Earth Syst. Dynam. Discuss., author comment AC8
https://doi.org/10.5194/esd-2021-26-AC8, 2021
© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.

Reply on CC6

Oliver López-Corona et al.

Author comment on "ESD Ideas: planetary antifragility: a new dimension in the definition of the safe operating space for humanity" by Oliver López-Corona et al., Earth Syst. Dynam. Discuss., https://doi.org/10.5194/esd-2021-26-AC8, 2021

Dear Dr. Maskey,

We thank your comments and we will address them fully in the revised version of the manuscript.

Maskey: "...Moreover, it is not implicitly explained how Fisher Information is related to human operating space. For this, the authors shall demonstrate the physical meaning of such qualifiers and also align with the scope of ESD."

The main idea in this context is that a safe human operating space should consider not only a "safe" range of important state variables in terms of tipping point, but also the dynamics of the systems, see for example unpublished work by Toledo-Roy and co-workers (https://www.youtube.com/watch?v=WzfdnoC3Kik), especially its capacity to respond to perturbations. The dynamic interpretation of Fisher information could be understood as a measure of the system stability or as we have proposed elsewhere (https://researchers.one/articles/19.11.00005) as a universal payoff function for antifragility measurement.

Cumulative evidence presented on our previous work on Ecosystem Antifragility (https://peerj.com/articles/8533/) and commented on the latter paper, points to the conjecture that ecosystem including Earth System tends to be not only under limited range values for key biogeochemical variables but also in a special dynamical regime of maximum complexity, maximum Fisher Information and balance between emergence (flexibility/randomness) and self-organization called Criticality. In these conditions, the ecosystems (including Earth systems) exhibit the greatest computational and inferential capacities related to the system capacity to respond and adapt to perturbations.

Maskey: "There are some jargon need to be defined properly and hence hard to understand. For instance, the authors introduced "TOA" on line 80 for the first time. What does it stands for? Give its full form. Likewise, the reviewer asks to define Lrad, Lin, and λ implicitly in Equation 3 and other variables in Equation 4.

On line 20, "of" is missing between work and Equihua et al."

We have already fixed this in the revised manuscript, Thank you.