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Examining Arid Soil Processes in Nevada USA Using Weighing Lysimeters

M. Young (1), Z. Yu (2), S. Tyler (3), K. Chief (1), E. Knight (2), J. Healey (1), J. Zhu (1), M. Menon (3), J. Mon (2)

(1) Desert Research Institute, Las Vegas, Nevada, USA, (2) University of Nevada, Las Vegas, Nevada, USA, (3) University of Nevada Reno, Nevada, USA (michael.young@dri.edu / Fax: +1 702-862-5427 / Phone: +1 702-862-5489)

Southern Nevada USA is located in the Mojave Desert, one of the driest areas in the United States. Research is needed to understand whether and to what extent land use and land cover changes associated with rapid urbanization and climate variability will alter the relationships between soil, water, and plants in this arid setting. Beginning in 2005, the research universities in Nevada began collaborating on the development of a research program focused on the scaling of mass and energy movement across the soil-atmosphere interface and the impact of scaling techniques on quantifying environmentally important processes (e.g., water and element cycling and coupled biogeochemical processes). One limitation to this endeavor is the lack of a meso-scale research facility that can help connect point-scale measurements to basin-scale soil and environmental processes. Thus, a major component of this research program, which has been called “Scaling Environmental Processes in Heterogeneous Arid Soils” or SEPHAS, involves the construction of a weighing lysimeter facility designed to examine arid soil processes. During the past 12 months, 4 weighing lysimeters were installed: three cylindrical tanks (2.35 m diameter x 3 m high) designed for repacked soils, and 1 square tank (2 m x 2 m x 3 m high) to be used for an intact soil block. The lysimeters balances have a precision of $\sim$200 g, or the equivalent of 0.05-mm water depth. Soil packing began in February 2008 using locally-derived material classified as a sandy, mixed, thermic Typic Torriorthents. The lysimeters were repacked to allow for comparative analyses; one lysimeter contains homogenized soil with a bare sur-

face, one has layered soil (as found in the field) with a bare surface and the third has layered soil with a creosotebush (*Larrea tridentate*) shrub. The fourth (square) lysimeter will contain the intact soil block to be collected during summer 2008. Lysimeters were instrumented at multiple (7) depths with multiple technologies to measure temperature, water content, water potential, soil gas and soil water chemistry, rooting extent, etc. Tracers have been added to examine transport and mixing through water and bioturbation. Data collected using automated systems will be archived and available to facility researchers through the Internet. A diverse set of testable hypotheses have been developed by the scientific community that can be addressed with this facility, and we seek additional collaborations as the experiments fully ramp up and while the soil completes a period of stabilization. A program website has been created (http://sephas.dri.edu).