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Ken Rainwater et al.
Texas Tech University

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ESTIMATING AQUIFER RECHARGE THROUGH PLAYAS OF THE GREAT PLAINS USING TEMPERATURE PROBES

Ken Rainwater, Texas Tech University, MS:1022, Lubbock, TX 79409-1022,
ken.rainwater@ttu.edu, (806)742-3490

Dennis Gitz, USDA-ARS, 3810 4th St., Lubbock, TX 79409-3300,
dgitz@lbr.ars.usda.gov (806)723-5232

Wayne Hudnall, Texas Tech University, MS:2122, Lubbock, TX 79409-2122,
wayne.hudnall@ttu.edu, (806)742-2490

Loren Smith, Texas Tech University, MS:2125, Lubbock, TX 79409-2125,
l.m.smith@ttu.edu, (806)742-2842

Richard Zartman, Texas Tech University, MS:2122, Lubbock, TX 79409-2122,
Richard.zartman@ttu.edu, (806)742-1626

The magnitude of recharge through playa wetlands in the High Plains has often been debated, but rarely been quantified. The ephemeral nature of water in playas makes it difficult and expensive to observe filling and drying/draining cycles. Rugged, inexpensive tools are needed to demonstrate the movement of water below the root zone to observe the recharge process. We performed proof of concept studies to evaluate temperature as an indicator of infiltration/recharge in playa wetlands. Single-ringed infiltrometers with embedded Cu-constantan thermocouples and Hobo probes at 50, 100, 150 and 200 cm soil depths were used to quantify infiltration and temperature. At two playas, one infiltrometer was installed in a clay-textured soil, characteristic of the playa bottom, and one was installed in coarse-textured soil adjacent to the playa. At least 70 cm of water was pumped into each infiltrometer at approximately 1.3 cm/min. After filling the infiltrometers, we assumed differences in soil temperature over time were caused by infiltrating water. Temperature differences were noted at the 50- and 100-cm depths at all locations after infiltration. The magnitude of temperature change was positively correlated with the rate of infiltration, and negatively correlated with soil depth. These temperature readings were in good agreement with the time and quantity of water added. This new field application has great potential to improve the understanding and predicting the life of the High Plains aquifer.

Contact: Dr. Ken Rainwater, Texas Tech University, Ken.Rainwater@ttu.edu, Water Resources Center, MS:1022; Texas Tech University, Lubbock, Texas 79409-1022, (806)742-3490, (806)742-3449