

Anthropocene, human sciences and historiography

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Abstract: The article initially presents an increasingly significant move of discussions about the Anthropocene towards humanities and social sciences. Then, taking as a starting point the proposal that these fields could contribute to the understanding of the “consequential meta-level” of studies on the Anthropocene, it discusses how some works produced in humanities and social sciences have dealt with the relationship between causes, effects and consequences regarding the new planetary regime, with a special focus on the debate about the “technosphere.” It concludes by indicating the potential of the “ontological turn” to expand the explanatory and communicative horizons of historiography.

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The studies on the Anthropocene

From the beginning of the 2000s until 2020, there has been an exponential increase in the number of publications related to the Anthropocene. They are not limited to the fields of the Earth system science (ESS) or geology and a significant amount already originates from the field of human sciences (Alcântara et al., 2021). This deluge of researches corresponds to an expressive diversity of epistemic and political perspectives, and the growing attention of the academy to the theme corresponds to an increasing difficulty of newcomers to place themselves in relation to these debates.

For this reason, we have seen in recent years the publication of studies that seek to synthesize, typify and qualify the various lines of thought from which the problems related to the post-Holocene¹ have been approached. In the field of natural sciences, it seems that this need has emerged mainly due to the initiative to formalize the Anthropocene as a geological epoch. As these studies make clear, the divergences about where and when to place the most recent geochronological or chronostratigraphic unity in the geological time scale are not limited to technical controversies. Since the differential of the Anthropocene would be the evincing of humanity's geological force, the explanations of this phenomenon are necessarily linked to historical and political causation. As I have shown in another work, since the early publications on the Anthropocene, the ESS needed to articulate a historical sense to the data and modelling of their researches (Lowande, 2023a). These narratives collided directly with the most refined discussions already produced in the field of human sciences about the relations between "humanity" and "nature," especially regarding the philosophical and political problems comprised in these two concepts. On the other hand, ESS researches raised much more consistent and impacting evidences to the varied investigative trends of human sciences, serving different diagnoses and prognoses regarding the paths taken by modern society.

This has been generating another avalanche of studies in the field of humanities and, with it, new attempts of synthesis and systematization specifically directed to the reception of the discussions on the Anthropocene in its realm. As expected, here too there are already several proposals of classification, each one with its own normative implications.

The term Anthropocene has been adopted by the community of scientist of the Earth system since the early 2000s, especially after the publication of the article that has this noun on its title, written by Paul Crutzen and Eugene Stoermer (2000). The idea that planet Earth has a global system composed of interconnected biophysical cycles, responsible for the maintenance of life as we know it, has several antecedents (as pointed by Crutzen, Stoermer, 2000; Crutzen, 2002; Steffen, Crutzen, McNeill, 2007; Steffen et al., 2011, 2020; Hamilton, Grinevald, 2015; Zalasiewicz et al., 2019; Horn, Bergthaller, 2020; Clark, Szerszynski, 2021). However, the attempt to measure or control these systems by means of mathematical models refers more directly to the period after the Second World War, whereas the consolidation of the ESS is linked to the creation of the Nasa Earth System Science Committee, in 1983, and of the International Geosphere-Biosphere Programme (IGBP), in 1987 (Hamilton, Grinevald, 2015; Steffen et al., 2020). The idea,

attributed to Crutzen, that humanity (or part of it) had become a geological force, seemed provocative to the stratigraphic community because the finding of this hypothesis would imply the inclusion of a new unity on the geological time scale. Some representatives of this community decided to take this provocation seriously in 2009 and created the Anthropocene Work Group (Zalasiewicz et al., 2021, p.2), aiming to demonstrate, drawing on the practice and language accepted by the stratigraphic community, the feasibility of including a new “era,” “epoch” or “period” on the geological time scale corresponding to human planetary agency.² This community has tended to a consensus about a new “epoch,” the “Anthropocene,” which would have begun, not in 1784, as Crutzen had initially proposed, but at a point between 1945 and 1962, a period corresponding to the beginning of the “Great Acceleration” of anthropic changes on the planet, identified through the presence of radioactive elements dispersed throughout the terrestrial surface resulting from atomic bombs testing (Zalasiewicz et al., set. 2017, 2019).

The historian Dipesh Chakrabarty (2009) was one of the first to highlight how this problem made unfeasible the old epistemological separation between natural and human sciences. The criticism of the epistemological scission between the realms of humanity and nature was, obviously, not new in the field of humanities (see, for example, Plessner, 2018, originally published in 1931; Adorno, Horkheimer, 2006, originally published in 1947; Löwith, 1952; Deleuze; Guattari, 2011, originally published in 1980; Agamben, 2004; Derrida, 2008; Latour, 2019a, 2019b).³ However, the accumulation of evidence on the imbrication between human and planetary history in the field of ESS and geology was an opportunity to reignite this debate. Soon, the Anthropocene became the center of attention of science and technology scholars (Latour, 2015, 2020a, 2020b; Stengers, 2015; Haraway, 2016), anthropologists sympathetic to the “ontological turn” (Descola, 2017; Povinelli, 2016; Danowski, Castro, 2017; Cadena, Blaser, 2018; Tsing, 2022), intellectuals from varied origins interested in animal studies,⁴ or in “object oriented ontology” (Morton, 2013), not to mention the studies on environmental humanities (see, in this regard, Horn and Bergthaller, 2020), and other fields.⁵

The discussions about the Anthropocene finally became a recurrent topic, represented in a significant way by human sciences as from the mid-2010s (Alcântara et al., 2021). This brought along different critical stands in relation to how ESS and geology had been presenting the idea of Anthropocene. We could tentatively divide the criticism according to the deletions produced by ESS and geology narratives in terms of capitalist causations (Roelvink, 2013; Malm, Hornborg, 2014; Moore, 2020), patriarchal causations (Grusin, 2017; Stevens, Tait, Varney, 2018; Hache, 2018), and racial or colonial causations (Povinelli, 2016; Davis, Todd, 2017; Yusoff, 2018; Gosh, 2021; Ferdinand, 2022). Some of this criticism has been considered in recent studies by groups more directly related to the discussions on the Anthropocene in ESS (Steffen et al., 2020) and stratigraphy (Zalasiewicz et al., 2019). The common stand is that the empirical and descriptive work of the natural sciences is not invalidated by the explanation of human causes of present planetary changes, whose competence would be of the social sciences and humanities.

The understanding of consequential meta-level of Anthropocene by humanities

This theme gained a more programmatic character in an article recently published by the group linked to the Working Group on the Anthropocene (Zalasiewicz et al., 2021). The authors made a distinction between the concept of Anthropocene as a new potential division of the geological time scale; as a concept drawing on the perspective of ESS, i.e., as a “new state of the Earth System;” and, as a set of emerging approaches in other disciplines.

In the first case, it would be only a description of the phenomenon, which would be “important per se, irrespective of their cause” (Zalasiewicz et al., 2021, p.6), for the purpose of comparison with other intervals on the geological time scale. However, it is important to remember that the temporal proximity and the unprecedented character of a geological time unit associated to human agency has been requiring new methods, forms of imagination (Latour, 2020a) and has even generated mistrust among the geological community (Finney, Edwards, 2016).

The second approach, identified with the emergence of ESS in the second half of the twentieth century, would regard a tradition of thinking the Earth as an autopoietic system (see also Haraway, 2016). This definition would be marked by a concern with the present planetary changes, using innovative modelling methods and producing a paradigmatic shift in science (Schellnhuber, 1999; Hamilton, Grinevald, 2015; Latour, 2020a) by showing that the Earth system might undergo abrupt and unexpected changes as soon as one of its “planetary boundaries” (Rockström et al., 2009) is forced into a “tipping point” (Lenton, 2016). It was the discoveries of scientists of the Earth system linked to Nasa, IGBP and other later international institutions of global research (Hamilton, Grinevald, 2015; Steffen et al., 2020) that showed that, with a high degree of probability, we would no longer be living in conditions analogous to those of the Holocene, the geological epoch starting approximately 12 thousand years ago and whose conditions of habitability are considered responsible for the accelerated proliferation of the human species throughout the planet. On the other hand, stratigraphy would also be of great importance to ESS, because it would provide the necessary comparative elements to reach the current conclusions about the health of the planetary system to which we belong.

