



# Sympoietic thinking and Earth System Law: The Earth, its subjects and the law

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## ABSTRACT

This article explores what the emerging paradigm of 'Earth System Law' suggests in terms of reconfigurations of the Earth, its subjects and the law. Which representations of the Earth and of its subjects does Earth System Law think with? And which human-nonhuman relations do these systemic reconceptualizations translate? While innovative in many regards when contraposed to international environmental law, Earth System Law's central novelty lies in its 'systems-oriented ontology'. Yet, it is precisely this underpinning that deserves, I argue, more critical attention. While Earth System Law's rendering of the *Earth system* seems to embrace an 'autopoietic' understanding of how life-making and life-sustaining processes are enacted, its proposed functioning of a planetary Earth System Law and the systems approach that underlies it remain elusive. This article unpacks these tenets by suggesting that, instead of looking at the functioning of the Earth through autopoietic lenses, a 'sympoietic' view should be preferred to make sense of how life emerges and contingently unfolds on Earth, and leave space for collective modes of being, thinking and acting in the Anthropocene.

## 1. Introduction

The Anthropocene has become a widely used term to denote the present geological time interval in which 'many conditions and processes of the Earth system are profoundly altered by human behaviours' (Steffen et al., 2007: 614).<sup>1</sup> Beyond its geological significance, the Anthropocene has also been described as a major 'event' in social theory, which disrupts fundamental analytical categories of modernist thought and practice at work in law, political sciences, history, sociology, economics and philosophy, such as the nature/culture, human/nonhuman or global/local dichotomies (Bonneuil and Fressoz, 2016; Hamilton et al., 2015). The Anthropocene is then as much a recognition of humans' *geological* force as a confirmation of nonhumans' or nature's *social* force. This implies a dual rejection of the modernist separation between 'humans' and 'nature' and the presumed mastery by the former over the latter in light of nonhumans' agency. Yet, the 'Anthropocene' remains a highly controversial concept, the definition, starting date, causes and implications of which are largely debated (Clark and Szerszynski, 2020; Yusoff, 2019; Davis and Todd, 2017; Malm and Hornborg, 2014). I will, however, bracket these questions for the purpose of this article and engage with the Anthropocene as it has been defined by Earth System Lawyers, namely as an epoch that demands a 'new legal

paradigm' (see, e.g., Kotzé, 2019: 1).

In environmental legal scholarship, the ever-accelerating anthropogenic perturbations characteristic of the Anthropocene have mainly been treated as a set of problems that requires rapid regulatory adaptations of existing laws to manage it. A good example is provided with the call to 'bolster legal boundaries to stay within planetary boundaries' (Chapron et al., 2017). Some scholars suggested a complete reform of environmental law. For Viñuales, for instance, we must 'revisit law in its entirety to understand its role in the Anthropocene': '[d]eveloping appropriate legal concepts may not merely consist in adding some new concepts ... or in fine-tuning some old ones', Viñuales notes, but may imply to 'redefine the entire legal cartography or language used to represent and norm the world, establishing new concepts and relations among them' (Viñuales, 2018: 11–12 and 25). Kotzé and Kim, for their part, have moved from diagnostic and prognostic research to venture towards prescribing a new legal paradigm: an 'Earth System Law for the Anthropocene' (Kotzé and Kim, 2019, 2021; Kotzé, 2019, 2020).

Earth System Law has been posited as 'a new overarching legal phenomenon that, more than environmental law ... comprehensively accommodates and encapsulates the juridical aspects of earth system governance, including a new accompanying research agenda' (Kotzé and Kim, 2019: at 1). According to its main proponents, while Earth

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<sup>1</sup> The formalization of the concept by the Anthropocene Working Group (AWG) still needs to be approved by the International Commission on Stratigraphy. AWG, at <http://quaternary.stratigraphy.org/working-groups/anthropocene/>.

System Law does not (necessarily) propose a newly defined body of law, it suggests or demands a novel legal imaginary or way of conceiving law and legal ordering that is attuned to the Anthropocene. In this article, I want to contribute to the nascent debate surrounding a potential 'Earth System Law' by reflecting on some of its 'ontopolitical' (Chandler, 2018) and 'onto-epistemological' (Barad, 2007) tenets in the context of the 'Anthropocene' — two dimensions that remain undertheorized in legal scholarship.<sup>2</sup> My intervention thereby contributes to the growing field of literature that engages with the onto-epistemological implications of the 'Anthropocene' for legal thought and practice (Birrell and Dehm, 2021; Birrell and Matthews, 2020; De Lucia, 2020; Burdon, 2020; Grear, 2020a; Matthews, 2019). Fundamentally, my contribution does not attempt to suggest a *different* Earth System Law for the Anthropocene, nor to propose a *new* legal norm to be included in existing legal frameworks, but to interrogate the logic, aspirations and assumptions that Earth System Law as currently conceived by its main advocates is advancing.<sup>3</sup> The result at which I am aiming is therefore neither a new legal system nor a new set of legal norms, but the continuation of a legal inquiry, the implications of which I am here trying to elucidate. Three central questions will guide my trajectory of thought. First, which representations of the Earth and its subjects does Earth System Law think with? Second, how do these reconceptualizations envisage human-nonhuman relations, or how life unfolds on Earth? Finally, what role does law play in purportedly governing these reconfigured relations? Insights distilled from these three questions will inform my critique of Earth System Law.

