

Heliborne survey

In India airborne geophysical surveys have been conducted for mineral prospecting and geological mapping by RSAS (GSI), NGRI, NRSC and AMD. Central Ground Water Board under Ministry of Water Resources, RD & GR, had taken up Pilot Project on Aquifer Mapping in which Heliborne survey has been taken up for the first time in the country for groundwater investigations. CSIR-NGRI has been engaged as consultant in the project “Aquifer Characterization using advanced geophysical techniques in the representative hydrogeological terrains (India)” which includes Heliborne survey (SkyTEM) carried out through Aarhus University, Denmark. The consultancy project would lead to:

- Delineation of multi layer Aquifers, geophysical parameter characterization and its refinements
- Recommendation of cost efficient, time saving and precise geophysical techniques under different hydrogeological conditions/ pilot areas.
- Establishing a protocol for geophysical investigations to be taken up as an aid to aquifer mapping to be up scaled for the entire country.

The electromagnetic geophysical methods are all based upon the fact that a magnetic field varies in time – the primary field – and induces an electrical current in the surroundings. The associated electrical and magnetic fields are called the secondary fields. The TEM method applies an ungrounded loop as transmitter coil. The current in the coil is abruptly turned off, and the rate of change of the secondary field due to the induced eddy currents in the ground is measured in the receiver coil, usually an induction coil. The primary field is therefore absent while measuring.

The SkyTEM is a heli-borne hook on transient electromagnetic system. There is no operator or instrument in the helicopter. The pilot can fly the helicopter independently and the data acquisition is automatic. It is a dual moment system facilitating measurements for shallow and deeper subsurface information separately.

Photos taken during Data Acquisition:



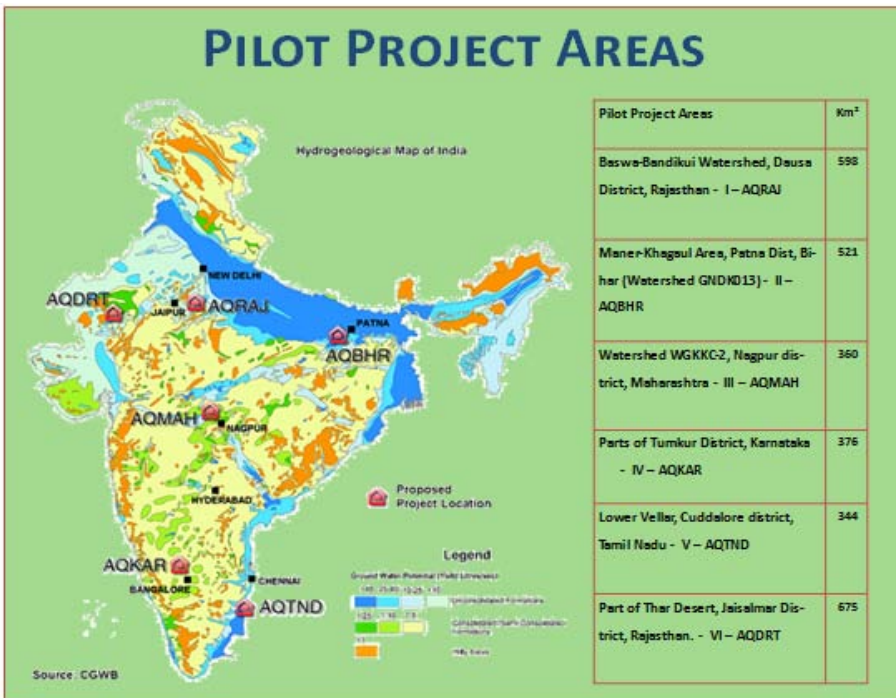
The sub surface information from the existing boreholes, ground geophysical investigations and hydrogeological investigations are compiled through forward modeling to interpret the data generated through heliborne survey for calibration and validation. Aarhus Bench integrates the ground geophysical data, borehole data and heliborne data to produce combined interpreted sub surface information.