The most important part of the article by Zalasiewicz et al. (2021) is dedicated to a broader use of the concept of Anthropocene, especially in the field of humanities, social sciences and environmental sciences. Firstly, it highlights the hypotheses according to which the Anthropocene would have started even before the Industrial Revolution.⁶ According to the authors, however, all of those hypotheses would lack the elements of global synchronicity required by stratigraphy, which does not mean that they cannot have anthropological, archaeological or pedological relevance.

After these considerations, the article of Zalasiewicz’s group approaches the expanded importance of the concept of Anthropocene, which became relevant also for disciplines such as political science, international law, economics, social thinking, philosophy and history. In this regard, the work provides a useful instructive picture about the positioning of human sciences regarding the theme, drawing on its diversity of perspectives. For the purpose of the present article, however, it is sufficient to illustrate the way in which the

reception in the field of history is presented, for it is from one of its particular aspects that the authors derive their programmatic proposition. Firstly, differently from stratigraphy and ESS, “historians are usually uncomfortable”⁷ in relation to global synchronic dating, and preferably adopt periodization that vary from place to place. Secondly, the interest for the particular in detriment of the general (historiography is taken here, thus, for its more historicist aspect) would lead the discipline to refuse any type of generalization in relation to the concept of “humanity.” Finally, the characteristic attitude of historiography, which the authors expand to the humanities in general, would be the fact that “some historians resist the impulse to define the Anthropocene for themselves, and ask not ‘when did the Anthropocene begin?’,” but rather prefer to ask “when did the human activities and ideas capable of producing the mid-20th century Anthropocene begin?” (Zalasiewicz et al., 2021, p.14).

These are precisely the characteristics that we find in the sharpest and well-known criticism of the narrative presentation of ESS and stratigraphy researches on the Anthropocene (e.g.: Malm, Hornborg, 2014; Moore, 2020; Bonneuil, Fressoz, 2017). Instead of refuting them, Zalasiewicz et al. (2021, p.9) preferred to recognize their legitimacy, proposing an arrangement that seems more like a peace agreement and that would consist of a broad-scope science of the Anthropocene capable of embracing all of these disciplinary perspectives:

In some of those disciplines, and in part of the literature, understanding of the Anthropocene concept has diverged widely from the ESS and geological (chronostratigraphic) concepts. According to some views, they reflect to varying degrees the notion that the scientific approach might be overly narrow and restrictive, and that the perspectives and insights of the humanities and social sciences should be at the forefront of analysis; it has been argued in that connection that characterizing the Anthropocene scientifically using purely quantitative data needs to be complemented by an understanding of how it captures ‘human interaction, culture, institutions, and societies – indeed, the meaning of being human’ ..., termed here the ‘consequential metalevel’ ... While this may seem to contrast with the temporal, evidence-based, and planetary approach followed by the geological and ESS communities, there is clear overlap between these two spheres of endeavor, and analyses of Earth System behavior in the Anthropocene can closely engage with sociotechnological aspects of the world (emphasis added).

In a recent article, Cristiano Arrais (2021) proposes, precisely, to resume the discussion about causes, outcomes and consequences in historiography. According to the historian, the debate is crucial so that, in a time of historical denial, historiography can contribute to making social players responsible for concrete historical injustice. The author’s perspective distances itself from a hermeneutic stance, advocating the explicative authority of historiography, in a way that seems to fit well into the role of “consequential metalevel capture” that Zalasiewicz et al. (2021) attribute to human sciences. For Arrais (2021, p.77), historiography has a multi-descriptive character, which allows it to bear “distinct explanatory models” in coexistence. It is the perspective of someone who narrates an experience that enables the production of logical statements capable of attributing a given

intentionality to historical agents, something that would become explainable from the consequences presently accessible when the explicative (historiographic) report is produced. Bringing this discussion to the debate on the Anthropocene, it would mean to affirm that the attribution of capitalist, colonial or patriarchal causes to the planetary changes, simultaneously and by different narrators, would not necessarily imply a contradiction. On the contrary, it is this particularity of historical knowledge that would enable the attribution of distinct and non-contradictory causes to one event, something extremely necessary for the explanation of the emergence of the post-Holocene world, caused and suffered in different ways by distinct agents, humans and non-humans.

I believe, however, that this methodological model is limited when regarding actions, outcomes and consequences dispersed on the temporal and spatial scales that are present in the historiographic reflection in the post-Holocene. The “asymmetric relationship between representation and experience”⁸ (Arrais, 2021, p.77-78) assumes proportions until now unimaginable when human history becomes perceived in its intersection with the planet’s geological history. The historiographical examples of the enunciations presented and criticized by Arrais, through which a human intention is deduced from the consequence of an action, do not point to the diffuse agency that now is presented as geo-historical, i.e., which is related to a humanity that provokes planetary agency and at the same time is pervaded by it. The analysis of some examples of studies dedicated to evaluate the role of the humanities in the face of the new conditions of the post-Holocene can help us to perceive the even more relevant role that historiography has to perform in this new time.

Some evaluations of impacts of the post-Holocene in human sciences

As the studies on the post-Holocenic world(s) increased in the field of human sciences, there was also the need to produce reviews with a critical or programmatic character that could orient us among this turmoil of voices. A path for this has been the presentation of syntheses on the impacts of discussions of ESS and stratigraphy in the different disciplines of human sciences, as is done by Zalasiewicz et al. (2021), but also Clive Hamilton, Christophe Bonneuil and François Gemenne (2015) and Carolyne Merchant (2020). Another possible approach is the production of a thematic division, with less concern about disciplinary boundaries, as in Bonneuil (2015), Fressoz (2015), Lorimer (2017), and Eva Horn and Hannes Bergtaller (2020). Finally, there are studies that seek to go beyond the presentation of a model of classification or other, proposing new methods and conceptualizations regarding epistemological and ontological problems raised by the evidences of the Anthropocene. This is the case of some studies previously mentioned, but also studies by Hamilton (2015), Alf Hornborg (2015), Pierre Charbonnier (2017), and Nigel Clark and Bronislaw Szerszynski (2021), among others. My focus, however, will be the establishment of a dialogue with some of these works, insofar as they help us to reflect about to what extent human sciences could take on the analysis of the “consequential metalevel” of the Anthropocene, as suggested by Zalasiewicz et al. (2021).

A work of synthesis and reflection that I would like to highlight is the book edited by Hamilton, Bonneuil and Gemenne (2015). This collective publication gathers different

perspectives expressly “to begin the rethinking of the social sciences and humanities prompted by the arrival of the ‘Age of Humans,’ an ironic moniker since modernity has supposedly been the age of humanism” (p.11; emphasis in the original). Anticipating, in a way, the division proposed by Zalasiewicz et al. (2021), based on “three definitional dimensions,” i.e., stratigraphy, ESS, and the human dimension of the problem, the authors note that from the start the two latter dimensions require “further causal and systemic investigations” (Hamilton, Bonneuil, Gemenne, 2015, p.3).