Generally speaking, Earth System Law endeavours to fulfil the call issued by the UN Secretary-General in 2014 to craft a new regulatory approach that 'draws upon the holistic scientific knowledge provided by Earth system science to evolve laws and policies that better manage human behaviour in light of the interconnections among people and nature' (UNGA, 2014: para. 50; Kotzé and Kim, 2019: at 2). Earth System Law, in this sense, commits to legally translate 'a holistic vision for the planet' and to offer 'a planetary form of earth law' (UNGA, 2014: para. 50). Indeed, as Kotzé and Kim reckon: the "strongest" form of Earth System Law is planetary earth law' (Kotzé and Kim, 2019: 8). In contrast to international environmental law, which addresses environmental issues through a silo approach and develops specialized laws in response to particular problems, Kotzé and Kim advocate an 'interdisciplinary systems approach to better analyse, understand and respond to the multiple complex governance challenges arising from an integrated, dynamic and complex Earth system' (Kotzé and Kim, 2021: 458). I by no means want to deny the crucial importance of Earth system sciences in defining the 'Anthropocene' and its ramifications, nor do I want to dismiss Earth System Law's reception of Earth system scientists' insights in this regard. Earth System Law, I will show, holds a compelling promise of transforming the analytical, normative and epistemic underpinnings of environmental law by replacing a top-down with a bottom-up approach, a human/nature dichotomy with an interconnected relationality, and a state-centric with a polycentric agential focus.

<sup>2</sup> I refer to the 'ontopolitical' and 'onto-epistemological' tenets of the 'Anthropocene' as the 'study of practices of knowing *in being*' thereby positing an inseparability of being, knowing and acting within the world (Chandler, 2018: xv). As Barad observes: '[t]he separation of epistemology from ontology is a reverberation of a metaphysics that assumes an inherent difference between human and nonhuman, subject and object, mind and body, matter and discourse' (Barad, 2007: 185, and 379–381).

<sup>3</sup> Fundamentally, I am not suggesting that Kotzé and Kim 'own' this legal paradigm, nor that what they coined as such is a definitive legal framework. As evidenced with this first special issue devoted to the theme, Earth System Law is only emerging, and its tenets and contours are open for debate and exploration. As of today, however, Earth System Law has mainly been developed by Kotzé and Kim and it is therefore with their suggestions and research agenda that I will work throughout this article.

Yet, certain onto-epistemological premises of Earth System Law fit uncomfortably with how life unfolds on Earth, and how human-nonhuman relations constitutive of it could possibly be governed through a purported 'planetary law'. This, I argue, has to do with the systems approach that underlies Earth System Law. It is this systems approach that I will unpack in this article. The analysis starts by unravelling the analytical and normative foundations of Earth System Law, which rely on specific representations of the Earth, its subjects and the law. Against what I see as an 'autopoietic' understanding of the Earth system that Earth System Law works with, I suggest thinking with a 'sympoietic' understanding and reflect on what this heuristic implies for the ways through which life on Earth can/not be governed.<sup>4</sup> Crucially, I am not arguing that 'sympoietic normativities' — to borrow a formulation coined by Grear (2020a) — should be turned into a new or alternative overarching legal paradigm for the Earth system. It is precisely this overarching, totalizing and all-encompassing approach that I suggest should be suspended. What I propose is therefore neither a replacement nor a redefinition of Earth System Law, but a revision of certain onto-epistemological precepts that underpin this emerging field of law.

## 2. An autopoietic Earth System Law?

As a new legal paradigm that promises to 'encapsulate all juridical aspects ... of earth system governance in the Anthropocene' (Kotzé and Kim, 2019: 2), Earth System Law revolves around systems thinking and complexity theory. Systems- and complexity-based approaches to more-than-human worlds are far from new. Holistic, interactional and systems-oriented ontologies are inherent to many indigenous cosmologies that long predated the emergence of systems approaches in modern social and natural sciences (Tahir et al., 2021: 7–10; Watts, 2013). In the Western tradition, a systems- and complexity-based approach to Earth sciences can be traced to the nineteenth century, when oppositions to mechanistic views over natural phenomena characteristic of Newtonian physics started becoming prominent (Capra and Mattei, 2015: 31–42). By way of illustration, the first page of *Kosmos*, which Alexander von Humboldt started writing in 1819, captures his 'earnest endeavor to comprehend the phenomena of physical objects in their general connections, and to represent nature as one great whole, moved and animated by internal forces' (Walls, 2020; Wulf, 2015). Even in legal sciences, early modern jurists like Jean Bodin already advocated an understanding of 'humans' and their respective laws as placed *within* the 'natural' system to comprehend the climatic and geographical influence on humans' temperament (Miglietti, 2020). As a cross-disciplinary field of research focusing on the Earth as whole (viewed as an integrated, complex and adaptive system driven by the interactions between energy, matter and organisms) Earth system sciences, however, only emerged in the 1980s (Steffen et al., 2020). As a sub-discipline of Earth system governance, itself a subfield of Earth system sciences analysed from a social sciences perspective (Biermann, 2007: 327), Earth System Law is still in its infancy, as this first special issue devoted to the theme epitomizes. One of Earth System Law's key novelty — yet also, I contend, its central challenge — lies in the application of systems thinking from Earth sciences to law. Indeed, any systems rendering is a simplified representation of an empirical reality. To make law reflexive of the Earth system would seemingly imply finding a way for legal systems to be (made) responsive to the functioning of the Earth as a whole. This totalizing exercise — which is onto-epistemologically problematic on its own — is further complicated by the contingency

<sup>4</sup> The question of how to govern life on Earth evidently relates to broader questions of governmentality and biopolitics as Foucault set out — questions that will, however, not be addressed in this article. See Foucault (2004). On necropolitics and the governmentality of death, see also Mbembe (2019). On biopolitics and law in the context of the Anthropocene, see De Lucia (2020).

and complexity that characterize the functioning of the Earth.

