Evapotranspiration from Remote Sensing and Spatio-temporal Analysis over the Tibetan Plateau

***Li Jia, Chaolei Zheng**
jiali@radi.ac.cn
State Key Laboratory of Remote Sensing Sciences, Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, Beijing, China

The Tibetan Plateau, the head water region of several Asian major rivers, is influenced by Asia Monson leading to significant annual and seasonal fluctuation in water cycle. Climate change has also impact on the water cycle patterns of the Tibetan Plateau via changing the spatial and temporal distributions of hydrological features. Evapotranspiration (ET) is a very important hydrological variable, among many others, as it is an essential component in both land surface water balance and energy balance. Understanding of spatial and temporal distribution of evapotranspiration and its seasonality needs better observations over the entire plateau. Satellite remote sensing observations have shown the great potential to provide essential land surface variables that can be used to estimate evapotranspiration at the plateau scale.

In this study, we will show a process-based model, i.e. ETMonitor, that implements modules modelling processes of soil and water evaporation, vegetation transpiration and snow sublimation. Evapotranspiration over 15 years at daily time interval and 1 kilometer spatial resolution over the Tibetan Plateau is estimated with the ETMonitor by using several land surface variables derived from multi-source remote sensing observations. The results shows large annual variation in ET following the intensity and evolution of Asian Monson. At the plateau scale the ratio between the evapotranspiration and the precipitation (P, from CMORPH) ranges from 0.61 to 0.80. Evapotranspiration in wet years did not always show larger ratio over the precipitation implying energy limit in some of the wet years. The largest values of ET/P are observed in two driest years between 2001-2015 indicating that depletion of soil moisture via evapotranspiration was enhanced by dry climate and strong solar radiation. Seasonal pattern of evapotranspiration is characterized by the movement of high values of ET to the central regions from the south of the plateau with the development of Monson area and intensity area from June to July. More analysis is needed to understand the spatial and temporal features of controlling factors on ET and trends of ET in different parts of the plateau. Impact of uncertainties in land surface variables (i.e. fractional snow cover and lake dynamics) from remote sensing retrievals on the estimated ET was also discussed.