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TI: Intercode Comparisons for Simulating Water Balance of Near-Surface Soils
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AB: Advances in computer technology, improvements in codes, including computational efficiency and processes simulated, and availability of long-term field monitoring data allow long-term simulations of near-surface flow that is important for groundwater recharge, contaminant transport, and waste containment. A variety of codes are available to simulate the water balance of near-surface soils; however, information on intercode comparisons is limited. The purpose of this study was to compare the characteristics and performance of different codes, including HELP, HYDRUS-1D, SHAW, SoilCover, SWIM, UNSATH, and VS2DT to simulate the water balance of near-surface soils. Factors that differ among these codes include graphical user interfaces, user friendliness, dimensionality, upper and lower boundary conditions, hydraulic properties (Brooks and Corey, van Genuchten, others), and processes simulated (liquid flow, vapor flow, hysteresis). A highly instrumented, engineered cover for waste containment in the Chihuahuan Desert provided information on initial and boundary conditions for the simulations and data to validate the simulation results. Simulations were conducted for the period October 1997 through September 1998 when the site was nonvegetated. Simulation results from all codes reasonably approximated the field-measured water balance. The main difference between the different simulation results was in the partitioning of precipitation into evaporation and soil water storage. These differences can be attributed primarily to the time resolution of the meteorological input data (daily, hourly, or 15 min) and the assignment of fluxes during precipitation events. The intercode comparisons are being used to identify important attributes of codes to simulate infiltration into the shallow subsurface. Such information can be used to make recommendations for modifications of existing codes and/or development of new codes.