The complexity of a system implies the emergence and self-organization of its constituent parts, which distinguishes complex systems from systems that are just complicated by possessing many parts (Kim, 2019: 904). Fundamentally, both systems and complexity theories have no inherent normative objectives. These orientations result instead from normative choices that depend on particular ways of framing reality in systemic and complex ways (Leach, 2021). From a normative perspective, Kotzé and Kim argue that ‘Earth System Law should be more closely aligned with the Anthropocene’s normative demands to the extent that it seeks to improve the ability of law to better respond to the deeply intertwined Earth system and its many complex socio-ecological challenges’ (Kotzé and Kim, 2019: 2). More specifically, these ‘normative demands’ are geared towards ‘preventing humans from encroaching on critical Earth system limits’ (Kotzé and Kim, 2019: 2). The proclaimed normative and transformative impetus of Earth System Law consists therefore in ‘ensur[ing] planetary integrity and socio-ecological justice’ by steering the Earth system away from catastrophic tipping through appropriate legal interventions and forms of regulatory control (Kotzé and Kim, 2021: 1).<sup>5</sup> From a governance perspective, Earth System Law therefore prescribes an all-encompassing, goal-oriented, processual and reflexive system of norms and regulations — one that is firmly embedded in and shaped by a will to govern the Earth or, to borrow Kim’s formulation, a will to ‘taming Gaia’ (Kim, 2021). Crucially, then, from an Earth System Law perspective, both the Earth and the law are viewed as complex adaptive systems (Kim and Mackey, 2014). In the next sections, I will explore this dual complexity — or the aggregation of the complex system of law within the complex system of the Earth — by unpacking, first, which representations of the Earth and its subjects Earth System Law is premised on before, second, revealing how a specific ‘autopoietic’ systems thinking underpins these particular representations.

### 2.1. The Earth of Earth System Law and its subjects

Specific representations of the Earth and its subjects underpin the Earth System Law paradigm. Earth System Law allegedly ‘fully respond[s] to a planetary perspective’ and purports to act as a ‘planetary systems-based law’ (Kotzé and Kim, 2019: 7). For Kotzé and Kim, the “strongest” form of Earth System Law is planetary earth law, which is fully premised on and informed by the entire Earth as a social-ecological system, with all living beings, both humans and non-humans, acting as responsible co-habitants of the planetary socio-ecological system’ (Kotzé and Kim, 2019: 8). How exactly Kotzé and Kim envision joint responsible action between humans and nonhumans, and how a responsible co-habitation could unfold therefrom, remains elusive in what they articulated thus far as planetary Earth law. The possibility of legal and political collective action within more-than-human collectives transcends, however, the analytical purpose of this article.<sup>6</sup> It suffices to note, here, that the planetary vision of the Earth system that Kotzé and Kim suggest as a premise for Earth System Law recognizes the interconnectedness between humans and nonhumans and embeds human societies within the Earth system itself (Kotzé and Kim, 2019: 7), thereby overcoming the dichotomy between Humans (as subjects) and Nature or the environment (as object) of law as per modern Enlightenment heritage (Wolloch, 2016). The notion of the Earth system merges, indeed,

<sup>5</sup> The central role played by the concept of ‘integrity’ in Earth System Law and its onto-epistemological implications would merit critical attention on its own. Such an assessment, however, is beyond the scope of this article. For a compelling critique of the notion of ‘integrity’ in environmental law against the backdrop of the Anthropocene, see Burdon (2020). Note, however, that Kim acknowledged the irrelevance of integrity for environmental law in the Anthropocene in his latest work (Kim, 2021: 5–6).

<sup>6</sup> For a salient exploration along such lines, see Lindahl (2021).

‘humans’ and ‘nature’ into a single, interactive and complex system, which opens up a new planetary mode of thinking and inhabiting more-than-human worlds. As Kotzé and Kim put it: ‘[t]he Earth system perspective is emerging as an epistemological framework within which to organize transdisciplinary debates focused on understanding the complex, adaptive, erratic and globally intertwined Earth system and its myriad socio-ecological implications for the living order’ (Kotzé and Kim, 2019: 5). This epistemological framework is reflective of a geophysical understanding of the Earth system conceived as a planetary whole. It is therefore useful to look at insights induced from humanities scholars who engaged with the Earth system from a planetary perspective to assess how such insights (could) align with the Earth System Law paradigm.

A planetary perspective over the Earth in which geological and biological processes are interconnected into a system-like entity has indeed become prominent in Anthropocene studies. This planetary condition has shifted perceptions of global space and interconnectivity and triggered numerous interventions about the symbolic forms and dispositions of the Earth. To inculcate a planetary consciousness aligned with the Anthropocene condition, planetary perspectives have attempted to steer away from reducing the the Earth to a ‘Globe’ — an object criticized for its sole devotion to human affairs, conquest and control (Ramaswamy, 2017). To borrow Latour’s wording, the exercise consists in ‘detach[ing] the figure of the emerging Earth from that of the Globe’, which is imbued with an image that ‘gave shape to the imperial idea of a universal power grab’ and control (Latour, 2016: 307–308). As Chakrabarty observed, there is a ‘growing divergence in our consciousness of the global – a singularly human history – and the planetary, a perspective to which humans are incidental’ (Chakrabarty, 2015: 55). What matters then is to reconnect life forms and their interactions across dynamic spatial continuums. If most planetary approaches in Anthropocene studies remain Earth-centred and do not venture into cosmic perspectives on planetary studies — or what Lenton coined ‘Exo-Earth system science’ (Clark and Szerszynski, 2021: 31; in reference to Lenton, 2016: 139) — these approaches recognize a spatial continuity at a terrestrial scale. In contrast to other terms like the ‘Globe’, such planetary perspectives therefore work towards decentring humans and acknowledge the distributed and entangled agencies between humans and nonhumans across space and time.

