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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Estimation of Hourly Land Surface Heat Fluxes over the Tibetan Plateau by the Combined Use of Geostationary and Polar Orbiting Satellites" *by* Lei Zhong et al.

Anonymous Referee #4

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High temporal resolution surface heat fluxes are very important for land-atmosphere interactions. In this manuscript, land surface temperature from polar and geostationary satellite are both used and fed into surface energy balance equation. The results are validated with flux tower observations, and finally hourly surface heat fluxes with 5 km spatial resolution are generated over TP based on the developed SEB scheme. Generally, the manuscript is interesting and well written. It can be published with minor revisions.

Special comments:

- Page 2, Line 30: I think the authors missed an important kind of method (data assim-

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ilation method) for surface heat flux estimations based on remotely sensed LST. Some reference are as follows,

Abdolghafoorian, A., Farhadi, L., Bateni, S.M., Margulis, S., Xu, T.R. (2017). Characterizing the eïňĂect of vegetation dynamics on the bulk heat transfer coefcient to improve variational estimation of surface turbulent ïňĆuxes. J. Hydrometeorol. 18, 321–333.

Bateni, S.M., Entekhabi, D., & Castelli, F. (2013), Mapping evaporation and estimation of surface control of evaporation using remotely sensed land surface temperature from a constellation of satellites, Water Resour. Res., 49, 950-968, doi:10.1002/wrcr.20071.

Crow, W.T., & Kustas, W.P. (2005). Utility of assimilating surface radiometric temperature observations for evaporative fraction and heat transfer coefficient retrieval, Bound-Lay. Meteorol., 115(1), 105-130, doi:10.1007/s10546-004-2121-0.

Xu, T.R., Bateni, Liang, S.M., Entekhabi, S.D., & Mao, K. (2014). Estimation of surface turbulent heat fluxes via variational assimilation of sequences of land surface temperatures from Geostationary Operational Environmental Satellites, J. Geophys. Res., 119, 10,780-10,798, doi:10.1002/2014JD021814.

Xu, T.R., He, X.L., Bateni, S.M., Auligne, T., Liu, S.M., Xu, Z.W., Zhou, J., Mao, K.B. (2019). Mapping Regional Turbulent Heat Fluxes via Variational Assimilation of Land Surface Temperature Data from Polar Orbiting Satellites, Remote Sensing of Environment, 221, 444-461, https://doi.org/10.1016/j.rse.2018.11.023.

- How to derive 5 km and hourly surface heat fluxes with 10 km and 3 hour forcing data?

- In equation 5, sensible heat flux is represented as Hs, while it is H in equation 11. They should be the same in one manuscript.

- What is the time period of this study? as well as validation results in Table 3.

- Figure2: the 'ITPCAS' is a name of institute, not data. It should be changed into

‘Meteorological data’ or something else.

- Figure 3: the estimated G0 has a big bias against ground measurements. This is because G0 is parameterized with Rn. G0 and Rn do not have the same diurnal variation shape. The G0 peak values are usually later than Rn. However, the parameterization did not consider this. The authors may discuss this in the manuscript.

- Figure 4: usually, the observations were drawn by open cycles, and estimations are drawn by solid lines.

- Why Rn is underestimated from June to Aug. at BJ site in figure 4? Why H (LE) is underestimated (overestimated) from Jan. to May? The authors should give some explanations.

- Figure 5: the authors give two days of diurnal cycles over TP. The results are from which day and which year? It should be noted on figure 5. In addition, why you choose these two days?

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2018-1165, 2018.

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