Monitoring Water and Energy Cycles at Climate Scale in the Third Pole Environment (CLIMATE-TPE)

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Abstract: The CLIMATE-TPE project aimed to advance understanding the interactions between the Asian monsoon, the Tibetan Plateau surface and the plateau atmosphere in terms of water and energy budgets, which is essential for assessing and understanding the causes of changes in cryosphere, and hydrosphere in relation to changes of plateau atmosphere in the Asian monsoon system and for predicting the possible changes in water resources in the Third Pole Environment. A core innovation of the project was to verify or falsify recent hypotheses (e.g. links between plateau heating and monsoon circulation, snow cover and monsoon strength, soil moisture and timing of monsoon) and projections of the changes of glaciers and permafrost in relation to surface and tropospheric heating on the Tibetan Plateau as precursors of monsoon pattern changes and glaciers retreat, and their impacts on water resources in South East Asia. This paper reports results related to: (1) A platform of in-situ observation stations of hydrosphere-pedosphere-atmosphere-cryosphere-biosphere interactions over the Tibetan Plateau, (2) Multiyear in-situ L-Band microwave radiometry of land surface processes, (3) Evaluation and generation of land surface heat fluxes and evapotranspiration, (4) Climate scale monitoring of soil moisture and soil temperature and validation of large scale soil moisture products, (5) Trajectory of water vapor transport in the canyon area of Southeast Tibet, and (6) Vertical characteristics of water vapor exchange between upper troposphere and lower stratosphere.

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