Earth Syst. Dynam. Discuss., 5, C492–C494, 2014
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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.

Anonymous Referee #1

Received and published: 6 October 2014

The atmospheric water vapor transport is crucial to understand the water and energy cycle between the Tibetan Plateau (TP) and its adjacent regions. Previous studies investigated the water vapor budget over the TP with coarse-resolution reanalysis data that are not able to resolve topography, whereas the present study uses a new high-resolution reanalysis data. It is well known that the vapor transport from south along Yarlong Zhangpo valley is a major water source of the TP, but the quantification of the vapor transport from southwest slope of Himalayas is quite uncertain. The major finding of this study is that the water vapor inflow from west and southwest is even larger than the well-known transport along the Yarlong Zhangpo valley from the south Asian monsoon. The results are quite new and well documented. As far as I know, someone has addressed the importance of the southwest transport with AIRS satellite data, but no publication is seen. I would like to recommend the publication of this paper,

subject to reasonable response to the following major and minor comments.

Major comments: 1. Water vapor flow around mountains depends on the velocity along the slope that has both horizontal and vertical components, but Eqs. (1) and (3) only takes the horizontal transport. 2. Water vapor inflow budget is critical and its estimation is a major contribution of this study. I am wondering the sensitivity of the budget to the location of the cross-sections. The present cross-sections are exactly defined at the edge of the TP, which may cause the following problems: (1) transport along slopes may be important but not be estimated well (see comment 1); (2) plentiful precipitation forms along the edge and the water vapor is not really transported into the Plateau. The second one is more concerned when we discuss the water budget over the TP. So, I like to see what the water budget is if we move all cross-sections slightly (for example, by 50 km) toward the center of TP. 3. Abstract: "Our results show that 40% of the atmospheric moisture needed for precipitation comes from outside the TP, while the remaining 60% are provided by local moisture recycling". HAR30 and HAR10 show quite different ratios of the water recycling, and thus this statement should have an uncertainty description or at least you should mention that the uncertainty is large.

Minor comments: 4. P3L13: the period in Lu N. et al. (2014) is short (2000-2010) and should be mentioned here to avoid misunderstanding. I suggest mentioning that specific humidity increased since 1970 (Lei Y. et al., 2014, Clim. Change., 125:281–290), as the decadal variability is more concerned in terms of lake area changes. 5. P3L15: Gao Y. et al. (2014) did not show evidence to support the intensification of the monsoon. Instead, Yao T. et al. (2012, Nature climate change, 2, 663–667) shows the monsoon was weakened, which is more consistent with observed wind stilling and precipitation decreasing in the monsoon-impacted regions (southern and eastern TP). 6. P7L11-13: Please extend slightly to describe the HAR precipitation accuracy 7. P11L21: you have high-resolution data, which provides the possibility to confirm "subsidence or high wind speeds" 8. P11L23: "In September we have the highest WV transport amounts over the TP." I guess there might be a result of wind speed recovery after the monsoon withdraw in September. The wind speed recovery will facilitate both more evaporation and larger water vapor transport. 9. P13L5: give the height of Level 12 10. P18: The work by Yang M. et al. (2007. Arctic, Antarctic, and Alpine Research, 39, 694-698) may support your results of water recycling over the TP.

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