To better grasp what is at stake when thinking about planetary conditions, Chakrabarty usefully distinguished between two ‘global’ categories of thought that require distinct forms of inquiry and critique, namely the ‘global’ of ‘globalization’ and the ‘global’ of ‘global warming’ (Chakrabarty, 2019, 2021). If the former demands to ‘zoom in to the details of intrahuman injustice’ (Chakrabarty, 2021: 137) and to abandon the universalist/Enlightenment view of ‘the human as potentially the same everywhere’ to account for “‘anthropological difference” – differences of class, sexuality, gender, history, [race] and so on’ (Chakrabarty, 2012: 1–2)<sup>7</sup>; the latter necessarily demands to ‘zoom out of that history – or else we do not see the suffering of other species and, in a manner of speaking, the suffering of the planet’ (Chakrabarty, 2021: 137). Unlike in the story of globalization, the outlook of a planetary perspective over the Earth system and the global warming that affects it ‘lays out a perspective on humans and other forms of life where humans cannot be at the centre of the story’ (Chakrabarty, 2018: 265). ‘Human’ subjects are here displaced and viewed as ‘a figure of “continuity” that connects us to other species and to processes we may consider planetary’ (Chakrabarty, 2018: 282). This ‘planetary subject’ thereby ‘dissolves the figure of the autonomous human subject who remains the mainstay of political [and legal] thought’ (Chakrabarty, 2018: 282). A planetary perspective on the Earth system and its subjects therefore suggests a

<sup>7</sup> ‘Anthropological difference’ refers to ‘naturalized differences’ that ‘have the capacity to limit the right to have rights’ and ‘universally create[] a relationship of domination or exclusion’. Balibar (2020): 6–7 (original emphases).



distinct form of planetary living, where the interests of the human species are entangled with those of other life forms to reimagine a different habitable planet Earth.

Yet, this planetary analytic of the Earth system and its functioning raises important theoretical and practical questions about the configuration of ‘humans’ as one species entangled with others — questions that Earth System Lawyers will need to grapple with. Theoretically, it begs a question regarding a possible collective experience which points, as Chakrabarty notes, to ‘a figure of the universal that escapes our capacity to experience the world’ as such, resembling instead ‘a universal that arises from a shared sense of a catastrophe’ (Chakrabarty, 2009: 212). But how could such ‘planetary subjects’ be legally represented in an aggregated and unified way, in light of the differentiation between human and nonhuman experiences of and exposures to planetary harms, and the unequal responsibility between humans in triggering these harms in the first place? How could a planetary perspective over law ever fit into a political and legal mode of representation of a ‘collective we’ (Lindahl, 2013, 2021),<sup>8</sup> where this collective would not only entail all humans as a species, but all other life forms with which humans are entangled? To start with, such a planetary approach to political and legal representation should operate, as Chakrabarty reckoned, ‘without the myth of a global identity, for, unlike a Hegelian universal, it cannot subsume particularities’ (Chakrabarty, 2009: 212). Indeed, there is no ‘humanity’ that ‘in its oneness can act as a political [and legal] agent’ (Chakrabarty, 2012: 14), let alone if in the representational structure, this collective action is expanded to nonhumans. In order for such reconfigurations not to reproduce a new ‘planetary humanism’ dressed in old liberal and cosmopolitan clothes, such approaches must therefore imperatively account for the differential vulnerabilities and legacies of violence and dispossession that some humans and nonhumans (have) cope(d) with in the face of planetary processes (Yusoff, 2019; Clark and Szerszynski, 2020: 100–123).

It remains to be seen how Earth System Law will deal with this dual — simultaneous yet inherently conflicting — exercise of ‘zooming in’ and ‘zooming out’ of human history (Chakrabarty, 2021: 137) when articulating an overarching ‘planetary systems-based law’ (Kotzé and Kim, 2019: 7). Any Earth System Law will necessarily have to deal with these multiple and contradictory registers of humans acting, *at once*, as a species vested with a geological agency yet also split with differential ‘response-abilities’ to act and account for enduring planetary disruptions (Petersmann, 2021). This simultaneous yet conflicting consideration is equally applicable when thinking about the entanglement of human-nonhuman agency, which must be acknowledged whilst also acted upon politically by disentangling nonhumans from humans in order not to undermine (human) political actions (Giraud, 2019). Finally, one should also caution against the inherent dangers of the ‘proactive rather than reactive, and future-oriented rather than past-dependent’ planetary analytic that Earth System Law puts forward (Kim, 2021: 8) — a future-based planetary analytic that should by no means be traded against a focus on unequal distributions of past, ongoing and enduring responsibilities and harms, at the risk of their erasures. With these caveats in mind, one can conclude that what Earth System Law offers in terms of transformative reconfigurations consists both in a welcoming replacement of a ‘human-centred Globe’ with a ‘more-than-human planet Earth’, and a replacement of a ‘liberal and autonomous human subject’ with a ‘collective species being’ that is sensitive to its entanglement with other nonhuman and nonanimal beings. These transformations radically revisit environmental law’s subjective, spatial, temporal and institutional premises. In light of the insights drawn from planetary reconfigurations and their critiques by

<sup>8</sup> On the experiences of collective self-identification and othering, and how this ‘first-person plural’ is central to the formation of legal orders, see Lindahl (2013). Lindahl’s representational structure is, here, limited to human collectives. For its expansion to nonhumans, see Lindahl (2021).

humanities scholars, however, Earth System Lawyers will need to clarify how any planetary-based, overarching and all-encompassing legal framework could possibly account for asymmetrical, unequal and incommensurable modes of being and acting in more-than-human worlds (Wakefield et al., 2021). Besides the two aforementioned transformations, there is another central element to Earth System Law that profoundly distinguishes it from an environmental law perspective, namely its embeddedness in systems and complexity theory. It is to these two tenets I now turn.