Among the implications raised from the need to revise the role of human sciences, the authors highlight two aspects directly related to the problem of causality. Firstly, they note that “in an epoch in which ‘Gaia’ has been reawakened, the social-only conceptions of autonomy, agency, freedom and reflexivity that have been modernity’s pillars since the nineteenth century are trembling” (Hamilton, Bonneuil, Gemenne, 2015, p.5). Then, after approaching the impacts of the Anthropocene in philosophy and politics, especially due to the renewed crisis of epistemic and ontological limits of the modern conceptions of nature and society, the authors consider that “it’s not just our capacity to agree and act collectively that is at stake. Now there is a question about our capacity to make decisions regarding events that are beyond the human experience” (p.11). These reflections already indicate that the issue of imputing intentionality to human actions no longer runs into contingency and irrationality only. Now, it is about a type of agency that is not controllable by rational calculation, although to a certain point it is foreseeable by the models produced by ESS, or by those produced by the various ecological warnings set off since the dawn of industrial capitalism (Fressoz, 2015). The reason is that human sciences must now deal with a history whose “subjects” are not only humans, hence we must look at a historical agency deriving from many perspectives and its reconstruction is much more complex, for which the comprehensive method could hardly enable us.

The first part of this same book continues with other perspectives on the role of the humanities regarding the evidences of the Anthropocene. Some chapters also present problems that we can relate to the theme of causality in historiography. For Christophe Bonneuil, the way we tell stories is important for the Earth’s destiny, because the history of a humanity whose telos is the detachment from natural determinations is what acted as “cultural origins” of the Anthropocene (Bonneuil, 2015, p.17). Regardless of the “definitional dimension,” as the author wrote in a previous article together with Hamilton and Gemenne, to talk about the Anthropocene is to tell a story, i.e., to narrate. And this would include: (1) assign values to the conditions at the beginning and at the end of the story; (2) illuminate certain actors and phenomena while others are obscured and silenced; (3) domesticate temporality by means of sequences, marks, transformations, lines of force, while others are hidden; and (4) “all this constituting a dramaturgy with implicit or explicit causal factors, with implicit or explicit moral lessons” (p.17-18).

It is precisely these axes of causality that would confer meaning to the four major prevailing narrative forms on the Anthropocene identified by Bonneuil: naturalist, post-nature, eco-catastrophist and eco-Marxist. The historian admits the possibility of other narratives (as the eco-feminist and other subaltern and non-western perspectives), because, as we have seen in the previous section, the historical explanation should admit a plurality

of viewpoints and equally consistent explanations. What Bonneuil adds to the debate is that this need of pluralization originates, above all, from the fact that narratives about the Anthropocene also have a performative character: “They preclude or promote some kinds of collective action rather than others, and so they make a difference to the becoming of the Earth” (Bonneuil, 2015, p.30).

The main characteristics of these four narrative forms indicate how the different relations between causes, effects and consequences imply different senses for human action regarding the Anthropocene. The narratives of ESS and stratigraphy, called “naturalists,” which are pointed as the dominant narrative form or even as an “Anthropocene metanarrative” (see also Bonneuil, Fressoz, 2017), would present an account in which humanity as a whole would be responsible for the change of the planetary conditions due to an innate condition, i.e., its progressive technological development. Human activities would have resulted in the transformation of the planetary biophysical cycles, and the planet’s new operatory stage would be an “unintended consequence” of these actions. For this narrative stream, to which we could attribute an epic character, humanity would have reached a new stage of awareness and, therefore, of intentionality, thanks to the technological and scientific development. Thus, the redemption of humanity would happen by means of the tutelage of the Earth system’s scientists, who would have to bravely face the irrational aspirations of political fights (for further detailed discussion on this “metanarrative,” see Lowande, 2023b).

A second type of metanarrative, the “post-nature narrative” would embrace the idea of “end of nature.” This perspective becomes aware of the Anthropocene as a higher stage of human intentionality, when humanity would have overcome its incapacity to understand non-human agencies. The Anthropocene is then welcomed, either for representing the moment when the separation humanity/nature is finally surpassed (Latour and Haraway, for example) or for indicating the point in which humanity would have become totally liberated from the natural imprisonment, becoming able to transform and tame the own planet thanks to its geotechnological power (eco-modernism). As in a comedy, thus, the fight of humanity against nature would not have been more than a misunderstanding.

A third type of metanarrative would have a more tragic character: for the “eco-catastrophists,” the modern project of society would have already taken us to a “point of no return,” thus abandoning the conceptions of historical linearity that would have guided human actions until the present and pointing to a posture of local adaptation to the catastrophic consequences of technological development.

Finally, the “eco-Marxist” narratives would point to an ironical positioning in relation to the other forms of constitution of sense. This is because all of them would hide the real causal relations responsible for the planetary transformations whose results is the Anthropocene: the capitalist relations of production.

Therefore, we see that the Anthropocene as “consequence” comprises, as Arrais (2021) helps us to predict, different historical explanations. However, the broadness of the results and their consequences raises problems for the potential of accountability of these narratives. The capability to clearly identify the imputation of intentionality or agency tends to loose itself in the complexity of the causal relations linked to the planetary transformations, or rather resumes modern temporalities (progress or socialist revolution,

for example) for which there seems to be no more time. Surely, Bonneuil does not propose the tropological analysis that I added above. However, it was interesting to include this element in order to indicate how these narrative forms practised until now are still tied to a historical imagination from European origin.⁹

In another chapter of his book, Clive Hamilton (2015) presents what he calls “eight rhetorical propositions about the Anthropocene,” among which we can also find interesting indications for the theme that concerns us more directly here. The first of his propositions already touches directly on the problems of attribution of the agency that this article deals with: if humanity is a “geological force,” it is the first time that such a force presents “elements of volition,” thus expressing will (p.32). Thereby, it would be about becoming aware that one of the most important geological forces on the planet is moved by the will that stands out among power disputes between humans; at the same time that, we could add, this very hegemony was conquered from the appropriation of the planetary geological force, namely the energy reserves stocked for millions of years in the innards of the Earth.

Therefore, this volition element is not mistaken by the one that sustained the modernist belief that “humans make their own history.” This is because between the human intentions and the consequences of geological reach that we experience in the present there is no possible explanation that is not related to the unforeseeable historicity of non-human agencies. The real “cognitive dissonance” occurs, as prefers Chakrabarty (2015), in the form of a rift between the human temporal scale, dictated today by neoliberalism (Turin, 2019), and the uncontrollable temporality of the Earth system. According to Hamilton (2015, p.35), “the tempo of the market’s metabolism is much faster than that of the Earth system, yet in the Anthropocene they no longer operate independently.”

Indeed, the “iron law of progress” (Hamilton, 2015, p.37) is in general made responsible for leading us to the Anthropocene. However, the progressive utopias would refer to a temporality already rescinded between neoliberal actions and their planetary consequences. There would be no more time for the humanist aspirations of progress or development. The resumption of a time nowadays occupied by neoliberals in their geo-historical myopia (thanks to the power they obtained by means of the violent extraction of the planetary energy heritage) is something that, as already demonstrated by the Brazilian indigenous peoples, could only be made drawing on an insurrectional theory that considers the mobilization of human and non-human agents. Although Hamilton also suggests this insurrectional path, it is difficult for him to perceive, as shown on his four last propositions, some possible future drawing on the tradition of thought he inherited from the European world. In this respect, here we are much better provided with traditions of Amerindian and Afro-diasporic rebellious reflection (Kopenawa, Albert, 2015; Santos, 2015; Krenak, 2019; Ferreira, Felício, 2021; Ribeiro, 2021).

The chapter of this book written by Alf Hornborg (2015) allows us to weave an important articulation with a discussion that reappeared recently with a lot of strength in other works. This debate is linked to the concept of “technosphere,” as presented by Peter Haff in an article published in 2014 in the journal *The Anthropocene Review*, on which we should dwell for a moment.

Technosphere and human agency beyond the intentionality of individual

According to Haff (2014, p.2), the technosphere would represent a “new stage in the geological evolution of the Earth,” being directly related to the Anthropocene. The technosphere would comprise

the world’s large-scale energy and resource extraction systems, power generation and transmission systems, communication, transportation, financial and other networks, governments and bureaucracies, cities, factories, farms and myriad other ‘built’ systems, as well as all the parts of these systems, including computers, windows, tractors, office memos and humans. It also includes systems which traditionally we think of as social or human-dominated, such as religious institutions or NGOs (Haff, 2014, p.2).

