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The observation and modeling of air-land interaction over heterogeneous landscapes of the Third Pole

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The exchange of heat and water vapor between land surface and atmosphere over the Third Pole region (Tibetan Plateau and nearby surrounding region) plays an important role in Asian monsoon, westerlies and the northern hemisphere weather and climate systems. Supported by various agencies in the People's Republic of China, a Third Pole Environment (TPE) observation and research Platform (TPEORP) is now implementing over the Third Pole region. The background of the establishment of the TPEORP, the establishing and monitoring plan of long-term scale (5-10 years) of it will be shown firstly. Then the preliminary observational analysis results, such as the characteristics of land surface energy fluxes partitioning and the turbulent characteristics will also be shown in this study. Then, the parameterization methodology based on satellite data and the atmospheric boundary layer (ABL) observations has been proposed and tested for deriving regional distribution of net radiation flux, soil heat flux, sensible heat flux and latent heat flux (evapotranspiration (ET)) and their variation trends over the heterogeneous landscape of the Tibetan Plateau (TP) area. To validate the proposed methodology, the ground measured net radiation flux, soil heat flux, sensible heat flux and latent heat flux of the TPEORP are compared to the derived values. The results showed that the derived land surface heat fluxes over the study areas are in good accordance with the land surface status. These parameters show a wide range due to the strong contrast of surface feature. And the estimated 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. The sensible heat flux has increased slightly and the latent heat flux has decreased from 2001 to 2018 over the TP. It is therefore concluded that the proposed methodology is successful for the retrieval of land surface heat fluxes and ET over heterogeneous landscape of the TP area. Further improvement of the methodology and its applying field over the whole Third Pole region and Pan-Third Pole region were also discussed.