecological understanding.

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