Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09858, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09858
EGU General Assembly 2008


# Implications of Under-Canopy and Interspace Soil Hydraulic Property Distributions in Large Scale Desert Ecosystems

**J. Zhu** (1), T. Caldwell (2), M. Young (1), and E. McDonald (2)

(1) Desert Research Institute, Las Vegas, Nevada, USA, (2) Desert Research Institute, Reno, Nevada, USA

(Jianting.Zhu@dri.edu / Fax: +1 702-862-5427 / Phone: +1 702-862-5416)

Desert soil hydraulic properties affect water penetration and water holding capacity; hence, these properties play a major role in the diversity and vigor of native vegetation, the root distributions of perennial plants, and microbial activity and abundance. Spatial heterogeneity of hydraulic properties limits our ability to upscale or downscale the observed processes, especially for desert environments signified by mosaics of canopies and open soil or interspaces. Hydraulic properties of under-canopy and interspace microsites have been shown to have distinct characteristics and to vary predictably. The objectives of this study are (1) to upscale under-canopy and interspace soil hydraulic properties, measured at the sub-shrub scale, for simulations of evapotranspiration (ET) at large scales in arid environments, and (2) to explore relationships between local scale soil hydraulic and physical properties and large scale ET. Results from recent field campaigns at the Mojave Global Change Facility (MGCF) and the Providence Mountains, both in the Mojave Desert of the southwestern U. S., show that gradients in physical and hydraulic properties exist in relation to proximity of the plant mound and size. Based on available field measurements characterizations of the local-scale hydraulic properties and other important characteristics, such as vegetation size, class and spatial distribution data, including rooting characteristics and root-water uptake parameters, we generate distinctly structured hydraulic and physical properties for under-canopy and interspace microsites. Based on the spatial structure

characterizations, we develop upscaled hydraulic properties that account for sub-scale heterogeneity. We also investigate the effects on upscaling schemes of the two distinctly structured hydraulic property fields obtained in under-canopy and interspace microsites and report on the effects on ET rates and overall water balance.