An Integrated Study of Airborne Study Magnetic and Resistivity Anomalies and Visually Interpreted Remotely Sensed Data of Salem Region, Tamil Nadu in Connection with Shaer Zone And Neotectonic Zone Demarcation

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The Salem region of Tamilnadu is situated along the transition zone Dharwar, greenstone belts and Southern Granulite Terrain (SGT). Though it is generally agreed that this part of the country is relatively stable, the evidence for early and late Proterozoic, Paleoseismicity are recorded in the form of Mylonites and Pseudotachylytes. Even much younger Holocene tectonics is recorded in the form of recent arching and deepening, braiding of drainages, migration of rivers and minor earthquakes. A few shear zones are already well established by earlier workers and there are many more which are hidden and unidentified. An integrated study in this part of country is intended with the aid of Aeromagnetic data, satellite imagery and resistivity data to enlighten the shear geometry of the terrain.

Aeromagnetic data for this study is obtained from AMSE wing of GSI, Bangalore and Department of mines and geology, government of Tamil Nadu. The aeromagnetic total intensity map with the contour interval of 50 gamma and DEM are prepared for Salem region. Since the aeromagnetic signatures are not only controlled by structure but also Lithology, wide variation is seen in the pattern of the contours. The distribution of contour pattern in NE-SW in northeastern part coincides with Kottapatti shear and southern margin of Shervaroys and Kalrayan hills and possibly represents Salem -Attur shear zone (eastern extension of Moyar Bhavani shear). The similar zones of anomalous contour pattern and magnetic breaks, aeromagnetic anomalous dome and basins from DEM are demarcated as aeromagnetic anomalies excluding BIF formations in Kanjamalai, Godumalai and Malliyakarai (Palaniyapuri) basin. Aeromagnetic profiles are drawn over anomalous zones in order to understand the lateral variation and to provide a terrestrial
perspective of the area. Aeromagnetic profile shows clear amplitude variations in accordance to the shear geometry of the terrain. IRS 1C satellite data is visually interpreted for preparing lineament and structure. Lineament density map and lineament iso-frequency map are prepared for Salem region using a 2.5 Sq. km grid. The lineament density maxima and frequency maxima zones are demarcated as the anomalous zones.

Schlumberger resistivity soundings data are collected from Public Works Department (PWD), Tamilnadu Water supply And Drainage board (TWAD) and Central Ground Water department (CGW). The apparent resistivity data are brought to GIS environment and isoresistivity maps for the depths of 25m, 50m, 80m, 100m and 150m are prepared. The isoresistivity maps show resistivity hills and valleys. The resistivity lows are compared with ground water data, as they may be related to groundwater province and are eliminated. The hills seem to match with massive rocks. Due to paucity of data in the NE part there is no significant results are derived. The domes and basins formed by the apparent resistivity contours are correlated with the anomaly maps prepared from aeromagnetic data and lineament analysis. The anomalous zones mapped from of all the threes sources are interpreted for the demarcation of shear zones. The prepared shear zone map was cross checked with limited field study. The field study shows evidences of brittle shearing at some places and ductile shearing at others in terms of pseudotachylytes and mylonites respectively.

The historical seismicity data published by geological survey of India (Anon 2000) was used for extracting over 250 epicenters to create a GIS database for south India. From this information, our area of interest for study is filtered out and iso-seismal map is prepared. The iso-seismal map is overlaid with newly generated shear zone map and shear zones of neotectonic characters are identified.