

Interactive comment on “Interplay between linear, dissipative and permanently critical mechanical processes in Arctic sea ice” by A. Chmel et al.

Anonymous Referee #2

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This paper presents a small set of measurements of sea ice small-scale motions (measured by a tiltmeter) and shows that the signal includes self-similar characteristics. The paper also shows other examples of sea ice self-similarity that have, in general, been published before by other researchers, such as floe distributions. I think the authors are getting at some interesting ideas, but the presentation is vague enough that they remain out of my grasp. (Poor English grammar does not help!) At the end of the article the question remains: why does this matter?

In general, references given by the authors are insufficient. I performed a quick literature search to learn what related work has been done, and I found a short list of papers that appear to be quite pertinent (e.g., Overland et al JGR 1995, Dempsey et al Int. J. Fracture 1999, Vasiliev et al Earth Obs. Rem. Sens. 1995, Palmer and Sanderson

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Proc Roy. Soc. Lond. 1991, Weiss Phys. Rev. E 2008, Kornes JGR 1998, Schulson JGR 2004). I also found several papers written by one or more of the current authors which are not referenced here but appear to be highly relevant. If nothing else, this makes me suspicious that the current work repeats earlier efforts. I urge the authors to carefully place their research in the context of the existing literature, to make very clear what has been done and what this paper contributes that is new.

The use of the term "thermodynamic" in this paper appears to differ from that which most sea ice modelers and observationalists recognize, i.e. the processes that lead to melting and freezing of the ice. Here it seems to be some sort of statistical/entropy thing related to (mathematical) dynamical systems. Likewise the word "dimension" appears in the very first sentence, and I am not sure to what it refers.

The introduction is very vague (e.g., "some other ones"). The reader needs more information in the introduction, to know what to expect in the rest of the paper. What is the question being answered? And in general terms, what tools will you use to answer it? Without this information, the rest of the paper comes across as a very incoherent bunch of details, many of which seem to come out of the blue.

Section 2, "Geometry and size distribution" provides interesting background, but it's not clear what is new here, if anything. The final four (mostly one-sentence) paragraphs are not backed up with data or references, and therefore I am not inclined to believe the statements therein.

What's the difference between parallelogram-like and diamond-like floes?

The following sentence appears in Section 5 ("Discussion"): "The data presented in this work demonstrate that the ASIC exhibits properties of both dissipative structures and SOC-systems." As far as I can tell, this is the critical statement of content for this paper. But why should I or anyone else care about this? What are the implications? Does this mean that elastic waves are necessary for modeling pack ice? or waves on some other scale, like tides?

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Interactive comment on The Cryosphere Discuss., 4, 1433, 2010.

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