Structural Mapping Of Southern Part Of Kadiri Schist Belt, Eastern Dharwar Craton Of Anantapur District, AP, India Using Geospatial Techniques.

B. Pradeep Kumar, P. Padma Sree, K. Raghu Babu, P. Srinivasulu

Abstract: More than 60% of the state of Andhra Pradesh makes up the eastern part of the Dharwar Craton. Three prominent greenstone belts occur in the southern part of the state with discontinuous trace into the adjoining parts of Karnataka State. They are Veligallu - Gadwal Belt, South Kolar or Bisanattam–Kadiri Belt and Ramagiri–Penakacherla Belt. The Eastern Dharwar Craton encloses a number of narrow linear bands of auriferous schist belts. They are also the locales of deposition of variety of minerals. The present study aims to prepare structural mapping on southern portion of Kadiri Schist Belt in portions of Anantapur district, Andhra Pradesh, India. The Southern Portion of Kadiri Schist Belt uncovered the existence of litho-units with marked likenesses to the Kolar type schist belt of Karnataka State. Geological studies of the study part include mainly three litho-units specifically schist belt litho-units, granitoids and dyke rocks. Remote sensing and Geographical Information Systems (GIS) have become more important for the study of geology, structural geology and extraction of lineaments. In this paper we focused to identify the type of lineament. The results clearly reveal that in the study part three types of lineaments were present namely Geographic lineaments- ridge parallel, Structural lineament- Dykes, structural lineaments – joints and fractures. Most of the lineaments were placed in South-Eastern part and North-Western part in the Rose diagram.

Keywords: Dharwar craton, Schist belt, Litho-units, Lineaments, Rose diagram.

1. INTRODUCTION

Volcano sediment belts of Dharwar craton are accepted as bel schist belts, which have been labeled as the Greenstone belt by Swaminathan et. Al., (1976) is based on the concept of Greenstone belt in South Africa by Anhaeusser et. Al., (1969) In assessment of their distinctive lithostratigraphic variations, the Greenstone belts of Dharwar Super group stood classified by Ramkrishnan at "Dharwar type" (in Eastern Block). Al., (1976) and who renowned one more old group of schists, and baptized them the early supercrastals of old Metamorphic (or) Sargur Group (Swaminathan et al., 1976). The volcanoes of Eastern Gold-bearing volcanoes of Dharwad Cretan were correlated with Ramkrishnan at the form of "Kavatian type". Al., (1976) The relative technique of " Keewatian type " was challenged because it was not only foreign, but the Kavatian region (Rennie Lake District of Canada) was also unethical, which was not even reflected by Canada's geologists as a type of area, which It was in favor of 'Abititi belt' recently. Therefore, the style and the Kolar style were chosen to describe these belts. Although "Abbit belt" & “Yellow Knife Greenstone belts" are usually based on universal succession, i.e., on the basis of upper volcanic rocks and top of the upper meta-sediment, yet for a direct stratigraphic correlation with a
belt No basis. one more. Their stratigraphic location is nowadays considered doubtful. The landscape of these late Archian belts is varied and illogicalities are existence observed in the interior the range of a shield. In order to evaluate the belt of schists, generally the transfer and sub-process process is attributed again, that is, horizontal tectonics, though dealing with the development of granite, vertical tectonics is functional, i.e., the plume source. For the past ten years, numerous workers, founded on the whole geo-chemical study of schists, are advocating the growth of mini-block on moreover side of the schist belt and supporting secular variations in various Tectono-Magnetic / Sedimentary environ (or) domains. are doing. For the development of the identical schist belt. These appearances were made important contributions by Rajamani et. Al., (1985), Walker et al. Al., (1989), Zachariah et al. Al., (1995).

