

A climatological estimate of heat and water fluxes over the Tibetan Plateau

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ABSTRACT

The present study shows the climatological characteristics of heat and water balance and their long term variations using the wetness index, WI ($=Pr/Ep$, Pr: precipitation, Ep: potential evaporation). Wetness index estimated annual accumulated value or accumulated value within warm period is good index for judging the regional climate conditions. Non-dimensional evaporation, E/Ep (E: actual evaporation), has the simple relationship to wetness index. Moreover wetness index well corresponds to ground surface conditions and it is one to one correspondence to NDVI (Normalized Differences Vegetation Index) over the Tibetan Plateau.

To estimate surface heat balance over the Tibetan Plateau, two additional relations were obtained. One is the relation between Bowen ratio and wetness index. The other is the relation between potential evaporation and NDVI. Heat balance over the Tibetan Plateau can be estimated by using the distribution of NDVI and empirical relationships mentioned above. Regional variation and long-term variation of potential evaporation and wetness index were examined. Bowen ratio decreases with wetness index. Ep in annual or warm period tends to decrease when Pr (or NDVI) in annual or warm period becomes large and Ep shows a constant when Pr (or NDVI) exceeds some critical value. NDVI or WI is large in south-east of Tibetan Plateau, small in north-west of Plateau. Heat balance analysis well corresponds to these distribution. Empirical relations between E/Ep and WI or between Bowen ratio and WI are meaningful even a period of one month. However the relations related NDVI are meaningful at least longer than a period of several months because of phase differences between NDVI and WI. The results of the present method were compared to the original heat balance or another data set and it was confirmed reasonable agreements.

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