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Interactive comment on "A twelve-year high-resolution climatology of atmospheric water transport on the Tibetan Plateau" *by* J. Curio et al.

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Curio, Maussion and Scherer describe the climatology for atmospheric water transport on/off the Tibetan Plateau for the High Asia Reanalysis (HAR) of Maussion et al. (2014). HAR provides high resolution data and in turn allows a much more detailed description of the atmospheric water inflow to the Tibetan Plateau and its water budget. The HAR water transport provides a major step for our understanding of the Tibetan Plateau water budget and its influence on regional and large scale climate.

The authors pose three objectives, the spatial climatology, the effect of topography on blocking and channeling moisture and the influence of model resolution. They deal with the first two topics convincingly but from my point of view they do not really address the last one.

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Any conclusions suffer from the short period of available data and the lack of appropriate validation data. I am not convinced that the authors sufficiently discuss the relation between their work and the literature on the water cycle of High Asia. While the language is good, the manuscript could still benefit from clarifying and simplifying some of the more complex sentence structures in later sections.

Nevertheless, from my point of view the manuscript requires no major changes. I only give some suggestions below. Additionally, I endorse the comments by Anonymous Referee 1.

Minor comments:

1. As already noted by Anonymous Referee 1, please give a short assessment of the quality of HAR precipitation.

2. Could the vertical resolution have an influence on transport and precipitation estimates?

3. Could precipitation suppression be an HAR/WRF-artefact rather than a dynamical plausible feature?

4. A question with respect to the assessment of import and local sources of precipitable water: I assume the model-setup behind HAR has a locally closed water balance and no artificial sources and sinks? This may sound ridiculous but if I recall correctly there are (mainly older) models for which this is not guaranteed.

5. a) Although you frequently mention the East Asian (summer) monsoon, I cannot identify to which studies you refer. As you see the lack of an influence as an important finding (and I agree) I would appreciate a pointer which findings you challenge.

b) As a side note, I wonder whether the disagreement on East Asian moisture inflow is due to differing definitions. Günther et al. (2011) present a borderline for the Pacific monsoon and some definitions assume both NWP and East Asian monsoons to be part of the same monsoonal circulation. Considering Günther et al.'s definition

ESDD
5, C501–C507, 2014

the south-east inflow is more due to the NWP-EA-monsoon than due to the Indian monsoon.
Compare e.g. WMO TD report "Global Monsoon System: Research and Forecast". Third International Workshop on Monsoon (IWM-III) (Hangzhou, China, November 2004) (WMO TD 1266)
http://www.wmo.int/pages/prog/arep/tmrp/documents/global_monsoon_system_IMW3.pdf

c) There is apparently on average no inflow from the East. However based on your current analyses, you cannot exclude this for individual years.

6. While I agree with your general description of the on average major influences (page 1161 bottom and 1162 top), it may confuse prior findings on climatological influences and anomalous influences in individual years.

7. In Figure 2c, the comparison between HAR30 and ERA-Interim shows large differences in the South Asian Monsoon, which are likely of interest to the present study and should be addressed. Less prominent are differences in northern latitudes of the domain.

8. You mention in passing work on drought and wetness on the Tibetan Plateau but don't give references. It is not necessary to add more references, but it could help to more highlight the interannual variability. Figure 5 indicates the strong interannual variability and I appreciate that you wish to discuss this in more depth in a subsequent study. However, the reader would benefit in her/his understanding by some information visualising the variations around the mean climatology. Standard deviations for some measures presented in the tables could provide this information. Additionally one or two individual cases added to Figure 3 could also be valuable.

9. a) Section 3.3: Could you check the description of the results for consistency? For example: You write "above these levels [15,16]" and "Level 10 which lays between".