2. STUDY AREA:

The study part is restricted to the Southern Portion of Kadiri Schist Belt, casing portions of Anantapur and Chittoor districts. The extent of examination is positioned among Kadiri in the North and Kandukuru in the South. The breadth of the schist belt deviates after 1 Km to 4.8 Kms and it lies among North Latitude 13°45’ and 14°7’ and East Longitude 78°2’ and 78°15’ enclosed in the survey of India (SOI) Toposheet Nos. 57 J/3, J/4, K/1 and K/2 and is geographically mapped on 1: 50,000 scale. Figure 1 depicts the location map study area. The climate everywhere Kadiri is somewhat dry with extreme temperatures fluctuating among 38° and 42° c although further south headed for Madanapalli the climate is usually pleasing through the usual temperatures ranging from 30° to 38° c. The area falls in rain shadow region through subtropical climate and the normal yearly rainfall is around 580 mm which is typically attained owed to the south-west monsoons.

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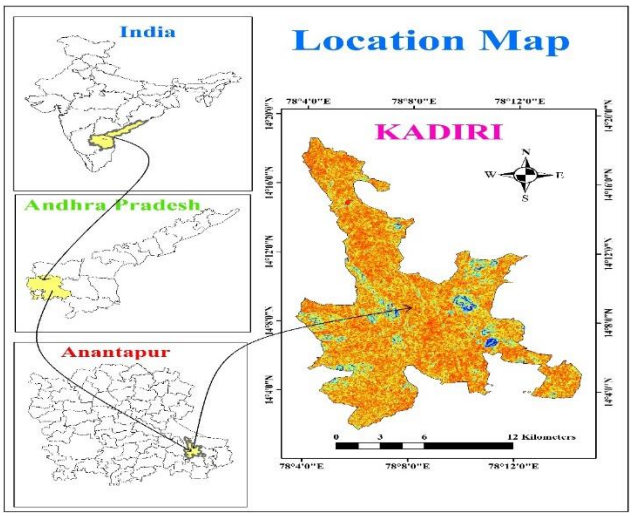

Fig 1: *Location map.*

3. MATERIALS AND METHODOLOGY

Indian Remote Sensing (IRS) satellite data of Landsat-8 is used. Survey of India (SOI) topo sheets are used. The following

table:1 *shows the data used for the study area.*

	Data used	Spatial resolution	Source
Satellite Data	Landsat 8	15 m	http://earthexplorer.usgs.gov/ http://bhuvan.nrsc.gov.in
Ancillary Data	SOI maps- 57 J/3, J/4, K/1 and K/2	1: 50, 000	Survey of India
Collateral Data	Climate, Soils etc.	Groundwater Department, Anantapur District, Andhra Pradesh	
Collateral Data	Soils, Climate, etc.		

3.1. Software used

ERDAS IMAGINE 2014, Arc GIS 10.4. Rock works.

3.2. Methodology:

The study aims to identify structural mapping on southern part of kadiri schist belt. SOI topographic maps with 1:50,000 scale were used and identified the field location and Georeferenced (WGS 1984) by using GIS software and created base map. Required satellite data is freely downloaded from the United States Geological Survey official website. Before the preprocessing of Satellite imagery began, a sweeping field survey was done throughout the study part, using GPS (Global Positioning System). Land sat-8 data has been downloaded with the spatial resolution 30 meters. Layer stacking is done by using ERDAS IMAGINE and given natural colour component is 7,6,4. There is an another free and very useful source for this mapping is BHUVAN, by using this maps I have prepared geology and geomorphology maps (According to the district administrative boundaries with the help of GSI maps) and lineament maps those are also extracted from this and drawn and mapping in the Arc GIS. Remote sensing maps are also taken in to consideration for lineament extraction in the southern part of kadiri schist belt. Rose diagram has been prepared by using Rockworks software. Fallowing figure 2 shows the methodology.