The large-scale technology would constitute an autonomous and independent phenomenon of human’s intentionality, which, according to Haff (2014, p.2), “does not mean that humans cannot influence its behavior, but that the technosphere will tend to resist attempts to compromise its function.” This is something especially interesting for the discussion proposed in this article.

Haff presents what would be the autonomous demands of the technosphere, which are synthetized in six rules gauged from the observation of its functioning and based on a perspective that considers different scales of analysis. One system could only have a direct relation with another system of the same “Stratum,” which would not occur with systems relatively very small (Stratum I), or relatively very big (Stratum III), except in an indirect way (“rule of inaccessibility”). Therefore, for example, a human being who would try to move a cell of a plant with the hand without the help of a microscope and other instruments, would inevitably move the whole system of equivalent magnitude, i.e., its leaves, stalk or roots. This means that a Stratum II system (the human being) can only interact directly with another Stratum II system (leaves, stalk or roots), not being able to access directly much smaller levels (Stratum I, e.g., the cells of a plant) nor much larger (Stratum III, e.g., the biosphere), which Haff names “rule of reciprocity.” This would provoke a distortion on our perception of the Anthropocene, which in relation to us (Stratum II) would present itself as a Stratum III system.

The other rules that would mediate the relations between humans and the technosphere would also imply an agency uncontrollable by human intentionality. A Stratum II system would be composed of a series of forces directed to reinforcing the organization of its components Stratum I, which would characterize the “rule of impotence” of these parts in provoking transformations in its higher organizational strata. There would be exceptions to this rule, for it is possible that sensible parts of the network of a system’s components might cause functioning problems on the whole (the case of “leaders” in human social systems), hence forming the “rule of control.” However, these leader pieces are also essential for the maintenance of the order of the system and will be rewarded for this. Moreover, human leadership is only possible in systems with relatively simple rules, which can be manipulated by these leaderships, something that would not correspond to the complexity of the technosphere or the Earth system, as much as the eco-modernists believe the contrary.

The rules of “performance” and “provision” would reinforce even more the autonomy of the technosphere in relation to human agency. If, on the one hand, the technosphere depends for its survival on the individual actions that we perform daily (whether we like or not), on the other hand, it would be impossible to think, today, about the maintenance of human life, with its population of eight billion individuals, in exponential growth, without its “environment,” i.e., the network of production and distribution of technological resources currently available. For Haff (2014), it would even be possible to try to isolate oneself from this technosphere (as hermits do), but the costs resulting from this decision would make this option little attractive for the great majority of the individuals of the system. On the other hand, the creation of new human needs is rapidly provided by the technosphere, at the same time that this provision corresponds to our contribution for its development and extension. Contrary to the eco-modernists’ beliefs, however, there are no evidences that the capacity of accelerated expansion of the technosphere, with the support of the activities of human and non-human sub-systems of which it depends, is unlimited.

Haff’s hypothesis draw the attention of researchers of the field of human sciences. Alf Hornborg (2015), for example, proposed that instead of the “Anthropocene,” we talk about the “Technocene.” However, for him, it is capitalism and the unequal distribution of energy resources and power that it provides that configures the very condition of the technosphere’s existence. The adverse effects of this technological distribution based on expropriation could be fought by means of the adoption of a system of values oriented to more egalitarian exchanges and associated to the vitality of the System Earth. If the existence of a global technosphere disallows talking about a historical agency as a human prerogative, Hornborg, on the other hand, does not abandon the analytical distinction between society and nature, because it is what enables to understand to what extent the unbridled expansion of the technosphere is a product of the unequal relations of production that characterize capitalism. To think the technological development as a result only of human inventiveness would be, therefore, to disregard its main condition of existence, i.e., the material expropriation provided, initially, by the spoliation of territories and by slave work. In this sense, historiography would acquire an explanatory competence not accessible to natural sciences, for “phenomena such as worldviews, property relations, and power structures are *social* phenomena. They are beyond the horizons of natural science, because they require analytical tools that natural scientists are not provided with” (p.62). The naturalist perspective would not be sufficient, thus, to demystify the global agency of technology, which, locally, seems to act by means of a “magic” character strengthened by the naturalist narratives. This magic would not resist a macrosocial analysis attentive to the power relations that hide the technological functioning from the local perception: “Rather than dream of advanced technological solutions to problems of ecological sustainability, we would recognise most modern technologies as social strategies for *displacing* problems (labour as well as environmental loads) to areas where labour and environmental degradation are less expensive” (p.65).

Since then, the theme of the technosphere has been revisited in human sciences in a way that seems to oscillate between Haff’s and Hornborg’s positions regarding human intentionality. Bronislaw Szerszynski (2016), for instance, believes that the naturalist

narratives on the technosphere start from a skewed and not much creative perspective, for these understand the terrestrial history as a linear evolutionary process with universal projections whose apex would be the current stage of complexity of the technosphere. Szerszynski proposes that a “speculative planetology” associated with a counter-intuitive reading of the Earth’s history might help to think of less linear relations between human animals and technological artefacts. Although the author does not admit the existence of some type of universal law that would guide in a deterministic way the evolution of planets to the technospheric forms, his argument points to a tendency to uncouple its metazoic determinants (i.e., a functioning dependent from pre-existing animal forms, especially humans) to forms that are more fungic or rhizomatic. Thus, humanity could even become a superfluous component for this planetary system endowed with its own agency, in case it evolves to the point of surpassing its planetary limits. However, as Szerszynski reminds us, there are no evidences in the science of exoplanets that point to this possibility, especially considering that no other technosphere outside the Earth until today has developed to the point of letting us know of its existence.

In another book, Zalasiewicz (2018) also presents the concept of technosphere proposed by Haff. For Zalasiewicz, the technosphere has coevolved with humanity since the pre-modern times, acquiring the current parasitic feature, apparently uncontrollable, due to the proliferation of technological novelties that would have become indispensable for the collective survival of the species in the present. The author does not believe either that the technosphere might evolve into more “sustainable” forms precisely due to this historically produced co-dependence. However, apparently Zalasiewicz does not consider the different objections posed by Hornborg or by Szerszynski to Haff’s theory. From the viewpoint of stratigraphy, the most interesting seems to be the fact that “technological objects, including mobile phones, may be considered technofossils geologically, because they are biologically-made constructs that are robust and resistant to decay,” and for the geologist, “they will form future fossils, to characterize the strata of the Anthropocene” (Zalasiewicz, 2018, p.16).

Eva Horn and Hannes Bergthaller (2020) also analyzed this problem in a work with the objective of mapping the main epistemological challenges of the concept of the Anthropocene for human sciences. It is noteworthy that Horn is co-author of the work in which Zalasiewicz et al. (2021) propose a division of attributions between ESS, stratigraphy and human sciences. In this more encompassing work, Horn and Bergthaller (2020, p.11) depart from an ontological approach of the Anthropocene in which the “conception of agency erases the distinction between purposive, intentional action and causal efficacy.”