Pilot Project on Aquifer Mapping

Heliborne survey was conducted in different hydrogeological terrains in the States of Rajasthan (Two areas – Parts of Dausa District and Parts of Jaisalmer District), Maharashtra (Parts of Nagpur District), Karnataka (Parts of Tumkur District), Tamil Nadu (Parts of Cuddalore District) and Bihar (Parts of Patna District).

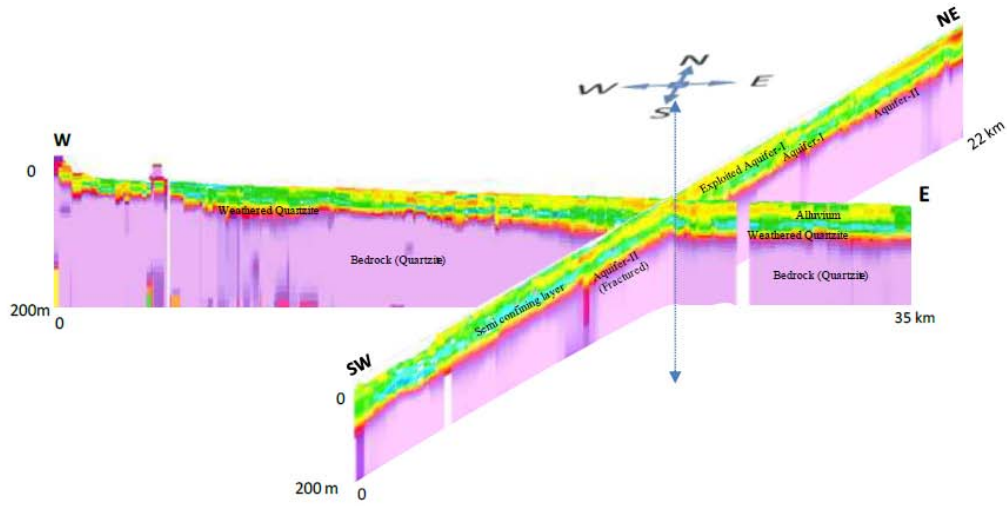
Salient features of the heliborne survey is tabulated below

Altitude of the loop above ground during the survey	30 m above the ground
Altitude of Helicopter during survey	60m above the ground
Specification of sub contractor system & ancillary equipment	
Weight	630 Kg
Length of carrier frame	34.6m
Width of carrier frame	20.6m
Average production speed on survey lines	80kmph
Line KM flown in the pilot areas	13706

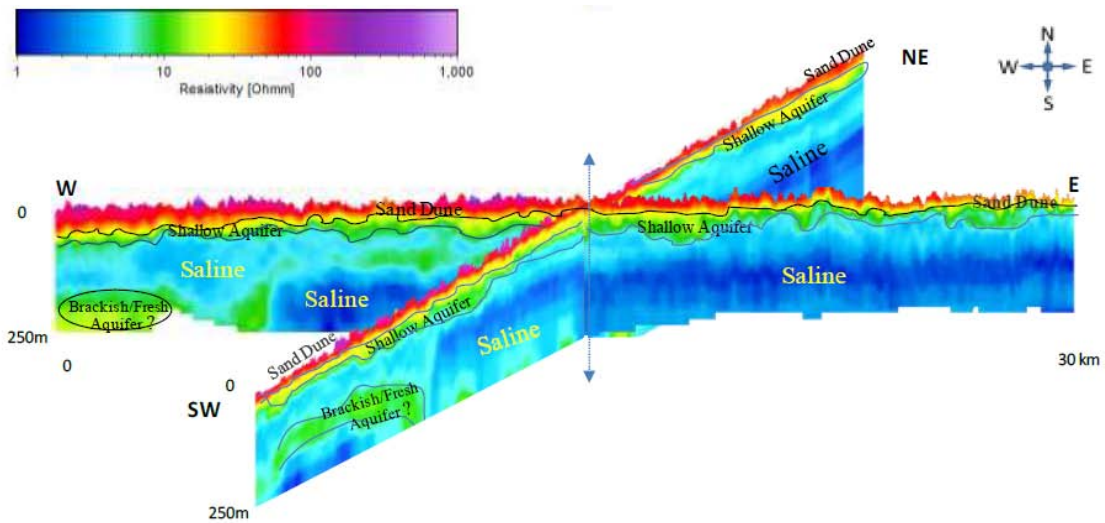


The analysis of Heliborne survey data and integration with geophysical and hydrogeological data has been completed and the report is under finalization by CSIR-NGRI. A few of the preliminary findings in different pilot project areas shared by CSIR-NGRI in terms of sub surface disposition are given below.

