

224-240 An Experimental Catchment for Understanding Ecohydrological Processes on Piedmont Slopes in the Chihuahuan Desert: Jornada Experimental Range



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13:00 - 15:00



Hall A (Saint Paul RiverCentre)

Abstract

This contribution describes our measurement efforts in a first-order shrub-dominated catchment of approximately 4.7 hectares located in a piedmont slope of the Jornada Experimental Range, New Mexico. Initial observations were first established in 1977, with the instrumentation of a $2.8 \text{ m}^3 \text{ s}^{-1}$ Santa Rita supercritical flume at the outlet of the catchment and a single rain gauge to quantify rainfall-runoff processes. In 2010, we commenced a long-term monitoring effort with the installation of a dense environmental sensor network, including a set of rainfall gauges, a nested design of hillslope and channel runoff flumes, several soil moisture and temperature profiles arranged along transects, and a complete set of meteorological, radiation, and water-energy-carbon (WEC) fluxes. Our initial aim was to close the water and energy balances at the catchment scale; however, the experimental measurements have gradually become a more integrated, long-term effort to elucidate intra-annual to inter-annual relations between hydrological and ecological processes and the mechanisms underlying these interactions. We have also used the experimental catchment as a laboratory for testing novel ground sensors, for developing data analysis techniques, to ground-truth imagery from unmanned aerial vehicles, and to support high-resolution catchment modelling applications. Novel insights on the role of subsurface water recharge on plant productivity and carbon uptake in subsequent seasons have emanated from the measurement methods. These activities support the notion that long-term experimental catchments are crucial for the understanding of the ecohydrological mechanisms and for advancing the catchment science in arid and semiarid regions of the southwestern United States.

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