

Dear Editor Prof. Ying Fan and Reviewer,

Thank you very much for the comments on our manuscript entitled “The role of the Amazon Basin moisture in the atmospheric branch of the hydrological cycle: A Lagrangian analysis” (hess-2013-613).

In order to answer the questions arisen by the Reviewer 1 concerning changes in the moisture transport associated with wet and dry periods and with anomalous Atlantic conditions, we have incorporated extra information in the second version of the manuscript. However, we totally agree that this extra material would make the paper difficult to read and comprehend.

Thus, following your suggestions, the main modifications in the third version of the manuscript were:

- Elimination of the section 3.2 of the second version of the manuscript which investigates possible changes in the role of the Amazon basin during flood and drought years.
- Reduction of the discussion associated with ENSO and AMM (sections 3.2 and 3.3 of the third version)

We look forward to seeing your further revision.

Best regards,

Anita Drumond and Co-Authors

Editor Decision: Reconsider after major revisions (06 May 2014) by Prof. Ying Fan
Comments to the Author:

This is the revised version of a manuscript that analyzes the sources and sinks of moisture to the Amazon Basin and from the Amazon Basin. This version is quite different from the previous one, as the authors include drought-flood years, ENSO and the Atlantic Meridional Mode.

The authors did an excellent job of improving the literature review, and the ENSO discussion. They addressed most of my concerns adequately – HOWEVER- they also added a lot of information from the previous version.

In my opinion, the additions made the manuscript very (very) difficult to read. I counted a total of 14 pages of multi-panel figures (some had 24 panels). This is simply too much information!! Furthermore, the discussion is extremely dense, with pink/green meaning different things in different figures (convergence-divergence-sources-sinks). My brain was completely exhausted by the middle of the paper.

The authors MUST reduce the amount of information presented in this manuscript. These are my suggestions:

- I would remove the independent analysis of drought / flood because they are so similar to ENSO – the differences can be acknowledged and then lead to the analysis of AMM.
- Significantly reduce the discussion associated with ENSO. In your conclusions, the most important point is that during ENSO years, the Amazon contributes to La Plata. Focus on that.
- Focus on the link between AMM and the oceans.

My overall suggestion is to think about your reader. How will you keep your reader engaged and not lose sight of the most important take away messages.

- Firstly, we would like to thank for the constructive commentaries of the Reviewer 2. In order to answer the questions arisen by the Reviewer 1 concerning changes in the moisture transport associated with wet and dry periods and with anomalous Atlantic conditions, we have incorporated extra information in the second version of the manuscript.

However, we totally agree with the Reviewer 2 that this extra material would make the paper difficult to read and comprehend. Thus, following the Reviewer's suggestions, we removed the independent analysis of drought / flood (old section 3.2) because they are similar to the ENSO and we included a brief

commentary in the ENSO results (new section 3.2). Please, read the text inserted in the manuscript:

“If we consider the six flood years in the Amazon (1988/89, 1993/94, 1998/99, 2008/09, 2010/11, 2011/2012) and five drought years (1979/80, 1982/83, 1997/98, 2004/05, 2009/10) identified from the previous studies of Marengo et al. (2013a; 2013b), the anomalous contributions from the SA and the NA boxes verified in the ENSO events are quite similar to the anomalous transports during these drought and flood episodes (figure not shown). This may be explained due to the strong similarity of the elements selected for both composites. Only one (1993/94) of the six flood years identified was associated with neutral ENSO conditions, while the other events took place during La Niña episodes. The same occurred for drought years: only one (1979/80) of the five episodes did not take place during El Niño conditions.”

In addition, we reduced the discussion associated with ENSO and AMM. Read the new sections 3.2 and 3.3 in the manuscript, please. As explained in the last rebuttal letter, we prefer to keep the figures in a monthly scale in order to follow the temporal evolution of the transport of moisture over the basin during the development of the rainy season with more details. We also think that using different colors to identify preferred sources and sinks during extreme ENSO and AMM episodes might generate more confusion. Thus, in the analysis of (E-P) our idea was to use pink colors to indicate preferred sources/sinks (in their respective figures) for EL Niño and for AMM+ episodes, and the greenish tones for La Niña and AMM- events. The figures of VIMF use bluish and reddish tones to indicate convergence and divergence, and they are showed at the right-hand of the sources fields.

We hope these modifications can contribute for a better understanding of the manuscript. Please, let us know if more adaptations would be necessary.

Minor edits:

Gat and Matsui (2012) – this is incorrect it should be 1991 and references quoted in – is incorrect, should be references quoted therein.

- Thank you, minor corrections were done.

- We have also moved the paragraph introducing the AMM from the methodology to the introduction. Please, see the text included in the Introduction

“Nevertheless, not all El Niño events are related to drought in the Amazon (Marengo et al., 2013). Recent studies have also pointed to the importance of the tropical Atlantic (TA) in the modulation of the Amazon climate (Yoon and Zeng, 2010), as observed during the 2005 and 2010 drought events (e.g., Marengo et al., 2008; Lewis et al., 2013), as well as during the 2012 flood in the Amazon River (Satyamurty et al., 2013). According to Servain (1991), the Atlantic Meridional Mode (AMM), also known as the meridional SST gradient, may be considered one of the main low frequency SST variability modes in the Tropical Atlantic, and its extreme episodes are characterised by an anomalous interhemispheric gradient structure. Associated with these anomalous SST patterns are changes in the trade winds, presenting as anomalous surface winds crossing equator, and the Atlantic ITCZ is displaced towards the warmer SST anomalies.”

- We have also included a short paragraph at the end of the Methodology summarizing the three topics discussed in the results. Please, see it:

“Summarizing, the results presented in the next section are organized into three topics. An analysis of the climatological annual cycle of the transport of moisture into and from the Amazon is discussed in the section 3.1. The technique of composite differences is then applied to investigate how ENSO (section 3.2) and AMM (section 3.3) episodes may affect the transport of moisture over the basin.”