

Airborne Geophysical Surveys

The U.S. Geological Survey (USGS) is developing high-resolution, regional maps of the shallow geology in the Mississippi Alluvial Plain (MAP) by collecting airborne geophysical data to support water resources planning in the region. Starting in late February and running through early March 2018, a high-resolution airborne geophysical survey will be acquired in the area just north and west of Greenwood, MS including the vicinities of the Sunflower, Ruleville, and Philipp communities (see map).

The survey will be conducted by CGG Airborne, a private company who specializes in the collection of airborne geophysical data around the world. Data are collected using specialized instruments towed beneath a low-flying helicopter along a grid of pre-planned flight paths. The helicopter will not land within the survey area, and does not fly directly populated areas.

USGS scientists will use these data to produce 3D maps of aquifer properties to depths of up to about 200 feet below ground. This information will form the basis for groundwater models that are being

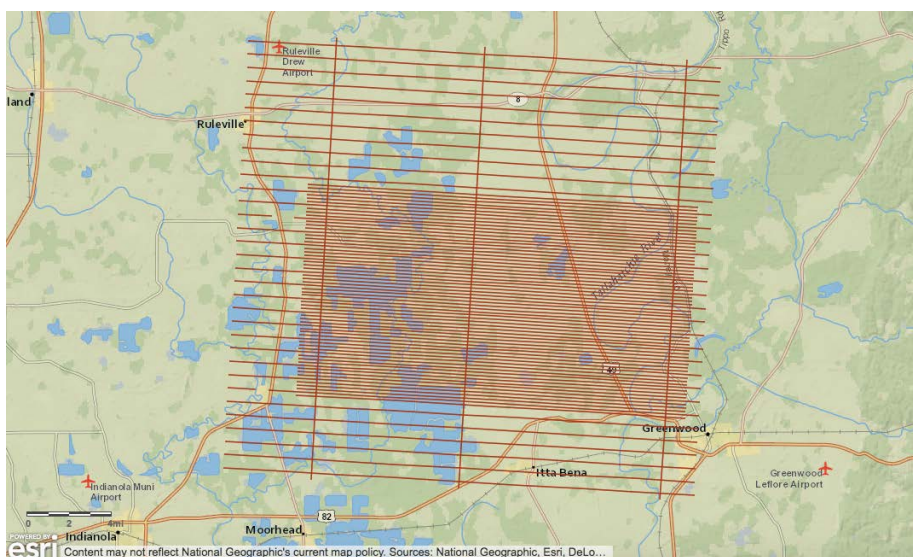
developed by the USGS to improve water management decisions in the area.

This work is part of the USGS Mississippi Alluvial Plain (MAP) Regional Water Availability project and will provide vital information for local water users and managers to better understand their groundwater resources and aquifer systems. All data, maps, and analyses generated by the geophysical surveys will be publically available at no cost.

By mapping the location and depth of freshwater aquifers over the surveyed areas, local and regional water management agencies will gain a better understanding of the variability and spatial distribution of properties such as aquifer depth, saturated thickness, and potential recharge pathways. The USGS has used this method throughout the U.S. for mapping geology and groundwater resources. Recent examples of results from USGS airborne geophysical surveys in Nebraska and South Dakota can be found online at:

<https://pubs.usgs.gov/sir/2011/5219/> and

<https://pubs.er.usgs.gov/publication/fs20163075>



Map of the survey area and planned flight lines (left). Image of the RESOLVE instrument in flight (right). An online map of the proposed flight lines can be found at: <http://arcg.is/1ieCLD>

Airborne Geophysical Measurements

The primary geophysical sensor used in this survey is the RESOLVE airborne electromagnetic instrument. Electronic sensors are carried in a 30 ft long Kevlar tube that is suspended 100 ft below a helicopter flying 200 ft above the ground. The helicopter travels at about 75 mph, and will fly in parallel lines across the survey area.

The helicopter will be based at the Greenwood airfield. From there, it will take off and fly to the survey area and commence flying the pre-planned lines. Surveys are not flown at night. You may see the system flying if you are outdoors in the area that we are surveying.

The RESOLVE system transmits an electromagnetic field (radio waves) into the ground, and measures the response. The strength of the response changes as the geology of the earth changes, telling us something about the type of geology underground to a depth of about 200 feet.

The electromagnetic field generated by this system is considerably weaker than the fields generated by natural and man-made sources surrounding us every day and will not interfere with any wireless communication or navigation equipment. The helicopter flies high enough that there is no wind from it felt at the ground, except when taking off or landing. We do not fly over homes or other inhabited areas. The system is suspended from the helicopter with a stainless-steel wire rope and a Kevlar rope backup.

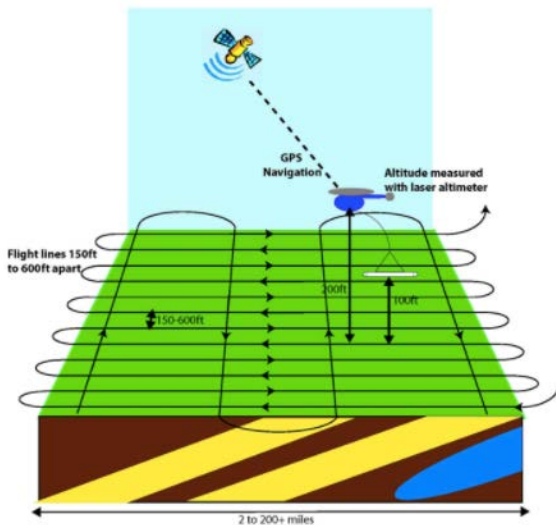


Diagram (left) showing airborne geophysical survey layout, instruments and subsurface rock layers. Picture (right) showing the RESOLVE electromagnetic sounding equipment used recently in South Dakota.

Anticipated Work Schedule:

February-March 2018: Airborne geophysical data collection

For more information, please visit the MAP Water Availability project page:
<https://www2.usgs.gov/water/lowermississippigulf/map/index.html>

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