EMS Annual Meeting Abstracts
Vol. 15, EMS2018-80, 2018

A seamless global land evapotranspiration with thermal remote sensing energy balance method

Xuelong Chen, Zhong Bo, Yaoming Ma, Cunbo Han, Isabel Trigo, Pierre Gentine, and Glynn Hulley
Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Beijing, China

A global daily evapotranspiration (ET) product without spatial-temporal gaps for 2000-2017 is delivered by using an energy balance algorithm and MODIS satellite data. It provides us with a moderate resolution estimate of ET without spatial-temporal gaps on a global scale. The model is driven by instantaneous remote sensing land surface temperature and daily meteorological data. A global turbulent exchange parameterization scheme was developed for global momentum and heat roughness length calculation with remote sensing information. The global roughness length was used in the energy balance model, which uses land-air temperature gradient to estimate the turbulent sensible heat, and take the latent heat flux as a residual of the available energy. Two gap-filling methods was used to produce daily gapless LST and evaporative fraction. The gap filling technique avoid gaps in the daily ET output from the energy balance model. This study produced an ET product for global landmass, at a daily time step and 0.05-degree spatial resolution. The performance of ET data has been evaluated in comparison to hundreds flux sites measurements representing a broad range of land covers and climates. The daily ET product has a mean bias of 0.04 mm/day, RMSE value of 1.56 ($\pm$0.25) mm/day. Sentinel 3A&3B, and FengYun 3B&3C will be tested in the algorithm to produce a more accurate global ET product. The daily ET product can be used to study the global energy and hydrological cycles at either seasonal or inter-annual temporal resolution. The talk will also discuss the application of the ET data to water balance, and water resource management.