

Interactive comment on “An important mechanism sustaining the atmospheric “water tower” over the Tibetan Plateau” by X. Xu et al.

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General comments:

In this work the authors investigated the mechanism sustaining the atmospheric “water tower” over the Tibetan Plateau. Results suggested that the plateau’s thermal structure leads to dynamic processes with an integration of two couples of lower convergences and upper divergences, respectively. Similarly to the CISK mechanism of tropical cyclones, the elevated warm-moist air, in turn, forces convective weather systems, hence

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building a water cycle over the plateau. An integration of mechanical and thermal TP-forcing is revealed in relation to the Asian summer monsoon circulation knitting a close tie of vapor transport from tropical oceans to the atmospheric “water tower” over the TP. Overall, this work presents a comprehensive discussion about this topic, hence I recommend that this work can be published on ACP after some modifications.

Specific comments:

Section 1 Introduction

Second paragraph When the authors explain why the abundant water resources appear in southeastern China in summer season; Duan and Wu (2005; Climate Dynamics) should be cited; in which they found that the lower southwesterly related to warm and wet air transportation from tropical oceans is induced mainly by the conjunction of TP thermal forcing and Eurasia thermal forcing because the TP topographical deflection effect exists also in winter;

Section 2 Data and method

A reference for NCEP/NCAR reanalysis should be given. Quality of NCEP/NCAR reanalysis over and around the TP is usually worse than some other reanalysis datasets such as JRA-25, ERA-Interim, or MERRA. A comparison between NCEP/NCAR and of the others is necessary.

Q1 and Q2 is defined firstly by Yanai (1961); please cite: Yanai, M., 1961: A detailed analysis of typhoon formation. J. Meteor. Soc. Japan, 39, 187–214.

Different authors gave different domain of the TP; is there any particular reason for the authors to choose it as (78-103E; 26-38N)?

Lower panel of Fig. 1. The center of column vapor content over is located over the central TP rather than the southeastern TP, why? Is this result data dependent?

Section 3 “This heat island over the massive TP exceeds that of any urban ag-

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glomerations in the world in both intensity and area”; A reference is needed here;

Lower panel of Fig.2. Why not use sensible heat directly to calculate its correlation with vertical velocity?

Fig.6. Only the cloud cover fraction in July 2008 is shown here, how about the JJA climate mean?

Interaction region marked in Fig.7 should be explained clearer in the context.

Technical corrections:

Caption of upper panel of Fig.1. Rivers are marked by green rather than light blue.

Right upper panel of Fig.2, contours of 500 hPa divergence are too much to easily read.

Upper panel of Fig.4. The topography of the TP should be clearly outlined.

Line 6 in the first paragraph of Section 4, Conclusion, “water storage” should be “atmospheric water storage”.

Fig.5 and its caption. Q1/Q2 should be Q1&Q2.

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