ESDD
5, C501–C507, 2014

b) I also miss the Tibetan anticyclone (compare the work of, e.g., Flohn) in your descriptions.

c) The mixing of water sources is, from my point of view, a major results which should be discussed later with its implications.

d) In the last paragraph of Section 3.3, you are basically describing the features of the heat low over Pakistan and the elevated anticyclone. It may be appropriate to give a reference. That is, your final sentence is not necessarily something new. Furthermore, I wonder to what extent the work of Sajjad Saeed on the heat low may be relevant.

Technical comments:

1. I would like to ask you to reconsider the use of the rainbow palette (even if the Figures appear to be already colorblind safe). See e.g.:
http://geog.uoregon.edu/datagraphics/EOS/
http://www.poynter.org/uncategorized/224413/why-rainbow-colors-arent-always-the-best-options-for-data-visualizations

2. I seem not to be able to find information about the top of the atmosphere in HAR, i.e. where the top level is approximately.

3. I propose to put Figures 9-12 as four panels of one new Figure.

4. Generally, I am confused by your description of prior results. It would help to just give a general summary of moisture paths to the TP and then discuss the different approaches and studies.

5. You appear to focus on very recent studies and to more or less ignore older studies. The Tibetan Plateau and its moisture and heat balance are a topic of intense research for 30 years now. Since the HAR data provides a new and improved perspective on the topic, it is valuable to discuss very thoroughly how the new findings challenge or complement previous assessments and conclusions. The works of, among others, Akiyo Yatagai, Tetsuzo Yasunari, or Michio Yanai may (or may not) be relevant.

ESDD
5, C501–C507, 2014

6. Your discussion section is more a summary of your results and not a discussion of them with respect to the literature. For example, if HAR10 and HAR30 differ by 60mm per year in AWT input, how do they compare to, e.g., ERA-I. Generally, it is necessary to more clearly discuss how your results add to or contradict works presented in motivating the study.

7. Similarly your conclusions are rather an outlook and not so much conclusions from your results. (As a sidenote: Is there a reference for the TP precipitaion variability? Analysing dry and wet episodes should not only be compared to Lu et al. who use a comparable time interval but also to studies dealing with other periods. These could potentially include Hahn and Shukla, 1976, Tang and Reiter, 1984, Luo and Yanai, 1984a,b, and especially Liu and Yin, 2001. But there are many more publications on dryness and wetness of the TP.)

Annotations, questions, typos etc:

I would suggest to slightly restructure the abstract to emphasize your main findings. For example, the larger than thought westerly contribution gets slightly lost.

page 1160

Line 16 (and elsewhere): extend (noun) -> extent

Line18: Do you mean “needed” or do you mean “available”?

Line 19ff: I would skip the outlook from the abstract.

page 1161

Line 2: “water supply” where?

page 1164

Line 14: “levels We” -> “levels. We”

Line 20ff: Please simplify this sentence.

ESDD
5, C501–C507, 2014

page 1168

Line 16: ? can just takes place through ?

Line 24: “in in” -> in

page 1170

Line 1: the fluxes does -> the fluxes do

page 1172

Line 5ff: Please clarify/simplify this sentence.

Page 1173

Line 11/12: Can you give a reference here with respect to the Brahmaputra Channel as main input channel?

Line 22: The paragraph is about CS1 and CS6. I think the break should be before the mention of CS2-3?

Line 29: (Fig. 11) In -> (Fig. 11). In

Generally Section 3.4: Especially here, I feel that less nested sentence structures could ease the understanding for the reader.

page 1175:

Line 14: numerous and large? or just numerous? or numerous large? (also page 1176, line 25)

Line 19: what-> which

Line 22/23: as found by . . . too. -> as also found by

Line 24: and so -> . Thus

page 1176

ESDD

5, C501–C507, 2014

Line 1: found out -> found

Line 10: did not considered -> did not consider

Line 12: does not has -> does not have

Generally for these paragraphs: you may want to check the language.

Page 1177

Line 6: skip “even”

Line 11: how and if -> maybe: if and how

Line 13: maybe could play -> could play

page 1180:

Line 1: Guenther -> Günther?

Interactive comment on Earth Syst. Dynam. Discuss., 5, 1159, 2014.