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Thermal characterization of the Ellenberger karst springs, Colorado Bend State Park, Texas [Abstract]

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Thermal Characterization of the Ellenberger Karst Springs, Colorado Bend State Park, Texas [Abstract]

Perennial karst springs discharge from the Ellenberger carbonates proximal to the Colorado River in the vicinity of Colorado Bend State Park, San Saba and Lampasas Counties, Texas. Thermal monitoring using HOBO pendant data loggers was conducted at eight springs along a fifteen kilometer stretch of the Colorado River for eighteen months and was compared with surface temperature and precipitation. Spring response and recovery to individual storm events is highly variable amongst the springs in the study area, including at least four distinctly different behaviors based on thermal signature and heat transport modeling. Two springs appear to be fed directly by matrix and bedding plane flow in the near-vicinity of their discharge points. Three springs appear to incorporate fracture and conduit flow within the proximal environment to their discharge points. Two springs appear to be associated with fracture and conduit flow that has been distally recharged. One spring shows virtually no response to surficial precipitation events and exhibits a minor hydrothermal component, suggesting it is coupled with a deep-circulation flow path, which is further confirmed by the high concentration of total dissolved solids at this spring. Thermal characterization of springs has the potential to provide significant insight into characterization of karst systems, which coupled with the inexpensive nature of thermal data loggers, makes thermal monitoring an efficient method of study. Furthermore, thermal monitoring in conjunction with mathematical models can give insight into the characteristics of conduits from which the springs flow.