

Interactive comment on “Determination of land surface heat fluxes over heterogeneous landscape of the Tibetan Plateau by using the MODIS and in-situ data” by Y. Ma et al.

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General comments: This paper presents a study on the determination of land surface heat fluxes over heterogeneous landscape of the Tibetan Plateau by using the MODIS and in-situ data. This paper is well organized and concise. The authors collect a large amount data at several stations over the Tibetan Plateau, a high and cold region, to validate their method.

ANSWER: Thank you very much for your comments and encouragement.

Major concerns 1. This paper is more suitable for another EGU Journal, Hydrology and Earth System Sciences, than Atmospheric Chemistry and Physics.

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ANSWER: Thank you very much for your suggestion. You are right, but we would like present our paper in Atmospheric Chemistry and Physics (ACP) after we check the aims and scope of ACP. Another reason is that we already published one of our paper in ACP now (X. L. Chen, Y. Ma, H. Kelder, Z. Su, and K. Yang, 2011, On the behaviour of the tropopause folding events over the Tibetan Plateau, Atmos. Chem. Phys., 11, 5113–5122, doi:10.5194/acp-11-5113-2011), and we would like publish our series research in ACP in the coming days.

2. In the Abstract and main text, it is claimed that authors propose a new method to estimate land surface heat fluxes over heterogeneous landscape. As the first author has published nearly ten papers in this field since 2002 (as cited in the paper), it is better to introduce how this method is different from previous ones and what are similar.

ANSWER: Thank you very much for your comments and suggestions. You are right, the first author (myself) have already published nearly ten papers in this field since 2002. The differences between the proposed methodology in this study and the previous ones are: 1) the surface reflectance, surface temperature, vegetation coverage, emissivity etc. are derived from MODIS data in this paper and ETM or AVHRR were used in the previous ones; 2) The study area and the determination procedure of sensible heat flux are different. The study area in this study is entire Tibetan Plateau, and the land surface becomes more heterogeneous than previous ones. The previous study were only carried out in meso-scale area. The “blending height approach” can be used for the determination of sensible heat flux in the previous study and the “tile approach” has already been used for the determination of sensible heat flux in this paper.

3. The comparison results, presented in Fig 5 and Tables 1 and 2, are much better than previous published results in this field. It is better to explain the advantage of this method.

ANSWER: Thank you very much for your comments and suggestions. The advantage of this method is that more accurate surface reflectance and surface temperature were

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determined and the process of atmospheric boundary layer was considered in more detail in the determination of sensible heat flux. It has already been pointed out in the revised manuscript now.

4. The authors should have many data for validation. Why only four cases?

ANSWER: Thank you very much for your comments and suggestions. You are right, the main goal of this research is to analyze the inter-annual variation of surface heat fluxes, and we have many data for validation. We should use as many MODIS images as possible for the study. Unfortunately, only four more clear days over the entire Tibetan Plateau were found due to the strong convection over there. Therefore four cases were used here.

5. It is unclear to me how to get T_{a1} to T_{an} in Eqs. (7)-(9). Observations or other estimates?

ANSWER: Thank you very much for your comments. T_{a1} to T_{an} in Eqs. (7)-(9) on each "tile" are observed at the reference height.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 19617, 2011.