Geophysical Research Abstracts
Vol. 21, EGU2019-6365, 2019
EGU General Assembly 2019

On the role of air temperature in transpiration model construction

Hailong Wang
Sun Yat-sen University, School of Civil Engineering, Guangzhou, China (whl84@hotmail.com)

It is well known that plant water use is controlled by stomata behavior in response to environmental changes. Since Jarvis proposed a modeling scheme in 1976 that stomatal conductance (gs) was mathematically linked with environmental variables, there has been abundant studies exploring the relationships to improve transpiration (Ec) estimation. Apart from radiation and soil moisture constraints, some studies involved air temperature (Ta) and specific humidity (q) while others Ta and vapor pressure deficit (D) to structure conductance (or transpiration) models. However, we found that use of Ta and D in the gs or Ec model at the same time can cause problem due to overlying constraints, because Ta and D are positively correlated. Therefore, use of both controlling factors could result in a lower maximum gs and Ec than observations. In this study, we test this hypothesis using sap flow and micrometeorological measurements across different biomes and climates in South Australia, Scotland, and China. Ec models were constructed with different combinations of Ta, q and D along with solar radiation and soil water content in the widely used Jarvis scheme. Preliminary results are shown here regarding Ec simulations in comparison with sap flow data. This study calls for attention to conductance or transpiration modeling, aiming to discuss the controlling mechanisms and improve the simulation accuracy.