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## The energy and water exchange and its effect on the weather and climate over the Tibetan Plateau and surrounding regions

**Yaoming Ma**

Chinese Academy of Sciences, Institute of Tibetan Plateau Research, Beijing, China (ymma@itpcas.ac.cn)

Containing elevated topography, the Tibetan Plateau (TP) has significant thermodynamic effects for regional weather and climate change, where understanding energy and water exchange process (EWEP) is an important prerequisite. However, estimation of the exact spatiotemporal variability of the land-atmosphere energy and water exchange over heterogeneous landscape of the TP remains a big challenge for scientific community. Focused on the above scientific question, a series of atmospheric scientific experiments and research programs have been conducted since the 1960s, quantitatively evaluating both the spatial distribution and the multi-timescale variation of EWEP via observation, remote sensing, and numerical simulation. Based on the three main approaches, the major advances on EWEP over the past 30 years are systematically summarized in this work. All these results advanced the understanding of different aspects of EWEP over the TP by using in situ measurements, multisource satellite data and numerical modeling. Future studies are recommended to focus on the optimization of the current three-dimensional comprehensive observation system, the development of advanced parameterization schemes and the investigation of EWEP on weather and climate changes over the TP and surrounding regions.