This appears clearly in the differentiation between human agency as *Homo sapiens* and as *Anthropos*, inspired in Chakrabarty. This distinction refers to a humanity that is a social and cultural species (*Homo*), but at the same time also a biological species and endowed with a geological force (*Anthropos*). Focusing on one dimension and neglecting the other, as it would be occurring in most of the literature on the Anthropocene, would mean not perceiving the centrality of the “shock” between these two facets of humanity for the understanding of the geological phenomenon that we are experiencing in the present. Thinking humanity as *Homo* would enable, in fact, the accountability of those guilty

for the emergence of the Anthropocene, “be they ‘capitalism,’ ‘modernity,’ or ‘Western thought’” (Horn, Bergthaller, 2020, p.12; emphasis in the original). This could be done, precisely, by means of historicizing the “epochal consciousness” represented by the concept of Anthropocene (see also Charbonnier, 2017), although this is not pointed as an objective of the book. On the other hand, taking humanity as *Anthropos* would bring the possibility to understand the “decoupling of intention and effect” that would occur not “because people fail to properly reflect on what they are doing, but rather through the massive accumulation of individual actions” (p.74). This would mean that humanity’s geological force would be an “unforeseeable consequence” of the history of power relations and their outcomes, therefore making unfeasible a historiographic narrative in which the access to the consequences would help us explain the causes or motivations and their results. This is therefore a posture that preserves a certain “human exceptionalism” (see also Hamilton, 2017) that seeks to avoid the excesses of both the eco-Modernist trend, which bets it all on human intentionality, and the post-humanist trend, which would dissolve the human agency on a flat ontology (as the one proposed by the theory of the actor-network), thus making unfeasible any way of accountability.

Also for Horn and Bergthaller (2020, p.80), the emergence of the technosphere as one of the most active components of the Earth system acting on the transformation of the planet demonstrates the “disjunction between the individual and the cumulative consequences of human action” that they cause. Again, here there is no causal chain that directly conducts individual actions to their global consequences, but rather translation processes between what humans make in their histories of differentiations and conflicts (*Stratum II*) and the constitution of a more encompassing system (*Stratum III*), the technosphere, in which respect its action is, resuming Haff’s ideas, quite limited. Narrating the relations between human actions and their consequences requires now the consideration of spatial and temporal scales in which the idea of “intentionality,” as outlined by the epistemology of human sciences inherited from the nineteenth century, if not lost, at least is transformed requiring a review of the epistemological, ethical and aesthetical frameworks of the historiographical activity. Therefore, the idea of the technosphere places us in the face of a “subject of the Anthropocene,” which is “a concrete ‘assemblage’ of people, infrastructures, forms of consumption, economies, and energy regimes” (Horn, Bergthaller, 2020, p.80; emphasis in the original), and whose planetary “scalability” (see also Tsing, 2022) can only be considered if we take into account an agency derived from an assemblage of humans, techniques and non-human actors (Horn, Bergthaller, 2020, p.150).

The ontological pluralism and the new forms of access to the planetary complexities in its imbrications with human actions

Nevertheless, it is still possible to add some more complexity to this discussion, as demonstrated by Nigel Clark and Bronislaw Szerszynski (2021) from the perspective of a “planetary social thought.” According to them, human sciences must seriously consider what they name “planetary multiplicity,” i.e., a quality of planet Earth (and of other planets) of acquiring different features throughout their existence. The present moment,

when the Earth is going through one more of its changes of “operational state,” coincides with the authority of its former spokespersons being challenged by other representatives of the “earthly multitudes,” which are capable of responding in different ways to the planetary multiplicity of the Earth. The problem of the historic agency unfolds, therefore, in the relation between an “inherent changeability of the Earth,” on the one hand, and “a shared way of responding to the challenges raised by the changeability of the Earth and the opportunities opened up by planetary self-ordering and variation” (p.9), on the other hand. Therefore, the problems of historical agency, intentionality and causality shift to a field yet to be known. Or, as Clark and Szerszynski (2021, p.10) prefer: “To inquire how, when, to what degree different kinds of social beings have joined forces with different geological formations or geophysical fluxes, we are suggesting, is to cast a glimmer of light on the question of what other powers of the Earth we might yet turn towards or turn back to.”

One way to broaden the pertinence of historiography in the post-Holocene is, therefore, to think to what extent we cannot only historicize the Anthropocene, but also how to geologize history. And this means, as suggested by Clark and Szerszynski (2021), not only to expand the temporal and spatial scales of our reports, but make visible the infinitude of agencies of different planetary powers by peoples, communities or collectives that have lived or live, and well, outside, or in resistance, to the excesses of the Capitalocene (Moore, 2020) or the Technocene (Hornborg, 2015). Therefore, it would be the case, from now on, of thinking historiography as the science and the art of communication of cosmological heritages that enable us to broaden our horizons in relation to what it means to be the subject or the object of the agency of planetary historicity, i.e., of the uninterrupted capability of differentiation. This also implies the broadening or transformation of the infrastructures and techniques of historiographic knowledge production, so that this becomes a field of dialogue in which participate experiences and bodies synchronized with the planetary temporality, itself having been historically alienated from the discipline of history.

However, it is not possible to reorient the matrix of the discipline science of history only drawing on the considerations presented in this article. When Jörn Rüsen (2001) proposed a “meta-history” intended for this purpose, this was preceded by a “comparative study of historical cultures and history of historiography” (Caldas, 2008, p.2). His enterprise was limited, though, by an idea of “constructive objectivity” of history that had as its horizon the “humanity as a universal community of communication” (Rüsen, 2001, p.143). The idea of cultural pluralism on which he based his formulations did not achieve surpassing, thus, the ontological perspective of European modernity founded on the distinction between humanity and nature. Therefore, the theoretical proposition of a new historiographical pragmatics better adapted to the current planetary regime would demand, firstly, a thorough study of the extra-modern or counter-colonial forms of giving meaning to the experience of the past. It would be necessary to add theoretical and conceptual elaborations produced collaboratively from the various ontological or cosmological perspectives, as to avoid a return to colonizing forms of historical narratives.¹⁰

In the field of anthropology, this discussion was very well developed by Mauro Almeida (2021). For him, it is perfectly possible to admit the positions of scientific consensus and, at the same time, the ontological autonomy of peoples who live a multiplicity of worlds irreducible

between themselves. According to the author, “it is about justifying the agreement between ‘global’ sciences and ‘local’ sciences without encompassing local metaphysics as variations of global metaphysics” (p.312; emphasis in the original). This proposal would be justifiable because the pragmatic experience does not invalidate the ontological, metaphysical or cosmologic multiplicity, something we can verify, for instance, in the coincidence of diagnoses related to the global planetary transformations of the present, drawing on radically distinct onto-epistemological perspectives (see Capiberibe, 2019, referring to Davi Kopenawa). Thus, it is possible to produce more efficacious responses to negationist ontologies, since these are outside the field of those pragmatic ontological agreements related to reality (on global change denial and the Anthropocene, see Edwards, 2010; Danowski, 2018; Oreskes, Conway, 2019; Latour, 2020a, 2020b; Mirowski, 2020; Shapin, 2020; Costa, 2021). In this case, it would be less of a relativist conflict between points of view and more of an “ontological war” between self-justifiable metaphysics (or “bad metaphysics”) and experienced-based ontologies.¹¹ This war effort is urgent because the pragmatic truth of the ontological denial is the genocide, which should move us all, either for mere sympathy or for the perception that this implies also the extermination of cosmologic heritages indispensable to the composition of fair and liveable planetary futures. This is because the ontologies of the “earthly multitudes” are the ontologies of the “resurgences,” i.e., of the “proliferation of new social and biological beings from the wreckage of colonial wars and the capitalist destruction of landscapes” (Almeida, 2021, p.324; see also Tsing, 2022).

However, this “pragmatic shift” as a necessary complement to the “ontological shift” in anthropology, according to Almeida (2021, p.316), seems to put historiography in a position of auxiliary science: “Anthropology, as a discipline worthy of the name of science, should recognize the self-constitution of peoples and, at the same time, incorporate the scientific evidence – historical, archaeological, palaeontological – that pragmatically confirms this existence in time and on the territory.” In my view, however, what is at stake is an onto-politics for which temporality is a key element, being less important whether we will keep the European names of “anthropology” or “historiography,” or not, for the creative mobilization of onto-epistemological heritages and the experiences that equip us for the ontological wars of the present. As we are reminded by Rodrigo Turin (2022, p.8), “the Anthropocene is also a historical problem, because it points – unprecedentedly – to the conditions of possibility of any history possible. And its repercussions extend both into the future and into the past.” According to the historian, the experience of the Anthropocene has also been forcing a progressive abandonment of the explicative categories inherited from the discipline’s history, because

under a certain fascination in the face of the unheard of, absolutely new, unprecedented, there is the invisibilization of historical experiences that still concern us – or, rather, concern more some groups than others – and that tend to have crucial political implications in a near future, with the aggravation of the climate (Turin, 2022, p.11).

