

## **EVALUATING GEOMORPHOLOGICAL CONTROLS ON AQUIFER RECHARGE USING CONTINUOUS RESISTIVITY PROFILING METHODS**

*Wade Kress, U.S. Geological Survey; Jason Payne, USGS; Benjamin Miller, U.S. Geologic Survey; Madison Kymes, Mississippi Department of Environmental Quality*

In order to determine representative values of recharge to the Mississippi River Valley alluvial aquifer, the U.S. Geological Survey (USGS) leveraged existing datasets that focused on the geomorphology of Quaternary deposits and local soil surveys. At a regional scale, recharge in an existing groundwater flow model of the study area correlates well with large-scale geomorphological features. However, it is difficult to extrapolate the spatial variability in recharge based on mapped geomorphology. Higher-resolution data like soil-survey data provide the means to assign spatially-heterogeneous estimates of recharge. Soil-survey data, however, often focus on the upper soil horizon (within 1.8 m of the land surface) and may not reflect the general geomorphological features upon which the soils lie. In 2016, the USGS, as part of the Mississippi Alluvial Plain (MAP) project, conducted a terrestrial continuous resistivity profiling (terrestrial-CRP) survey to characterize the near-surface (< 15 m) lithology that controls recharge to the alluvial aquifer at selected locations in north-western Mississippi.

The terrestrial-CRP surveys identified important variations in shallow subsurface geoelectrical properties from Money to Steiner, Mississippi; a distance of approximately 68 km. Geomorphological features in the study area had distinct ranges of resistivities that were used to identify boundaries of individual geomorphic features. Abandoned channels of the Mississippi River and back swamp deposits had relatively low resistivities due to the high clay content indicating a lower potential for recharge. Conversely, because of the increased sand content, abandoned courses of the Mississippi River and point bar deposits of other streams and rivers resulted in higher resistivities and a higher potential for recharge. Point bar deposits along the Tallahatchie River were relatively heterogeneous and had the highest overall resistivities indicating the highest potential for recharge. Drilling logs from nearby boreholes confirmed that type and changes in lithology correlated positively with the resistivity profiles.