Determination of land surface heat fluxes and evapotranspiration (ET) over heterogeneous landscape of the Third Pole region (Tibetan Plateau and nearby surrounding region)

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The exchange of energy and evapotranspiration (ET) between land surface and atmosphere over the Tibetan Plateau and nearby surrounding region (Third Pole region) play an important role in the Asian climate system. Supported by the Chinese Academy of Sciences and some international organizations, a Third Pole Environment (TPE) Observation and Research Platform (TPEP) is now implementing over the Tibetan Plateau and surrounding region. The background of the establishment of the TPEP, the establishing and monitoring plan of long-term scale (5-10 years) of the TPEP will be shown firstly. Then the preliminary observational analysis results, such as the characteristics of land surface heat fluxes partitioning, the characteristics of atmospheric and soil variables, the structure of the Atmospheric Boundary Layer (ABL) and the turbulent characteristics have also been shown in this study.

The parameterization methods based on satellite data and Atmospheric Boundary Layer (ABL) observations have been proposed and tested for deriving regional distribution of surface reflectance, surface temperature, net radiation flux, soil heat flux, sensible heat flux, latent heat flux and ET over heterogeneous landscape. As cases study, the methods were applied to the whole Tibetan Plateau area and Nepal area. To validate the proposed methods, the ground-measured surface reflectance, surface temperature, net radiation flux, soil heat flux, sensible heat flux and latent heat flux in the TPEP are compared to the derived values. The results show that the derived surface variables, land surface heat fluxes and ET over the study area are in good accordance with the land surface status. These parameters show a wide range due to the strong contrast of surface features. And the estimated land surface variables and land surface heat fluxes are in good agreement with ground measurements, and all the absolute percent difference is less than 10% in the validation sites. It is therefore concluded that the proposed methods are successful for the retrieval of land surface variables and land surface heat fluxes over heterogeneous landscape of the Tibetan Plateau area and Nepal area. Further improvement of the methods and its applying field were also discussed.