Therefore, historiography and anthropology can converge in new ways of dwelling on the problem of post-holocene forms of existing on the planet. As Guilherme Bianchi (2019) has demonstrated, historiography and anthropology can also compose pragmatic

truths drawing on cosmological provocations that are strange to both. For instance, finding that the very categories of past, present and future might be insufficient to “explain” the experience of Amerindian communities; if they are strange to the accelerated time of the historicity of Modernity, Capitolocene or Technocene, they are not strange to the successful mobilization of planetary powers concerning living in radically changing worlds (see also Danowski, Castro, 2017). It is this type of approach that can help us to understand how to deal with the destructive heritage of colonization and capitalism, because certain ways of isolation (Castro, 2019), or of “hacking” the technosphere (Comitê Invisível, 2015), require perceptions of the experience that are unavailable in the explicative or comprehensive models inherited from modern historiography.

Final considerations

This article sought to demonstrate that today human sciences are impelled to make a stand on the problems of intentionality, causality and responsibility that inevitably emerge from investigations of the Earth system science on the Anthropocene.

A tendency identified from the interpretation of some of these studies points to a discontinuity between human intentional actions and their planetary consequences. The idea of the existence of a “technosphere” as a systemic level produced by human activities, though hardly accessible to our comprehension, tends to reinforce even further this position.

Another tendency shows us, however, that this inability of communication with the planetary scales of existence is much more due to the very limitations of modern ontological imagination. Among the peoples that we could then call “extra-modern,” i.e., those who are not conditioned by the limits of the naturalist (or “western”) forms of ontological imagination, we can find ancient and not alienated traditions of comprehension and agency of planetary potentialities.

Advancing inconclusively on what was presented until here, it could be affirmed that the discussions produced from the fields of ethnology and the very Amerindian and Afro-diasporic thoughts indicate that these different forms of comprehension and agency are due to the differentiated relation that these peoples keep with their “territories.” These territories, which are not taken simply as sources of “assets” by collectivities not transformed into “commodities people” (Kopenawa, Albert, 2015), may be thought of as a sort of intermediate stratum between our immediate life and the System Earth. It is the territory as way of belonging that is presented as a key to revert the alienation represented by the “inaccessibility,” existing only for the naturalist ontology, between our body and the System Earth. This is a recurrent theme in the historical-(cosmo)political interpretations presented by intellectuals such as Antônio Bispo dos Santos (2015), Davi Kopenawa (2015), Ailton Krenak (2019), Joelson Ferreira and Erahsto Felício (2021), for example. These works present us what I would call an “epistemic privilege” of the peoples that resist the imposition of the ontology not only naturalist, but also, and especially, colonialist. This privilege is a result, as Déborah Danowski and Eduardo Viveiros de Castro (2017) have noted before, of centuries of existence amid the resistance of these peoples to the extremely violent process of colonial expansion.

Therefore, the history of historiography could contribute to the inventory of these “counter-colonial” – as Antônio Bispo dos Santos (2015) would say – ways of giving sense to our relations with the planetary potentialities. A theory produced from this survey, and in dialogue with the producers of these forms of conceptualization, could guide us to a responsible life in the face of the planetary agencies ignored by the colonial ontology. Thus, the history of historiography could contribute to overcoming the problems of cause and consequence in the post-Holocene linked to human actions that Zalasiewicz et al. (2021) rightly recognize as not being of the competence of stratigraphy or the Earth system science.

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NOTES

¹ I chose to use the term “post-Holocene” and its derivatives because regardless of how the planetary present is named, it is undeniable that we live in conditions that are not analogous to those of the Holocene. In doing so, I intend to adopt a more open position regarding the diversity of ways of naming this period, which are not necessarily mutually exclusive, without running the risk of precipitately being committed to any of them. Other specific ways of naming the planetary present (Anthropocene, Capitalocene etc.) will be used to demarcate explicative positioning to which they are related.

² For detailed information on the constitution of the Anthropocene Work Group, see Lowande (2023a).

³ I thank Sérgio Ricardo da Mata for the indication of the works of Plessner and Löwith. Regarding the former, see also Mata (2020).

⁴ For a synthesis of the discussion, see Süssekind (2018).

⁵ It is interesting to note that the critical heritage studies also reacted relatively early to the implications of the discussion on the Anthropocene for a field traditionally divided between “natural heritage” and “cultural heritage” (see, e.g., Harrison, 2013, 2015; Holtorf, 2015; Olsen, Pétursdóttir, 2016; DeSilvey, 2017).

⁶ The other hypotheses of dating for the Anthropocene mentioned in the article refer to the following marks: since the late Pleistocene and the beginning of the Holocene; around 7000 BP; between 3000 and 2000 BP; and 1610, hypothesis denominated *Orbis spike* by Lewis and Maslin (2015).

⁷ It is necessary to take into account, however, that “while most historians remain unconcerned by the concept of the Anthropocene, some subgroups – such as environmental historians, intellectual historians, economic historians, and historians of science – have addressed it vigorously if not consistently” (Zalasiewicz et al., 2021, p.14).

⁸ [Translator’s note] In this and other citations of texts from Portuguese, a free translation has been provided.

⁹ For an instructive presentation of these narrative possibilities, see Mello (2010). On the limits of these forms of historiographic imagination for the representation of the Anthropocene, see Simon (2020).

¹⁰ The idea of collaborative theorization practice inspired on the theoretical discussion of public history was generously presented to me for the first time by Rodrigo Turin in a personal communication. However, the possible mistakes in its written formulation are my entire responsibility.

¹¹ This is why the very “Gaia convocation” (Stengers, 2015; Latour, 2020a), for instance, could not be considered reputable, because, from an ethnological viewpoint, “Gaia is not a scientific consensus acceptable by all good-faith judges” (Almeida, 2021, p.315).

