Geophysical Research Abstracts
Vol. 18, EGU2016-9579, 2016
EGU General Assembly 2016

Generalization of the complementary relationship between actual and potential evaporation from heterogeneous surfaces

Milad Aminzadeh and Dani Or
Department of Environmental Systems Science, ETH Zurich, Switzerland

The partitioning of radiative energy over drying surfaces remains a challenge due to the nonlinearity of the drying process that affects surface temperature. We propose a pore-scale representation of surface drying that links evaporative and thermal fluxes and yields a unique surface temperature for input climatic variables. We then generalize the complementary relationship (CR) between potential and actual evaporation using a reference state defined by surface temperature of an evaporating surface to estimate actual evaporation over homogeneous drying surfaces [Aminzadeh et al., 2015]. The model is extended to quantify the CR over spatially heterogeneous surfaces where different drying dynamics and surface properties interacting in space and time with the near surface air affect (through the CR) average evaporative fluxes. We consider the various areal fractions of surface elements (e.g., bare soil, free water, vegetation) and their own drying dynamics and compare the aggregated response with field observations. The generalized CR offers a physically based framework for linking land-atmosphere interactions with energy partitioning over heterogeneous surfaces that could benefit future climate modeling and regional water resource management.