

## **GEOPHYSICS**

A major direction of the Geophysics research group focuses on integrated geophysical studies in tectonics (imaging tectonically active margins), resources exploration (minerals, groundwater and geothermal), and near-surface environmental related problems with special emphasis to application of potential field methods. Another research component, which has been recently added to the group is Earthquake Geophysics.

In the past seven years, the research group has (i) delineated subsurface configuration using Integrated geophysical study to understand the geothermal system in Eastern Ghats Mobile Belt, Odisha, India; (ii) evaluated the gravity-magnetic properties at Madawara Igneous Complex (MIC) and southern part of Bundelkhand craton; (iii) conducted electrical and 8 electromagnetic (including time lapse electrical resistivity) tomography studies to map and monitor industrial/municipal waste dump sites; (iv) imaged the tectonically active margins such as Himalaya, Sumatra-Andaman tectonic setups using high-resolution land and marine geophysical datasets; (v) developed algorithms for petrophysical parameter estimation of hydrocarbon reservoirs and (vi) methods of high frequency Ambient Noise Tomography. The newly formed Earthquake Geophysics team specializes in simulating earthquake cycles using the rate- and state-dependent friction law to explore the physical conditions behind earthquakes, slow slip, and stable sliding. The team conducts systematic and analogue shear experiments using biaxial apparatus and plans to set up a triaxial machine with a double direct shear setting.

In addition to all such important research contributions, the geophysics research group has developed methods and studies several geophysical processes including, self-potential study to delineate the redox potential of contaminated zones, geophysical data analysis, modeling and interpretation, data enhancement and joint inverse modeling of gravity, magnetic and seismic data, application of machine learning approaches for gravity and resistivity and seismic data modeling and interpretation, machine learning assisted seismic data processing, interpretation and reservoir characterization.