REFERENCES

- ADORNO, Theodor W.; HORKHEIMER, Max. *Dialética do esclarecimento: fragmentos filosóficos*. Rio de Janeiro: Zahar, 2006.
- AGAMBEN, Giorgio. *The open: man and animal*. Stanford: Stanford University Press, 2004.
- ALCÂNTARA, Valderí Castro et al. Antropoceno: o campo de pesquisas e as controvérsias sobre a Era da Humanidade. *Revista Gestão & Conexões*, v.9, n.3, p.11-31, 2021.
- ALMEIDA, Mauro W.B. Anarquismo ontológico e verdade no Antropoceno. In: Almeida, Mauro W.B. *Caipora e outros conflitos ontológicos*. São Paulo: Ubu, 2021.
- ARRAIS, Cristiano Alencar. Causalidade e intencionalidade: uma contribuição ao debate sobre dimensão explicativa da historiografia. *História da Historiografia*, v.14, n.36, p.73-102, 2021.
- BIANCHI, Guilherme. Arquivo histórico e diferença indígena: repensando os outros da imaginação histórica ocidental. *Revista de Teoria da História*, v.22, n.2, p.264-296, 2019.
- BONNEUIL, Christophe. The geological turn: narratives of the Anthropocene. In: Hamilton, Clive; Bonneuil, Christophe; Gemenne, François (org.). *The Anthropocene and the global environmental crisis*. London; New York: Routledge, 2015. p.17-31.
- BONNEUIL, Christophe; FRESSOZ, Jean-Baptiste. *The shock of the Anthropocene*. London: Verso, 2017.
- CADENA, Marisol de la; BLASER, Mario (org.). *A world of many worlds*. Durham: Duke University Press, 2018.
- CALDAS, Pedro Spinola Pereira. A arquitetura da teoria: o complemento da trilogia de Jörn Rüsen. *Fênix: Revista de História e Estudos Culturais*, v.5, n.1, p.1-9, 2008.
- CAPIBERIBE, Artionka. Um interminável Brasil colônia: os povos indígenas e um outro desenvolvimento. *Maloca: Revista de Estudos Indígenas*, v.1, n.1, p.53-77, 2019.
- CASTRO, Eduardo Viveiros de. *Brasil, país do futuro do pretérito*. São Paulo: n-1 Edições, 2019.
- CHAKRABARTY, Dipesh. The Anthropocene and the convergence of histories. In: Hamilton, Clive; Bonneuil, Christophe; Gemenne, François (org.). *The Anthropocene and the global environmental crisis*. London; New York: Routledge, 2015. p.44-56.
- CHAKRABARTY, Dipesh. The climate of history: four theses. *Critical Inquiry*, v.35, n.2, p.197-222, 2009.
- CHARBONNIER, Pierre. A genealogy of the Anthropocene: The end of risk and limits. *Annales. Histoire, Sciences Sociales*, v.72, n.2, p.199-224, 2017.
- CLARK, Nigel; SZERSZYNSKI, Bronislaw. *Planetary social thought: the Anthropocene challenge to the social sciences*. Cambridge, UK: Polity Press, 2021.
- COMITÊ INVISÍVEL. *Aos nossos amigos*. [S.l.]: Guide Artes Gráficas, 2015.
- COSTA, Alyne de Castro. Da verdade inconveniente à suficiente: cosmopolíticas do Antropoceno. *Cognitio-Estudos: Revista Eletrônica de Filosofia*, v.18, n.1, p.37-49, 2021.
- CRUTZEN, Paul J. Geology of mankind. *Nature*, v.415, n.6867, p.23, 2002.
- CRUTZEN, Paul J.; STOERMER, Eugene F. The "Anthropocene". *Global Change Newsletter*, n.41, p.17-18, 2000.
- DANOWSKI, Déborah. *Negacionismos*. São Paulo: n-1 Edições, 2018.
- DANOWSKI, Déborah; CASTRO, Eduardo Viveiros de. *Há mundo por vir? ensaio sobre os medos e os fins*. Florianópolis: Desterro – Cultura e Barbárie; Instituto Socioambiental, 2017.
- DAVIS, Heather; TODD, Zoe. On the importance of a date, or, decolonizing the Anthropocene. *ACME: An International Journal for Critical Geographies*, v.16, n.4, p.761-780, 2017.
- DELEUZE, Gilles; GUATTARI, Félix. *Mil platôs: capitalismo e esquizofrenia*. São Paulo: Editora 34, 2011.
- DERRIDA, Jacques. *The animal that therefore I am*. Trad. David Wills. New York: Fordham University Press, 2008.
- DESCOLA, Philippe. ¿Humano, demasiado humano? *Desacatos*, n.54, p.16-27, 2017.
- DESILVEY, Caitlin. *Curated decay: heritage beyond saving*. Minneapolis: University of Minnesota Press, 2017.
- EDWARDS, Paul N. *A vast machine: computer models, climate data, and the politics of global warming*. Cambridge: MIT Press, 2010.
- FERDINAND, Malcom. *Uma ecologia decolonial: pensar a partir do mundo caribenho*. São Paulo: Ubu, 2022.

- FERREIRA, Joelson; FELÍCIO, Erahsto. *Por terra e território: caminhos da revolução dos povos no Brasil*. Arataca: Teia dos Povos, 2021.
- FINNEY, Stanley C.; EDWARDS, Lucy E. The “Anthropocene” epoch: scientific decision or political statement? *GSA Today*, v.26, n.3, p.4-10, 2016.
- FRESSOZ, Jean-Baptiste. Losing the Earth knowingly: six environmental grammars around 1800. In: Hamilton, Clive; Bonneuil, Christophe; Gemenne, François (org.). *The Anthropocene and the global environmental crisis*. New York: Routledge, 2015. p.70-84.
- GOSH, Amitav. *The nutmeg’s curse: parables for a planet in crisis*. [S.l.]: Penguin, 2021.
- GRUSIN, Richard A. (org.). *Anthropocene feminism*. Minneapolis: University of Minnesota Press, 2017.
- HACHE, Émilie. “Tremblez, tremblez, les sorcières sont de retour!”: Écrivaines, philosophes, activistes et sorcières écoféministes. In: Beau, Rémi; Larrère, Catherine (org.). *Penser l’Anthropocène*. Paris: Les Presses Sciences Po; Fondation de l’écologie politique, 2018. p.113-123.
- HAFF, Peter. Humans and technology in the Anthropocene: six rules. *The Anthropocene Review*, v.1, n.2, p.1-11, 2014.
- HAMILTON, Clive. *Defiant Earth: the fate of humans in the Anthropocene*. Cambridge, UK: Polity, 2017.
- HAMILTON, Clive. Human destiny in the Anthropocene. In: Hamilton, Clive; Bonneuil, Christophe; Gemenne, François (org.). *The Anthropocene and the global environmental crisis*. New York: Routledge, 2015. p.32-43.
- HAMILTON, Clive; BONNEUIL, Christophe; GEMENNE, François (org.). *The Anthropocene and the global environmental crisis*. New York: Routledge, 2015.
- HAMILTON, Clive; GRINEVALD, Jacques. Was the Anthropocene anticipated? *The Anthropocene Review*, v.2, n.1, p.59-72, 2015.
- HARAWAY, Donna Jeanne. *Staying with the trouble: making kin in the Chthulucene*. Durham: Duke University Press, 2016.
- HARRISON, Rodney. Beyond “natural” and “cultural” heritage: toward an ontological politics of heritage in the age of Anthropocene. *Heritage & Society*, v.8, n.1, p.24-42, 2015.
- HARRISON, Rodney. *Heritage: critical approaches*. New York: Routledge, 2013.
- HOLTORF, Cornelius. Averting loss aversion in cultural heritage. *International Journal of Heritage Studies*, v.21, n.4, p.405-421, 2015.
- HORN, Eva; BERGTHALLER, Hannes. *The Anthropocene: key issues for the humanities*. New York: Routledge, 2020.
- HORNBORG, Alf. The political ecology of the Technocene: uncovering ecologically unequal exchange in the world-system. In: Hamilton, Clive; Bonneuil, Christophe; Gemenne, François (org.). *The Anthropocene and the global environmental crisis*. New York: Routledge, 2015. p.57-69.
- KOPENAWA, Davi; ALBERT, Bruce. *A queda do céu: palavras de um xamã yanomami*. São Paulo: Companhia das Letras, 2015.
- KRENAK, Ailton. *Ideias para adiar o fim do mundo*. São Paulo: Companhia das Letras, 2019.
- LATOUR, Bruno. *Diante de Gaia: oito conferências sobre a natureza no Antropoceno*. São Paulo: Ubu; Rio de Janeiro: Ateliê Editorial, 2020a.
- LATOUR, Bruno. *Onde aterrar? Como se orientar politicamente no Antropoceno*. Trad. Marcela Vieira e Alyne Costa. Rio de Janeiro: Bazar do Tempo, 2020b.
- LATOUR, Bruno. *Jamais fomos modernos: ensaio de antropologia simétrica*. Tradução Carlos Irineu da Costa. São Paulo: Editora 34, 2019a.
- LATOUR, Bruno. *Políticas da natureza: como associar as ciências à democracia*. São Paulo: Editora Unesp, 2019b.
- LATOUR, Bruno. Telling friends from foes in the time of the Anthropocene. In: Hamilton, Clive; Bonneuil, Christophe; Gemenne, François (org.). *The Anthropocene and the global environmental crisis*. New York: Routledge, 2015. p.145-155.
- LENTON, Tim. *Earth system science: a very short introduction*. Oxford: Oxford University Press, 2016.
- LEWIS, Simon L.; MASLIN, Mark A. Defining the Anthropocene. *Nature*, v.519, n.7542, p.171-180, 2015.
- LORIMER, Jamie. The Anthro-po-scene: A guide for the perplexed. *Social Studies of Science*, v.47, n.1, p.117-142, 2017.
- LOWANDE, Walter Francisco Figueiredo. A ciência no tempo das catástrofes: o caso da emergência da ciência do sistema terra. *História*, v.42, p.e2023007, 2023a. Disponível em: <https://doi.org/10.1590/1980-4369e2023007>. Acesso em: 25 jul. 2023.
- LOWANDE, Walter Francisco Figueiredo. A proposição historiográfica da ciência do sistema