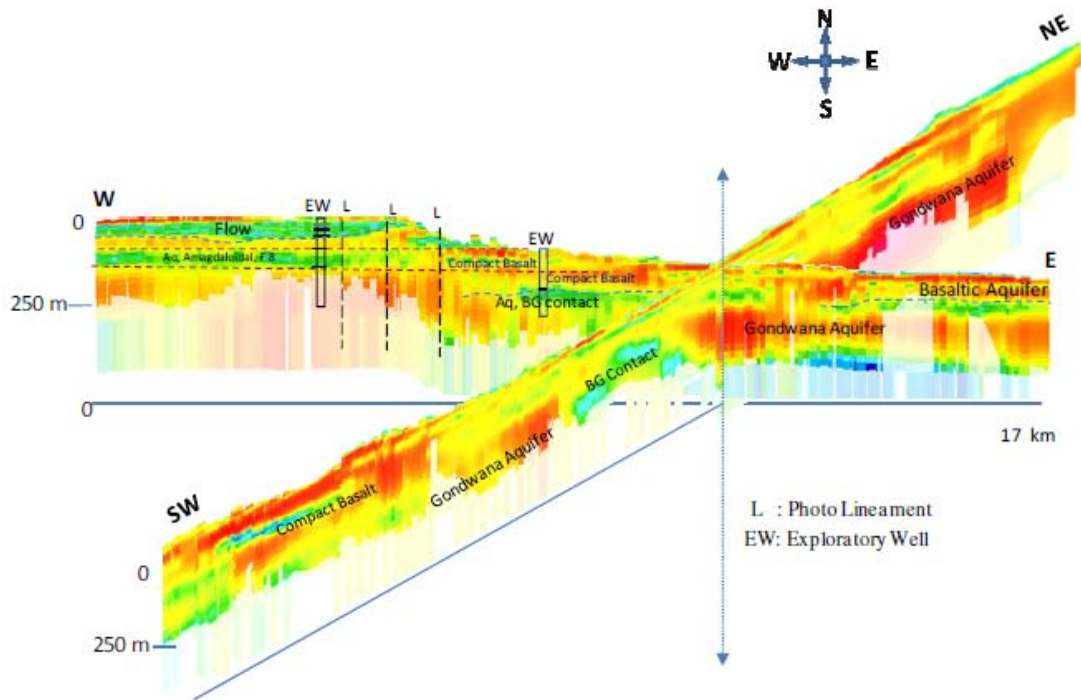
- Parts of Dausa District, Rajasthan (Alluvium underlain by Crystalline Terrain)



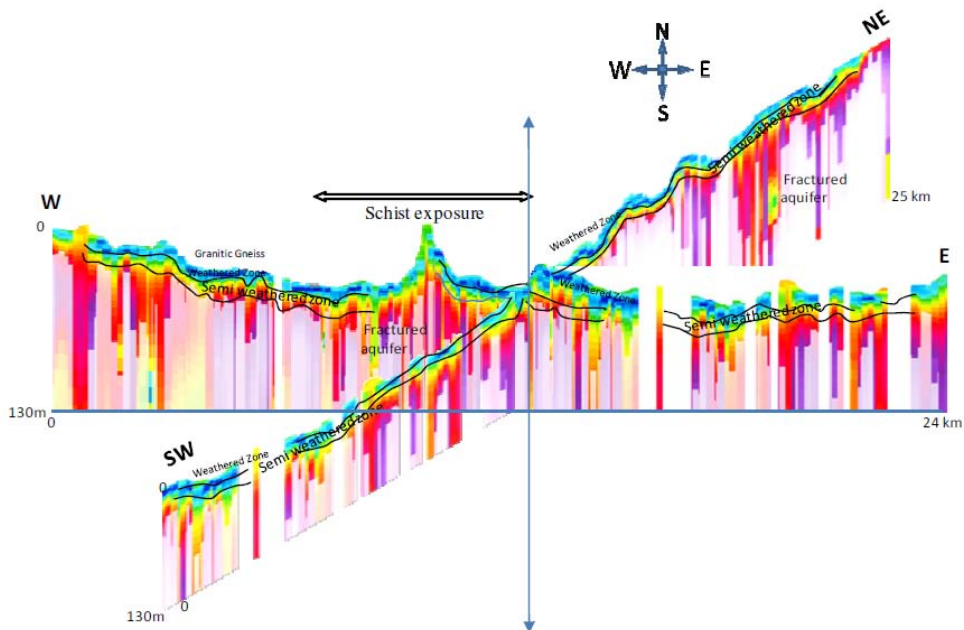
- Parts of Jaisalmer District, Rajasthan (Desert Terrain)