## 2.2. The (Double) System(s) of Earth System Law and its autopoiesis

In addition to these transformative views of the Earth (instead of the Globe) and of an interconnected species being (instead of a liberal individualism) there is a third element of Earth System Law that deserves attention, namely its ‘systems-oriented ontology’ (Kotzé, 2020: 94). As noted above, Earth System Law views both the Earth and law as complex adaptive systems. In Kotzé’s words, Earth System Law is a ‘complex adaptive system that seeks to govern, in a mirror-like way, aspects of the Earth’s complex adaptive system’ (Kotzé, 2019: 8–9). As Kotzé views it, ‘a system (the Earth’s included) is greater than the sum of its component parts’ or, put differently, is ‘something that is made up of many individual parts that are *causally connected* and that all interact in tandem’. Kotzé also emphasizes that ‘*causality* is central to a system and is specifically evident in a system’s feedbacks’, which refer to ‘a *chain of cause and effect relations* that forms a *closed loop*’ (Kotzé, 2020: 81, emphases added). ‘Thus’, Kotzé concludes, ‘any outputs of a system ... continuously flow back as inputs into that same system in a *closed circuit*’ (Kotzé, 2020: 82, emphases added). Finally, Kotzé posits that a systems’ inquiry seeks ‘to understand complex and dynamic human and non-human relationships’ or, in other words, ‘complex *self-organizing* systems’ (Kotzé, 2020: 85, emphases added). Three main characteristics of Earth System Law’s ‘systems-oriented ontology’ can be distilled from the above, namely that (i) the *causal connections* between the parts of complex systems unfold in (possibly long-term) feedback loops that are non-linear and their effects therefore unstable and unpredictable; that they function as (ii) *closed* systems with self-defined boundaries between interdependent sub-processes (or parts) that interact with the external world and can react *within* the system to external change; and that they function as (iii) a *self-organized* system with *self-emerging* properties. When it comes to the Earth as a system, the foundations of this specific ‘systems-oriented ontology’, I want to argue, are therefore seemingly *autopoietic*.

As originally developed by biologists Maturana and Varela in the early 1970s, autopoiesis (from Greek *autós*, self, and *poiesis*, production) means self-(re)production (Maturana and Varela, 1973: xvii). A system is autopoietic when ‘organized (defined as a unity) as a network of processes of production (transformation and destruction) of components’, which ‘(i) through their interactions and transformations continuously regenerate and realize the network of processes (relations) that produced them; and (ii) constitute [the system] as a concrete unity in space in which [the components] exist by specifying the topological domain of its realization as such a network’ (Maturana and Varela, 1973: 78–79). Tellingly, Maturana and Varela used the image of a ‘living machine’ to represent autopoietic systems (Maturana and Varela, 1973: 77–84). More simply put, an autopoietic system is a system capable of reproducing and maintaining itself — a ‘network of inter-related component-producing processes such that the components in interaction generate the same network that produced them’ (Geyer, 2001: 14549). In 1995, Margulis and Sagan already observed that ‘the biosphere as a whole is autopoietic in the sense that it maintains itself’ (Margulis and Sagan, 1995: 20). It is this autopoietic definition of the Earth as a system that maintains itself that initially informed Earth system sciences (Clarke, 2012: 58). As established above, it is also this autopoietic understanding of the Earth as a complex, materially closed and self-organizing system that was retained by Earth System Lawyers. Indeed, Kotzé defined the Earth system as operating as a ‘*complex*

self-organizing system': a 'materially closed system consisting of inter-linked physical, chemical and biological processes that cycle materials and energy in non-linear, complex and dynamic ways *within* the system' (Kotzé, 2020: 81–83 and 94, emphases added).

What is more, Earth System Law posits that the law itself is also a complex adaptive system, operating within the complex adaptive system of the Earth. When it comes to the system of law, however, Kotzé and Kim have not yet articulated what systems theory Earth System Law, as a complex adaptive system, would endorse or develop — that is, whether or not they envision Earth System Law as functioning autopoietically within the Earth system, which, as seen above, matches an understanding of an autopoietic system. Yet, since Earth System Law is suggested as a framework that mimics or emulates the functioning of the Earth system — in Kotzé's words, as governing the Earth system 'in a mirror-like way' (Kotzé, 2019: 9, emphases added) — it seems safe to believe that Earth System Law is also imagined as operating autopoietically. Back in the 1980s, Luhmann already applied the notion of autopoiesis to legal systems. Luhmann defined autopoietic social systems, including law, as self-referential and operationally closed systems which are, however, not hermetic to their environment (Luhmann, 2004; Teubner, 1993). Simply put, 'social systems are self-referential ("autopoietic"), cognitively open, but operatively closed systems' (Messner, 2014: 315). More specifically, as systems of communications, Luhmann defined social systems as 'recursively produced and reproduced by a network of communications' which 'cannot exist outside of such a network' (Luhmann, 1986: 174). Communications, in this sense, are operationally closed or limited within the autopoietic system, but the latter can be 'irritated' by changes in the (external) environment which 'trigger resonance' within the (internal) system and its components (Baxter, 2013: 171). Whether or not Earth System Law would align — and to what extent — with an autopoietic definition of legal systems remains to be verified and is not the purpose of this inquiry.<sup>9</sup> Instead, in the next part of this article, I want to problematize Earth System Law's *autopoietic* understanding of the *Earth system* on three main grounds by contesting, first, that life on Earth operates within self-defined and organizationally closed boundaries; second, that the Earth system is self-organized; and finally, that the functioning of the Earth system can be causally determined. To this end, I will contrapose this autopoietic qualification of the Earth system's functioning with a 'sympoietic' understanding, which I unpack in the next section by drawing on the notion of *sympoiesis* — an epistemic framework that better captures how life emerges and unfolds on Earth through processes of becoming-with others.