terra: uma revisão das críticas à “metanarrativa do Antropoceno”. *História da Historiografia*, v.16, n.41, p.1-27, 2023b. Disponível em: <https://www.historiadahistoriografia.com.br/revista/article/view/1941>. Acesso em: 25 jul. 2023.

LÖWITH, Karl. Nature, history, and existentialism. *Social Research*, v.19, n.1, p.79-94, 1952.

MALM, Andreas; HORNBERG, Alf. The geology of mankind? A critique of the Anthropocene narrative. *The Anthropocene Review*, v.1, n.1, p.1-8, 2014.

MATA, Sérgio da. Ser humano: político por natureza? *Tempo*, v.26, n.1, p.248-254, 2020.

MELLO, Ricardo Marques de. Teoria do discurso historiográfico de Hayden White: uma introdução. *Revista Opsi*, v.8, n.11, p.120-145, 2010.

MERCHANT, Carolyn. *The Anthropocene and the humanities: from climate change to a new age of sustainability*. New Haven: Yale University Press, 2020.

MIROWSKI, Philip. *Democracy, expertise and the post-truth era: an inquiry into the contemporary politics of STS*. Bloomington: Indiana University, 2020. Disponível em: https://www.academia.edu/42682483/Democracy_Expertise_and_the_Post_Truth_Era_An_Inquiry_into_the_Contemporary_Politics_of_STS. Acesso em: 14 fev. 2022.

MOORE, Jason W. ¿Antropoceno o Capitaloceno? Sobre la naturaleza y los orígenes de nuestra crisis ecológica. In: Moore, Jason W. *El capitalismo en la trama de la vida: ecología y acumulación capital*. Madrid: Traficantes de Sueños, 2020. p.201-227.

MORTON, Timothy. *Hyperobjects: philosophy and ecology after the end of the world*. Minneapolis: University of Minnesota Press, 2013.

OLSEN, Bjørnar; PÉTURSDÓTTIR, Þóra. Unruly heritage: tracing legacies in the Anthropocene. *Arkæologisk Forum*, n.35, p.38-45, 2016.

ORESQUES, Naomi; CONWAY, Erik M. *Merchants of doubt: how a handful of scientists obscured the truth on issues from tobacco smoke to climate change*. New York: Bloomsbury, 2019.

PLESSNER, Helmuth. *Poder y naturaleza humana: ensayo para una antropología de la comprensión histórica del mundo*. Madrid: Guillermo Escolar, 2018.

POVINELLI, Elizabeth A. *Geontologies: a requiem to late liberalism*. Durham: Duke University Press, 2016.

RIBEIRO, Maria Muniz Andrade, Mayá. *A escola da reconquista*. Arataca: Teia dos Povos, 2021.

ROCKSTRÖM, Johan et al. Planetary boundaries: exploring the safe operating space for humanity. *Ecology and Society*, v.14, n.2, art.32, 2009.

ROELVINK, Gerda. Rethinking species-being in the Anthropocene. *Rethinking Marxism*, v.25, n.1, p.52-69, 2013.

RÜSEN, Jörn. *Razão histórica, teoria da história: fundamentos da ciência histórica*. Brasília: Editora UnB, 2001.

SANTOS, Antônio Bispo dos. *Colonização, quilombos: modos e significações*. Brasília: INCTI; UnB, 2015.

SHELLNHUBER, Hans Joachim. “Earth system” analysis and the second Copernican revolution. *Nature*, v.402, n.S6761, p.C19-C23, 1999.

SHAPIN, Steven. É verdade que estamos vivendo uma crise da verdade? *Revista Brasileira de História da Ciência*, v.13, n.2, p.308-319, 2020.

SIMON, Zoltán Boldizsár. The limits of Anthropocene narratives. *European Journal of Social Theory*, v.23, n.2, p.184-199, 2020.

STEFFEN, Will; CRUTZEN, Paul J.; MCNEILL, John R. The Anthropocene: are humans now overwhelming the great forces of nature. *Ambio: A Journal of the Human Environment*, v.36, n.8, p.614-621, 2007.

STEFFEN, Will et al. The emergence and evolution of Earth System Science. *Nature Reviews Earth and Environment*, v.1, n.1, p.54-63, 2020.

STEFFEN, Will et al. The Anthropocene: conceptual and historical perspectives. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, v.369, n.1938, p.842-867, 2011.

STENGERS, Isabelle. *No tempo das catástrofes: resistir à barbárie que se aproxima*. São Paulo: Cosac Naify, 2015.

STEVENS, Lara; TAIT, Peta; VARNEY, Denise (org.). *Feminist ecologies: Changing environments in the Anthropocene*. Cham: Springer, 2018.

SÜSSEKIND, Felipe. Sobre a vida multiespécie. *Revista do Instituto de Estudos Brasileiros*, n.69, p.159-178, 2018.

SZERSZYNSKI, Bronislaw. Viewing the technosphere in an interplanetary light. *The Anthropocene Review*, v.4, n.2, p.1-11, 2016.

TSING, Anna Lowenhaupt. *O cogumelo no fim do mundo: sobre a possibilidade de vida nas ruínas do capitalismo*. Trad. Jorge Menna Barreto e Yudi Rafael. São Paulo: n-1 Edições, 2022.

TURIN, Rodrigo. A “catástrofe cósmica” do presente: alguns desafios do Antropoceno

para a consciência histórica contemporânea. In: Müller, Angélica; Legelski, Francine (org.). *História do tempo presente: mutações e reflexões*. Rio de Janeiro: Editora FGV, 2022. Disponível em: https://www.academia.edu/70916662/A_cat%C3%A1strofe_%C3%B3smica_do_presente_alguns_desafios_do_Antropoceno_para_a_consci%C3%Aancia_hist%C3%B3rica_contempor%C3%A2nea. Acesso em: 15 fev. 2022.

TURIN, Rodrigo. *Tempos precários: aceleração, historicidade e semântica neoliberal*. Rio de Janeiro: Zazie, 2019.

YUSOFF, Kathryn. *A billion black Anthropocenes or none*. Minneapolis: University of Minnesota Press, 2018.

ZALASIEWICZ, Jan. The unbearable burden of the technosphere. *The Unesco Courier*, v.70, n.2, p.15-17, 2018.

ZALASIEWICZ, Jan et al. The Anthropocene: comparing its meaning in geology (chronostratigraphy) with conceptual approaches arising in other disciplines. *Earth's Future*, v.9, n.3, 2021. Disponível em: <https://onlinelibrary.wiley.com/doi/10.1029/2020EF001896>. Acesso em: 25 jan. 2022.

ZALASIEWICZ, Jan et al. (org.). *The Anthropocene as a geological time unit: a guide to the scientific evidence and current debate*. Cambridge, UK: Cambridge University Press, 2019.

ZALASIEWICZ, Jan et al. The Working Group on the Anthropocene: Summary of evidence and interim recommendations. *Anthropocene*, v.19, p.55-60, set. 2017.

