

APPLICATION OF REMOTE SENSING FOR MAPPING SURFACE GEOLOGY IN HEAVILY VEGETATED COVER IN NORTH MISSISSIPPI

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ABSTRACT

Remote sensing and GIS techniques were used to investigate the geology in the heavily vegetated terrain of north Mississippi. The study area includes the recharge zone of the Tertiary age Memphis Sand Aquifer, the principal source of groundwater for northern Mississippi and western Tennessee, including the city of Memphis, Tennessee. This investigation incorporates Landsat 7 imagery, National Elevation Dataset (NED) data at 30-meter and 125-meter resolution, and field data in a geologic assessment of a portion of north Mississippi. The satellite imagery was processed to generate landuse-landcover information. Slope values were derived from NED. Evaluation of the relationships between the geology, land use, and elevation parameters concluded that:

1. Strong correlation exists between the outcrops of the Tertiary age Memphis Sand and forested areas due to steep (high) slopes developed on these highly dissected sediments;
2. Strong correlation also exists between Quaternary age Pleistocene deposits and highly developed agriculture because of the gradual (low to moderate) slopes on these younger unconsolidated sediments;
3. Pleistocene deposits form a geomorphic terrace above the underlying Memphis Sand that is easily distinguished on NED data, Landsat 7 imagery, and geologic field data;
4. It may be possible to extend this technique into areas that have not been field-mapped in north Mississippi and west Tennessee toward developing a more comprehensive geologic database for the USGS investigation of the Memphis Sand Aquifer.

The results of this investigation will be helpful in understanding the surface geology in the recharge zone of the Memphis Sand.