### 3. A sympoietic becoming-with others, or how life unfolds on earth

'The great geopolitical fallacy of political ecology', Latour provocatively posits, 'is that the Earth is a whole where "everything is connected"' and that, 'if only we could bring together the boxes representing the "natural" elements with the "social" ones, we would have unified the question and could zoom in from the larger scales to the smaller ones' (Latour, 2014: 5).<sup>10</sup> Indeed, as I will argue in this section,

<sup>9</sup> For a compelling critique of autopoietic systems theory applied to environmental law, see Philippopoulos-Mihalopoulos (2007, 2014). For a comparative analysis between Luhmann's systems theory and its mismatch with socio-ecological resilience thinking, see Mai (2020): 113–114. For a critique of the political agnosticism that comes with social autopoiesis and its impoverished view of social processes, see Mingers (2002).

<sup>10</sup> Elsewhere, Latour remarks that when speaking of 'the Earth as a system', the Earth's 'political and philosophical pedigree is much harder to render explicit' (Latour, 2017a: at 62). Latour's critique of systems, however, arguably only applies to a cybernetic approach. Latour's work has indeed largely been inspired by Gaia theory, which is another systems approach (Latour, 2017b). On Gaia and the Earth system, see also Lenton and Latour (2018).

the Earth does not operate as a closed off system composed of distinctive 'layers' (Latour and Weibel, 2020: 8). 'The problem of such a view', to continue with Latour and Weibel, 'is that it imports a technical metaphor (mechanical or cybernetic) that implies (most of the time surreptitiously) the hidden presence of an engineer at work who has devised the whole as a system of which we see only the parts' (Latour and Weibel, 2020: 8).<sup>11</sup> Against this holistic and mechanistic view of the Earth system, a *sympoietic* understanding of life-sustaining processes offers a distinct way of apprehending how life unfolds on Earth.

Sympoiesis (from Greek *sún*, together, and *poiesis*, production) means collective creation or organization. As Haraway asserts, '*sympoiesis* is a simple word; it means "making-with"' (Haraway, 2016: 58). This 'making-with' is never limited to humans, since 'all organisms make ecological living places, altering earth, air, water', thereby producing workable living arrangements whereby 'each organism changes everyone's world' (Tsing, 2015: at 22). In 1995, environmental scientist Dempster coined the term 'sympoiesis' — in contraposition to 'autopoietic' systems — to refer to 'collectively-producing systems that do not have self-defined spatial or temporal boundaries ... are evolutionary and are characterized by continuing complex relations among system components' (Dempster, 1998: 180).<sup>12</sup> This sense of collective making aligns with biologist Margulis' theory of 'sybiogenesis' as a life-making process (Margulis, 1998: 35–37). This life-making process unfolds through the *intra*-active relating of 'holobionts', which are an assemblage of a host and the many other species living in or around it (Reitschuster, 2020: 351). In contrast to the usual 'interaction' of entities made up by pre-existing bounded units (like genes, cells, organisms and the like) which always assumes separate individual agencies (traditionally exclusive to humans) that would precede each action, the neologism 'intra-action' is here used in a Baradian sense, to signify the mutual constitution of entangled human-nonhuman agencies (Barad, 2007: 33). It is through such human-nonhuman entangled agency that life-making and life-sustaining processes are enacted, thereby enabling life on Earth.

Such a sympoietic view bears important consequences on how we conceive of life on Earth and the relations between humans and non-humans that compose it, since 'holobionts' are assemblages or networks between organisms (or bionts) that gave up *some* of their autonomy over the course of their mutual evolution to combine into different, joined organisms. This network of organisms explains the shared genetic material observable across species. As novelist Richard Powers reminds us: 'You and the tree in your backyard come from a common ancestor. A billion and a half years ago, the two of you parted ways. But even now, after an immense journey in separate directions, that tree and you still share a quarter of your genes' (Powers, 2018: 553). Contemporary biologists are therefore advocating for a 'symbiotic view of life' by applying this biological evidence of holobionts in fields ranging from anatomy, physiology, genetics, evolution, immunology or development. As Gilbert, Sapp and Tauber argued: '[f]or animals, as well as plants, there have never been individuals. This new paradigm for biology asks new questions and seeks new relationships among the different living entities on Earth. We are all lichens' (Gilbert et al, 2012: 336).<sup>13</sup> Gilbert and others speak of 'sybiopoiesis' to refer to the 'codevelopment of the holobiont' over evolutionary and planetary time and observed how 'Nature may be selecting "relationships" rather than individuals or genomes'. 'What we usually consider to be an "individual"', they continue,

<sup>11</sup> On this mechanic view of systems, see Maturana and Varela (1973): 78–79.

