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Abstract
Transport from the soil surface to groundwater is commonly mediated through deeper portions of the vadose zone and capillary fringe, where variations in temperature and water saturation strongly influence biogeochemical processes. This technical note describes a sediment column design that allows laboratory simulation of thermal and hydrologic conditions found in many field settings. Temperature control is particularly important because room temperature is not representative of most subsurface environments. A

2.0-m-tall column was capable of simulating profiles with temperatures ranging from 3 to 22°C, encompassing the full range of seasonal temperature variation observed in the deep vadose zone and capillary fringe of a semiarid floodplain in western Colorado. The water table was varied within the lower 0.8-m section of the column, and profiles of water content and matric potential were measured. Vadose zone CO2 collected from depth-distributed gas samplers under representative seasonal conditions reflected the influences of temperature and water table depth on microbial respiration. Thus, realistic subsurface biogeochemical dynamics can be simulated in the laboratory through establishing column profiles that represent seasonal thermal and hydrologic conditions.