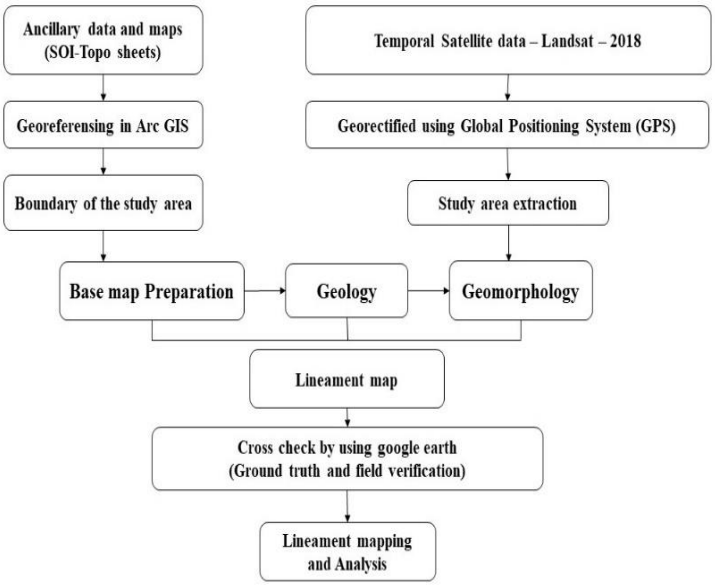

Fig 2 : *Methodology*

4. RESULT AND DISCUSSION

4.1. Geomorphology of the study area:

The soil is coarse-grained and reddish on the granitic terrain, although it is fine to medium-grained in color, from shady to dark black on metabasic volcanic rocks and metaacid volcanic rocks. The sandy soil is produced along with the sequences of the rivers and the clay soil laterally the paleo-fluvial channels. The mango gardens and orchards (mainly tomato) are plentiful. Peanut is a crop commonly grown in this area. Figure 3 shows the geomorphology of the study part.

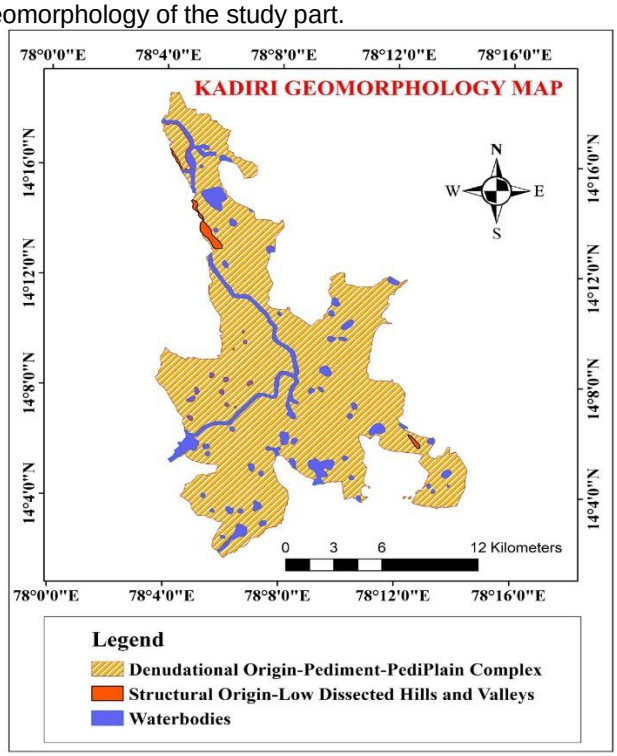

Fig 3: *Geomorphology of the study are.*

4.2. Geology of the study area:

In the study part, there are many basic dykes as intrusive in all the developments that embody the past phase of the igneous activity in the extent. They are uncovered as long, thin and obstinate crests ranging from a few rhythms to numerous kilometers. They are fundamentally of doleritic structure; Gabbrocks are also visible in some places (Figure 4). They are uncovered in mounts, mounds and also in plains endways with other rocks at the similar flat. whereas the dykes in the granitic terrain are massive. Infrequently they display porphyritic texture also. The chilled margins are clearly seen in lesser dykes. At places more or less dykes were seen off-set by lateral faults evacuated either sinisterly or dextrally. Different types of boulder dykes and Lateral faults in dykes of kadiri schist belt have been seen in Plate 1 and 2.