<sup>12</sup> As Dempster later clarified: '1) autopoietic systems have self-defined boundaries, sympoietic systems do not; 2) autopoietic systems are self-produced, sympoietic systems are collectively-produced; and, 3) autopoietic systems are organizationally closed, sympoietic systems are organizationally ajar'. Dempster (2000): 1.

<sup>13</sup> Lichens are composite organisms that live in mutually beneficial or symbiotic ways (Reitschuster, 2020: 351).

'may be a multispecies group that is under selection' (Gilbert et al., 2019: 673). Seen through such a prism, the sense of individuality and autonomy of the human being is perceived as nothing but a delusion, considering that humans are more than half non-human in the form of bacteria, fungi and viruses (Oliver, 2020).

Against this backdrop, and although Margulis — who with Lovelock founded the Gaia theory that initially helped 'the Earth system metaphor ... become a popular scientific framing' (Kotzé, 2020: 83; in reference to Lovelock and Margulis, 1974) — called these life-sustaining processes *autopoietic*, Haraway notes how she would likely have preferred 'the terminology and figural-conceptual powers of *sympoiesis*', but 'the word and concept had not yet surfaced' (Haraway, 2016: 61). As Haraway affirms, however, the Earth 'is *sympoietic*, not *autopoietic* ... always partnered all the way down, with no starting and subsequently interacting "units"' (Haraway, 2016: 33, emphases added).<sup>14</sup> The Earth and its sub-processes are thus radically *open*, both from a cosmic perspective whereby the Earth is only one planet affected by astrophysical forces within the solar system and the universe (Clark and Szerszynski, 2020: at 77–99), as well as a microbiomic perspective whereby the Earth is a host of holobionts that intra-actively create and maintain life collectively. A sympoietic view of the Earth and collective making of life thereby dismisses any finite systemic coherence, cause-and-effect thinking and organizational closure through fixed boundaries across space, time and matter. It is the *potentiality* of human-nonhuman encounters and their contingent unfolding or co-evolution that matters in this 'becoming-with' others. This foregrounds a necessary de-centring of the human subject, its autonomy and assumed comprehension and control over any-thing nonhuman.

Moving beyond theoretical biology and its disciplinary understandings of evolution of life on Earth onto the terrain of onto-epistemology, Jones coined the concept 'symbiontics' to define the ontic — or 'what is' — as a permanent state of symbiosis — or the condition of 'living-with' (Jones, 2020). Similarly, Morton defined the state of human-nonhuman coexistence as symbiotic. In what he qualifies as the 'symbiotic real', it is 'unclear which is the top symbiont' — namely who is the host and the being that is being hosted, or which organism lives on or inside another (Morton, 2017: 1). Consequently, the question of how varied species 'influence each other — if at all — is never settled: some thwart (or eat) each other; others work together to make life possible; still others just happen to find themselves in the same place' (Tsing, 2015: 22).

Crucially, however, this state of entanglement and distributed agency across humans and nonhumans should not be mistaken for an interconnectedness of all beings as one, nor as a simplistic reading that there are no boundaries at all or differentiated power asymmetries between intra-active beings (Jackson, 2020). Such an understanding would curtail the possibilities of strategic (human) political action by dissolving political subjectivity into the nonhuman word (Wakefield et al, 2021: 11-13). It is therefore key to emphasize that agential entanglement implies neither an absolute fusion nor an absolute split between humans and nonhumans, but acknowledges instead an agential distinction or non-absolute 'separation', as Neyrat argues, between intra-active humans and nonhumans (Neyrat, 2018: 149-151). As Barad compellingly puts it, 'agential cuts engage in agential separability — differentiating and entangling', without 'producing (absolute) separation' (Barad, 2010: 265, emphases omitted). This agential separability also matters to account for the enduring patterns of differences, of inclusions and exclusions, which generates different *abilities to respond* to such patterns — or different 'response-abilities' between humans and nonhumans (Haraway, 2016; see also Petersmann, 2021). This ability to respond to the other 'cannot be restricted to human-human encounters

<sup>14</sup> More accurately, Haraway asserts that 'sympoiesis enfolds autopoiesis and generatively unfolds and extends it' (Haraway, 2016: 58, and footnote 38, at 180).

when the very boundaries and constitution of the "human" are continually being reconfigured and "our" role in these and other reconfigurings is precisely what "we" have to face' (Barad, 2007: 392). How 'humans''s agency and 'response-ability' differ among humans and from other nonhumans matters, therefore, for the intra-active relations that compose them and which compose the world in its becoming. It is in this important sense that '[w]e are responsible for the world of which we are a part', precisely because 'reality is sedimented out of particular practices that we have a role in shaping and through which we are shaped' (Barad, 2007: 390).

In light of the above, a sympoietic view generates a rupture with onto-epistemologies of fixed and bounded systems and the traditional notions of causality and agency, which lie at the heart of an autopoietic framing of the Earth system's functioning. A sympoietic understanding of human-nonhuman intra-actions, instead, requires paying attention to immanent and situated modes of relating, and the contingent, asymmetrical and potential ways in which being, knowing and acting can emerge in more-than human worlds. The situated reality enacted by particular relations cannot be extended to an all-encompassing or universally applicable scale — a risk inherent to any planetary perspective or Earth system legal analytic. Now that we have sketched, in broad brush terms, what a sympoietic view of life would entail, how could it inform Earth System Law and its accompanying research agenda? In the form of a conclusion, I will reflect on what I see as the main contributions and insights with which Earth System Law might need to grapple.

