

***Interactive comment on “ESD Ideas: It is not an Anthropocene; it is really the Technocene: names matter in decision making under Planetary Crisis” by Oliver López-Corona and Gustavo Magallanes-Guijón***

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Received and published: 11 February 2020

We thank the Carsten Herrmann-Pillath for his comments that we respond below.

Comments (>>)

>> The authors present ideas that have been articulated und debated in the literature for long: a) in the context of the anthropocene discussion, especially with reference to the technosphere notion (e.g. Peter Haff), even using the same term 'technocene' (for an overview, see Malhi, Yadvinder. 2017. The Concept of the Anthropocene. Annual

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Review of Environment and Resources 42, 1, 77–104. b) in the rich and complex literature following Dawkin's 'Extended Phenotype' book (1982), including very substantial contributions such as Kim Sterelny's. In that context, one should be aware that the notion of 'culture', as used in evolutionary anthropology, includes artefacts, hence technology. Therefore, there is also a well developed modelling literature following the trail of Boyd and Richerson.

We thank the Reviewer for sharing this literature we have not included basically because this is not a systematic review of the literature, our focus is on Systems Dynamics, and the format of the article type is very length restricted, but we will make our best to reflect some of this.

New text added: In this sense, the discussion in the literature about the concept of anthropocene is important. For example, from the ecosystem sciences Yadvinder Malhi (2017) explores the functioning of the biosphere and its interactions with global change; while from a cultural evolution perspective Boyd, R., & Richerson, P. J. (1996) have studied the development of this geological era. This, without neglecting Haff's vision, Peter K. (2014) who also proposes six key rules that mediate human beings and technology in the anthropocene.

»> This reviewer does not pay respect to modesty in pointing out that I have developed a very similar model and diagram as the authors sketch, in the book 'Foundations of Economic Evolution' (2013), explicitly building on niche construction theory and co-evolutionary theory. That means, I do not think that the authors present a new idea. If they really want to contribute a new idea in this field,

New text added: Of particular interest is the work of Peter Halff about how different human technological systems such as communication, transportation, bureaucratic and other systems are interlinked and actually act to metabolize energy (mostly fossil fuels) in a sort of global emergent entity with similarities to the lithosphere, atmosphere, hydrosphere and biosphere. The author calls this the Technosphere, which he consid-

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ers the defining system of the Anthropocene and most important in the context of the present work, he thinks it influential and even model what we might consider most intimately and essentially human: our ideas, personal purposes, feelings, and dreams. In the same sense a direct antecedent of the importance of niche construction is the seminal work of Herrmann-Pillath who has pointed out how technology co-evolve with other components of human culture such as its institutions in parallel with behavioral and biological evolution, constituting a key element of niche construction. This recognition is incorporated in what we think is a novel ontology, the Ecobiont, discussed in our previous work (López-Corona, et.al. 2019) and that makes our understanding of Technocene somehow different to previous proposals, because is not only about the predominium of technology that enhance human capacity for niche construction; it is also about the predominium of a new ecobiont, the technobiont.

»> I recommend that they should concentrate on the question whether certain universal evolutionary principles apply across all ontological levels, such as thermodynamic imperatives. But even here they must build on what we already have, such as Peter Haff's contributions. There is also a rich literature on evolutionary modelling of technology which employs generic evolutionary concepts, such as the replicator notion, which the authors may find inspiring.

Thank you for the recommendation, but we think that is an entirely different work. As we see it, our contribution is well pose under: (1) Thechnocne as a preponderance of new ecobiont; (2) Technocene concepts implies the use of Precautionary Principle in relation to the space of possible interventions for Planetary Crisis fight; (3) turning attention to a topic that has not received enough consideration, the great technological acceleration of the past 50 years and how it has become an Earth System Dynamics changer

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Interactive comment on Earth Syst. Dynam. Discuss., <https://doi.org/10.5194/esd-2019-49>, 2019.