STRATIGRAPHIC SUCCESSION

Mafic Dykes
Pegmatite, Quartz veins
--------- Intrusive Contact ---------
Monzogranite-Syenogranite Suite
--------- Intrusive Contact ---------
Tonalite-Granodiorite-Monzogranite Suite
--------- Intrusive Contact ----------
Quartz-Felspar Porphyry and Quartz Porphyry }
Rhyodacite with volcanic Conglomerate and Rhyolite}
Meta basalt and Meta andesite
}
---------Tectonic Contact ----------
Tonalite Trondhjemite Granodiorite gneiss Suite

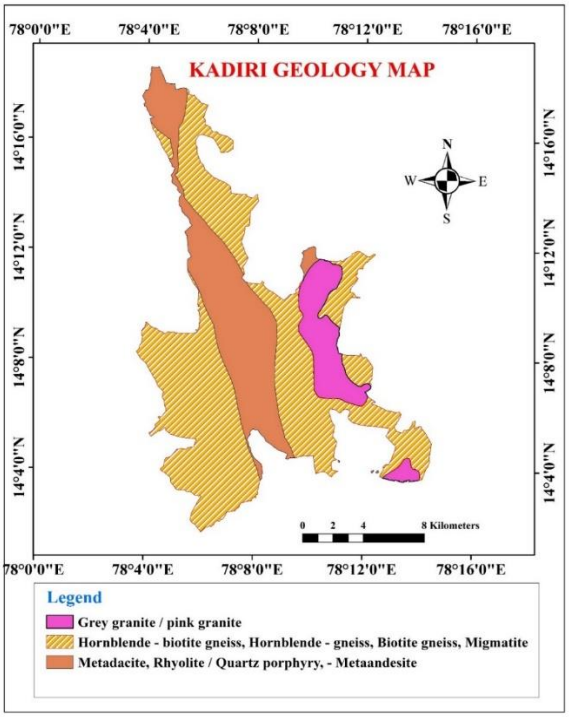

Fig 4: *Geological map of the study area.*

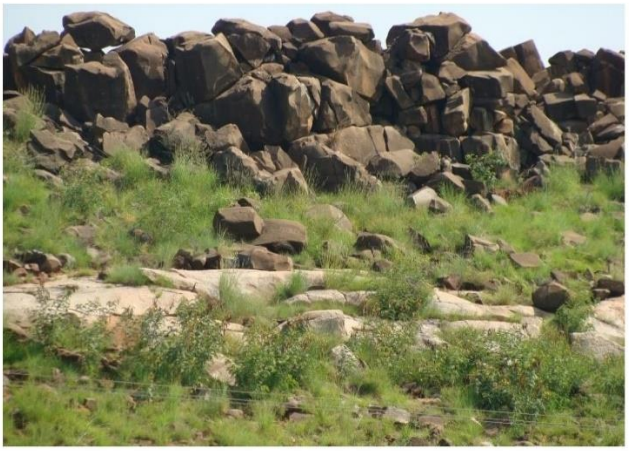

Plate 1: *Bouldery dyke in the schist belt*

Plate 2 : *Lateral faults in dykes.*

A macroscopic investigation of the dyke samples specifies that they are melanocratic in colour and aphanitic to sub-aphanitic in texture. Pyroxenes, Magnetite and plagioclase feldspars are simply divergent in hand samples.

4.3. Lineament:

A lineament is a linear feature and expression of underlying structure like fault, Joints and fractures. The common nature of any two sets of lineaments are in the trend along NE-SW and NW-SE. If any geological structure present in the landscape may be consider as a lineament. These lineaments are very useful in ground water exploration. Delineation of structure is very useful for finding new minerals and their exploration. Fracture zones and igneous intrusions like dykes and many other geomorphic features are named as lineaments (Pradeep Kumar. B.; et al 2019). Remote sensing Land sat images can give the detailed clue in finding and mapping of the lineament. In the fallowing figure 5 depicts the lineament mapping of the kadiri schist belt. Majorly three types of lineaments have been mapped namely Geographic lineaments- ridge parallel (in blue colour), Structural lineament- Dykes (in red colour), structural lineaments – joints and fractures (in rose colour).

