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Earth System Dynamics
Discussions

Interactive comment on "Classification of mechanisms, Climatic Context, Areal Scaling, and Synchronization of floods: the hydroclimatology of floods in the Upper Paraná River Basin, Brazil" *by* Carlos Lima et al.

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Classification of mechanisms, Climatic Context, Areal Scaling, and Synchronization of floods: the hydroclimatology of floods in the Upper Paraná River Basin, Brazil

by Carlos Lima, Amir AghaKouchak, and Upmanu Lall

In my view, the authors' contributions are relevant to the field and of interest of those working on improving flood risk management either in flood design or in short term prediction. It is not of my knowledgement that this paper was published elsewhere.

1. Does the paper address relevant scientific questions within the scope of ESD? In my view, yes. The main contribution of the paper is establish a link between flood frequency and flood generating mechanisms. The authors assume the Hirschboeck's hypothesis that "exceptional floods in basis of all sizes could be related to anomalies in the large scale atmospheric circulation" (Hirschboeck, 1988). Such approach has not been applied in South America basins.

2. Does the paper present novel concepts, ideas, tools, or data? The authors propose a statistical approach in order to classify flood generation mechanisms, spatial scaling of floods, and flood event synchronization in a large river basin. This was exemplified with data from a basin located in Brazil.

3. Are substantial conclusions reached? In my view, yes. Specifically:

a. Four distinct patterns of rainfall were observed and associated with the atmospheric circulation and moisture transport.

b. Associated with these patterns, the authors identified also four types of floods for the analyzed basin.

c. It was also identified that the spatial scaling exponents of floods as a function of drainage area are similar for floods types 1 and 2, and for types 3 and 4. The exponent is higher for types 3 and 4 than those for floods types 1 and 2. The area exponents for flood variance are considerably higher than those for mean scaling, which, according with the authors (and I agree), points out to the possibility of a multi-scaling approach.

d. The techniques used were also able to identify distinct patterns of flood synchronization and movement, which were conditional to the sorm track. This has a potential use to improve analysis and prediction for flood emergency and flood control systems purposes.

4. Are the scientific methods and assumptions valid and clearly outlined? Yes, the methods and assumptions were clearly outlined. The authors were quite careful in the

mathematical development.

5. Are the results sufficient to support the interpretations and conclusions? Yes, In my view the results provide support to the interpretations and conclusions drawn by the authors.

6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Yes, in my view the work can be reproduced by others scientists – of course, given that these are skillfull in the techniques and methods employed in the manuscript.

7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? Yes, the authors did an extent review of literature providing the due credit and indicating their own contributions. The authors dia a good job in putting their work in the context of recent literature.

8. Does the title clearly reflect the contents of the paper? In my view, yes.

9. Does the abstract provide a concise and complete summary? In my view, yes.

10. Is the overall presentation well structured and clear? Yes, in general the paper is well written and structured.

11. Is the language fluent and precise? Yes, but there is still room for improvement. I would recommend a last review for english style.

12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Yes.

13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? In my view all the material presented are needed and clear. The paper should not be shortened.

14. Are the number and quality of references appropriate? Yes. The authors, as I already mentioned before, made a good job putting their work into perspective of the

current literature.

15. Is the amount and quality of supplementary material appropriate? Yes, in my view the presented material is enough and of high quality, and it allows the reader to understand fully the methods and the analysis that was made.

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