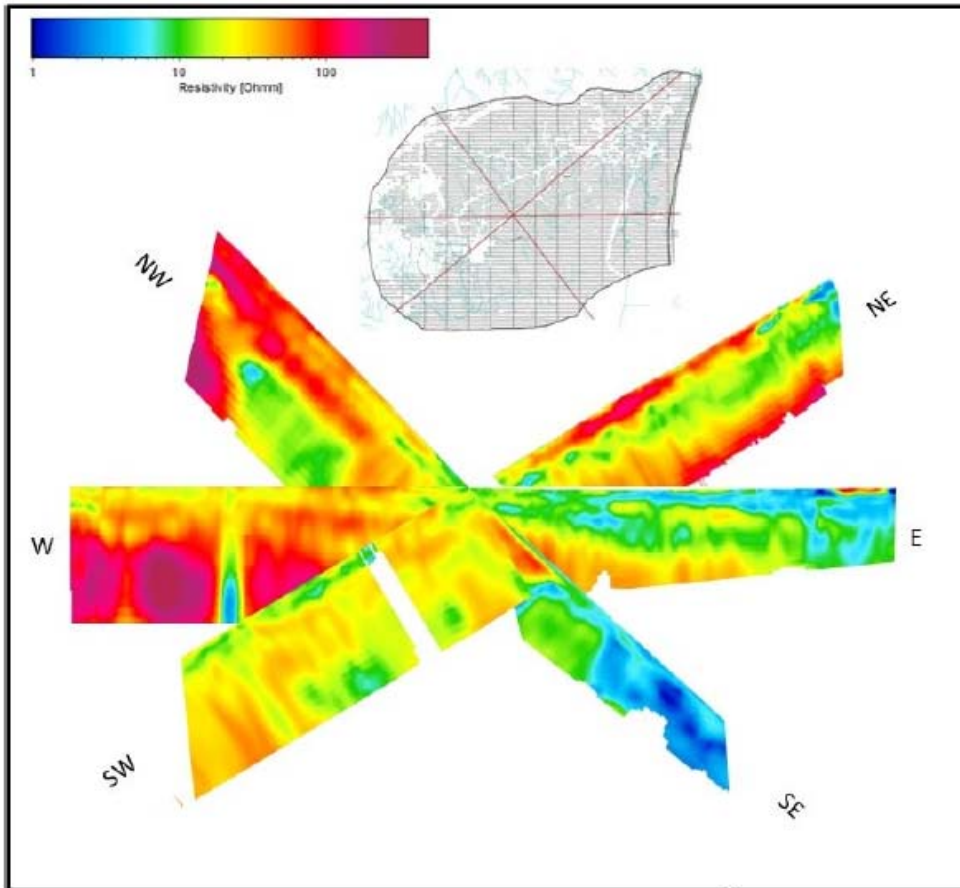
- Parts of Nagpur District, Maharashtra (Basaltic Terrain)



- Parts of Tumkur District, Karnataka (Crystalline Terrain)



- Parts of Cuddalore District, Tamil Nadu (Coastal Terrain)



- Parts of Patna District, Bihar (Alluvial Terrain)