#### 4. Conclusion

This article explored what the emerging paradigm of Earth System Law, as currently advocated by its main proponents, is suggesting in terms of reconfigurations of the Earth, its subjects and the law. While innovative in many ways, Earth System Law's central novelty concerns the systems-oriented ontology and complexity theory that underlie it. Yet, as this article argued, it is precisely these underpinnings that deserve more critical attention. While Earth System Law's interpretation of the functioning of the *Earth system* seems to embrace an autopoietic approach, its understanding of the functioning of Earth System *Law* remains elusive.

Overall, Earth System Law purportedly aims to 'respond to the Anthropocene's regulatory demands' by drawing on 'three Earth system-related regulatory implications': 'inclusivity, interdependencies and complexity' (Kotzé, 2019: 1). Arguably, Earth System Law thereby already endorses certain dimensions of what a sympoietic view of life implies, by positing, for example, the 'inclusive place of humans in nature', the interdependencies of 'inter- and intra-generational, inter- and intra-species relations' and the 'complexity and its associated characteristics of unpredictability [and] non-linearity' (Kotzé, 2019: 8). Yet, while I side with Kotzé and Kim in their lament that international environmental law operates in a 'segmented' approach built around 'relative Holocene stability, equilibrium, predictability, harmony, continuity, and linearity' (Kotzé, 2019: 8; Kotzé and Kim, 2021), I also call for caution regarding certain onto-epistemological tenets embedded in the 'systems-oriented ontology' that Earth System Law is advocating.

Earth System Law, as proposed in its current form, views the Earth system as (i) having self-defined boundaries, (ii) being self-organized and (iii) organizationally closed — in sum, as an *autopoietic* system (Dempster, 2000). This view of the Earth as autopoietic presumes a 'whole' that is always already unified in advance (Latour, 2014: 97). With this article, I wish to draw the attention of scholars working with Earth System Law to the fact that life on Earth might better be captured as permanently emerging through contingent, collectively-produced and more-than-human relations — in sum, as functioning through *sympoiesis*. As Tsing reminds us, '[e]cologists turned to [sympoietic] assemblages to get around the sometimes fixed and bounded connotations of ecological "communities"' (Tsing, 2015: 22). Metaphors like 'communities' or 'systems' foster indeed an imaginary that overemphasizes the



cause-and-effect thinking and functioning of operationally closed and bounded entities (Tega Brain, 2018), thereby downplaying the role that contingency plays in producing and sustaining life-enabling processes. It is this contingent surplus, this opacity, this abyssal inaccessibility — or what Neyrat calls the ‘unconstructable part’ of the Earth (Neyrat, 2018)<sup>15</sup> — that no system is able to contain.

This article tentatively sketched the importance to grapple with ‘sympoietic thinking and action’ (Haraway, 2016: 67), posited as a condition of existence, of living and potentially becoming-with nonhumans. All questions remain open regarding how law could possibly operate sympoietically — an exercise that others like Grear, Akhtar-Khavari or Albrecht have already attempted to initiate.<sup>16</sup> A related interrogation would consist in exploring whether and to what extent a ‘sympoietic’ approach to law would fit with what has been coined by some as ‘critical autopoiesis’, which understands itself as ‘acentric, post-identity, post-human, fully material, radically ecological (in the sense of beginning from the systemic environment rather than the system), and as an infinite repetition of difference’ (Philippopoulos-Mihalopoulos, 2014: 391). My objective was not to offer a substantive, definitive or actionable legal framework, but to unpack and problematize certain onto-epistemological tenets of the one suggested as an ‘Earth system-centred legal paradigm for the Anthropocene’ (Kotzé, 2019: 9). The reader is intentionally left not with a set of solutions to work with but with a series of interrogations about the specific worldview that oftentimes is assumed by an autopoietic understanding of the Earth and its (legal) ordering, which under-acknowledges the contingency of sympoietic encounters and their potential unfolding in terms of life-sustaining and world-making processes.

#### Declaration of competing interest

I hereby confirm there is no conflict of interest that applies for this submission.

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<sup>15</sup> Neyrat argues for a political ecology that places the universe at its core so as to deal with the obscure foundation of ‘nature’: its unconstructable base that makes up the trajectory of an Earth destined to cosmic destruction. Instead of reducing the Earth as something *for* humanity, Neyrat views the Earth as a ‘*traject*’ that traverses the living and the nonliving and *accompanies* humanity throughout the time it will be granted. Against this backdrop, he argues for an ‘ecology of separation’ that views ‘nature’ as ‘other’: neither an a-natural Earth amenable to human mastery, nor a hybrid Earth in which humans and non-humans have merged, but a distancing from nature that recognizes its ‘unconstructable part’ and inaccessibility to humans (Neyrat, 2018: 180–181). In Neyrat’s sharp words: ‘[i]t is precisely this surplus that makes the Earth into a wholly full body: not a body filled with matter or organs, but with potentialities that no system – whether technical or living, artificial or organic – is able to contain’ (167–168).

<sup>16</sup> See e.g. Grear (2020a) (who suggests ‘sympoietic normativities’ as ways of co-living and co-organizing in the face of the Anthropocene’s catastrophic implications); Grear (2020b): 350–352 (who advocates for a political ecology of the commons and frames a commons as an assemblage or a site of sympoietic/multipoietic commoning); Akhtar-Khavari (2020) (who draws on the concept of symbiosis to outline a novel cooperative restoration paradigm for environmental law); or Albrecht (2020) (who suggests that the concept of ‘ghehds’ should replace that of ‘rights’ to make sense of the science of symbiosis).

systems theory and its relevance for law in the Anthropocene. Finally, I am grateful for the comments I received by Dipesh Chakrabarty, Dimitri Van den Meerssche and two anonymous reviewers, to whom I extend my appreciation for their time and efforts.

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