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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Influence of ENSO and tropical Atlantic climate variability on flood characteristics in the Amazon basin" *by* Jamie Towner et al.

Anonymous Referee #3

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This paper investigates whether the differences between positive/negative and neutral phases of various climate indices in the tropical Pacific and Atlantic Oceans affect flood characteristics in the Amazon basin for the period 1979-2015. This statistical study do not imply much explanation (which is not the purpose of the work). It is an original work as it addresses not only flood magnitude but also the timing and the duration of the floods. It is interesting as it covers the whole Amazon basin. River data are both observed and simulated (GloFAS 2.1), the indices are the usual one, but attention is paid to the differences between the impact of Central and Eastern Pacific events. For these reasons, this paper is interesting but it is not very original in its form and methods. In addition, it suffers some imperfections that are listed underneath. The major ones

are the following:

- You do not define precisely what the flood duration is

- You do not pay attention to the significance of the correlations. This cannot be accepted.

- You do not always comment all your results. See various remarks on this topic, below.

- in section 3.4.1, you comment three topics. Two are thematic; one is related to the data. How? Why did you chose these topics?

Detailed comments:

Page 2, line 17: "...the largest rainfall anomaly" Largest in mm? in length ?

Page 2, line 26: the reference Bazo 2018 is a web page where nothing is told about the duration of the inundation. Please give a more precise reference or avoid it.

Page 3, line 3: Apart from Tomasella, see also https://halshs.archives-ouvertes.fr/hal-02987838/ on the topic of the timing of peak river flows.

Page 3, line 19: the prediction of the end of the wet season could also be useful for population. See https://www.sciencedirect.com/science/article/pii/S2214581817303543

Page 6, lines 3-4: why do you justify not using the MJO ? While you do not justify not using for instance the PDO, that combining with ENSO can promote extreme events (see the authors you mention in Towner et al 2020).

Page 7, section 2.7: Are the days above the 95th always consecutive during an annual cycle? The answer is no. There can be a sequence of days above 95th, then a few days below and again days above 95th. How did you determine the duration of the flood? Did you count the days above 95th? Did you include in this count the intermediate days? Do the duration of the flood and the date of the beginning of the flood allow to know the date of the end of the flood? Or not?

Page 8, line 16: what is the relationship between the fact that the annual maximum of GloFAS 2.1 occurs earlier than observations and dams? Explain, please. What about the role of the large floodplains in the Upper Madeira basin (Llanos de Mojos) ?

Page 8, lines 19-22: Neighboring stations are also subject to ITCZ migration. Why would only stations 45 and 51 behave differently?

Page 8, 3.1.1: You show on the figures the significant values, but do not say in the text how many (or what %) of them are significant. This is essential, as non-significant values are not very interesting! This remark is true for all the indices.

Page 9, line 17: Northwestern or northeastern?

Page 10, lines 1-10: are these signals consistent with what is found for rainfall?

Pages 8-10: Why the signals are stronger with GloFAS 2.1? Why don't you comment that in the text?

Page 10, lines 30-31, last sentence: this is also true for TNA in Western Amazon.

Page 11, line 21: not only in the Jurua, but also in the Madeira, Purus, Negro

Page 12, line 2: You could explain that the extra days in Obidos may be related to the extra days along the Negro ad Branco rivers.

Page 12, line 4: What is DOT ?

Page 12, section 3.3.1: Figure 9h shows some consistent positive anomalies along the Purus and the Madeira. You do not comment them. Why?

Section 3.4: why do you focus on these 3 topics. You should explain that in the introduction of this section.

Section 3.4.1: you do not mention that Espinoza et al 2013 tell that the intensity of floods is more likely related to an early La Nina event, as observed during the 2011–12, early rainfall and simultaneous peaks of both tributaries of the Amazonas Rivers.

You should consider this in yours reflexions.

Page 13, line 24: show these years in figure 11.

Page 14-15, section 3.4.2: why the differences between EP and CP? Rapidly. This has been commented in the literature (see your review paper).

Page 15, line 20: again, tell whether the correlation are significant or not.

Page 17, lines 10-13: Can combining indices be a perspective?

Tables and figures

Table 1: which are the significant values?

Figure 1: 1) Are "mean annual maximum river flows" monthly values? Extreme annual values? Tell it in the caption. 2) Give more information in the caption about the index that is represented in 1c and 1f. Are all the figure essential in the main text? Some figures could be supplementary.

Figure 1S: Fazenda Vista Alegre is not at the confluence of the Madeira and Solimões. Check it.

Table S1: List the stations in number order and not alphabetical order. It will be easier to find the stations mentioned by their numbers in the text.

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