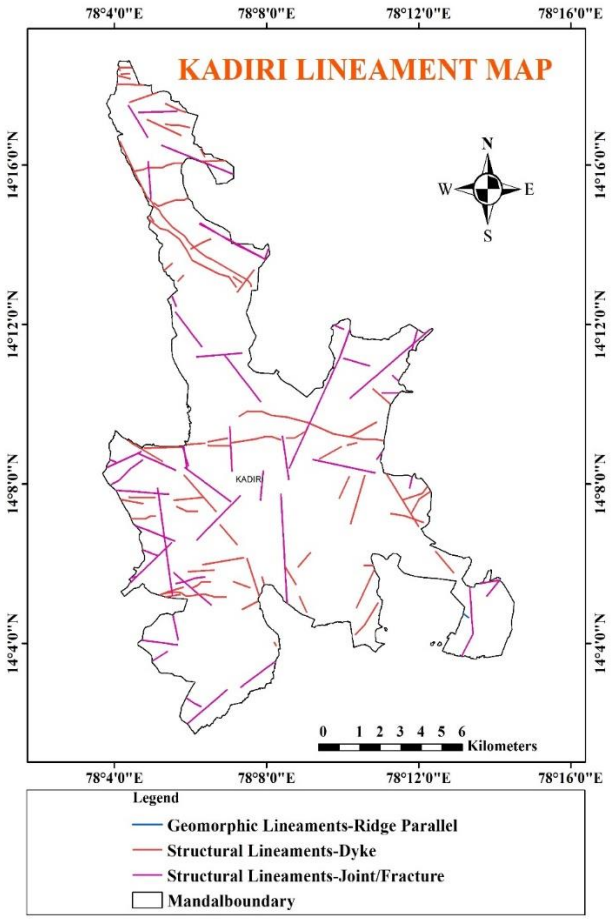

Fig 5: *Lineaments.*

4.4. Rose Diagram:

In structural mapping, rose diagrams are castoff to plot the positioning of dykes, fractures and joints. Lineament direction plotted on rose diagrams (Figure 6). Structural or lineament map with rose diagram for all lineaments and differentiation of geological and geomorphological lineaments have been calculated and it is useful to identifying the placement. In this study most of the lineaments were placed in Eastern part and North-Western part in the rose diagram.

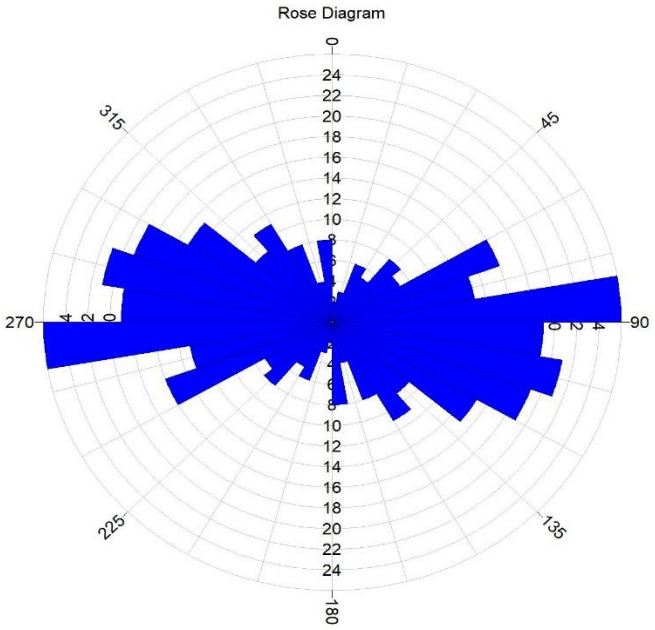

Fig 6: *Rose diagram.*

5. CONCLUSION

The Kadiri Schist Belt is bimodal including overwhelmingly of corrosive volcanic through inconsequential vital volcanism having a place with the Dharwar super group. The results clearly reveal that in the study part having three types of lineaments were present namely Geographic lineaments- ridge parallel, Structural lineament- Dykes, structural lineaments – joints and fractures. Most of the lineaments were placed in South-Eastern part and North-Western part in the Rose diagram. This helps in analysis of a combination skyline, which is bound to shear zone, is followed up and down the schist belt intermittently. Three suites of syn-to-late kinematic granitoids are connecting the schist belt. The above litho -units are meddled by mafic dykes and quartz and pegmatite veins. The stratigraphic progression of the rock greenstone landscape of the examination territory has been worked out by selective field thinks about and the deductions were likewise drawn from different specialists who did work in the contiguous regions.

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