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Application of geospatial technologies in Lineament analysis for mineral prognostication- A Case Study-- Ramagiri schist belt and surrounding areas of Eastern Dharwar Craton

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The objective of the present study is to attempt quantitative analysis of the lineaments extracted from remote sensing data products, derivative maps from ground and aerogeophysical surveys using GIS technologies. The parameters/indices thus calculated are taken as inputs for generating evidence maps to be used as one of the themes in spatial modelling for identifying the favourable zones for gold mineralisation in parts of Ramagiri Schist belt and surrounding areas. The other themes taken in spatial modelling include lithological, structural, geochemical, geophysical, aero geophysical and remote sensing data.

The area of study represents a part of Eastern Dharwar Craton and is mainly composed of the Achaean granite-greenstone rocks, Palaeo-Proterozoic granite suite, Meso to Palaeo-Proterozoic basic dykes, pegmatites, quartz veins, kimberlites, lamprophyres, lamproites etc. Sediments of the Cuddappah Supergroup (Meso-Proterozoic) form the cover over the crystallines in the east-central part of the study area. Narrow belts of Dharwar Supergroup of rocks comprising Ramagiri-Penakacherla, Jonnagiri & Gadwal schist belts occur as supra-crustal rocks within the gneissic terrain. The schist belts, Ramagiri Schist belt and Jonnagiri Schist belt in particular, are known for gold occurrences/prospects.

Lineament extraction from various sources and their analysis contributed immensely in delineating the favorable zone of mineralization, especially for gold and diamond bodies as geological structures elements including lineaments are one of the controlling factors for the mineralization. Delineation of fracture zones is based on the extraction of lineaments from satellite imagery (IRS 1-D LISS-III with 23.5 m spatial resolution), SRTM DEM (with 90m resolution), derivative maps from processing of ground gravity & magnetic data and aeromagnetic data together with their analysis coupled with understanding of the tectonic evolution of the area provided useful information as to finding of favourable areas for mineralization. Identifying the unit area/grid for calculating lineament indices viz. *lineament frequency, lineament density, lineament intersection frequency & density* has become the most crucial aspect. To identify the unit area, theissen polygons are generated from the midpoints of the lineaments falling in the area under study. Mean area of the theissen polygons generated is taken as the Unit Grid area. All the lineament indices/parameters have been assigned to the centroid of the grid and generated continuous rasters using various interpolation techniques. This method of calculating the unit grid for the present work is unique and done for the first time and found to be more rational and accurate. Three parameters of lineament analysis viz. *lineament-length density, lineament frequency and lineament intersection frequency* are taken into account. Besides, *the ratio of lineament intersections and the number of lineaments* are also considered as an additional parameters. The analysis indicates that higher densities of lineaments and lineament intersections represent a higher level of fracturization of the study area. As the mineralized areas are generally associated with sheared and fractured zones, this exercise has immensely helped in targeting the favourable areas for gold mineralisation. Further,

the exercise is also validated by plotting of known mineral occurrences of the area on the various lineament indices maps. The outputs of lineament analysis are integrated with other thematic layers using spatial modelling techniques in GIS environment.

References:

[1]Adeyinka Olasehinde1 et al (2013) : Geological Lineaments and Pattern Analysis in Mineral Exploration: A Case Study of the Riruwai Complex Sciknow Publications Ltd. ER 2013, 1(4): 110-118 Earth Resources DOI: 10.12966/er.11.01.2013 [2] M. F. Ramli et al (2009) : Lineament mapping and its application in landslide hazard assessment: a review Publications: Springer-Verlag 2009:222-223 Bull Eng Geol Environ (2010) 69:215–233 DOI 10.1007/s10064-009-0255-5