

Earth Syst. Dynam. Discuss., community comment CC2  
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## Reply on AC1

Richard Rosen

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Community 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-CC2>, 2021

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Sorry, but I do not accept the validity of your response. You can not just put up vague ideas and connections between them for which there is no scientific basis. You have to show via theories of physics that the argument and connections you hypothesize has some basis in theory. For example, you can't just speculate that scientists can measure the entropy of complex systems like the earth system or the climate system, which they can not. How would you even define what the entropy is of such a complex system? Entropy can only be measured in theory for very simple systems. And you don't even connect the type of reflected radiation you measure and analyze to climate change in theory. What is the connection? And how does entropy relate to resilience? You do not say. So you cannot claim to write about promising research ideas like these without showing that theories of physics are well enough developed to show that they are promising.

Furthermore, you seem to get the sign wrong when discussing entropy. You speak of entropy production or increases as being good on lines 58-59. Entropy "production" (increases?) is not a sign of the health of a system. The reverse is true -- reductions of entropy for small sub-systems are "good", because that means that such sub-systems can be more organized and, perhaps, resilient. But none of this can be measured. And the end of line 57 makes no sense at all. The word "imperative" is not the correct English word to use here. Some radiation falling on any surface produces some heat (how do you define heat - which wavelengths of electromagnetic radiation?). How does this fact relate to resilience to climate change and other issues raised by the planetary boundaries literature?

Please listen -- you MUST at least demonstrate that you understand physics, including thermodynamics, before you can claim that you are proposing interesting new ideas to the ESD community. Right now your paper shows great confusion.