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An investigation of regional tectonic strain on water levels in Devils Hole, Death Valley National Park, Nevada

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Abstract

Changes in hydraulic head at Devils Hole due to regional tectonic deformation were estimated using aquifer properties and the volumetric strain field present through the Great Basin in the western United States. Devils Hole is a large fault cavern located along a 15 km spring discharge line in a carbonate-rock aquifer, 240 km west of Las Vegas, Nevada. Geodetic measurements indicate that extensional strain in the Devils Hole area is oriented N 65 W and has a rate of 8 nanostrain/yr. Changes in hydraulic head due to strain were calculated and then used as initial conditions in a calibrated numerical ground-water flow model. Results of this analysis show that tectonic deformation could produce up to 0.02 cm/yr of water-level decline in Devils Hole. However, this rate is relatively small in comparison to rates caused from other factors such as natural recharge and ground-water pumping.

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