

Structural Evolution of Mainpat Plateau, Surguja District, Central India

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Abstract The Mainpat Plateau falls in Surguja district in Chhattisgarh state, India. It is located in Survey of India toposheet numbers 64 N/1, N/5 and N/6 lying between longitudes E83°08' to 83°25' and latitudes N22°41' to 22°55'. General elevation of the Plateau is around 1060 m msl. The Mainpat Plateau as a whole is a mesa landform; rising more than 450 m high from the foothills, and consisting of Archaeans (granite-gneisses, phyllite, etc.), Gondwanas and Deccan basalt. Archaeans found at the foothills are overlain by the Gondwanas at the western escarpment, and covered by basalt at the top. The Central Indian Craton (CIC) has four major NE-SW trending major lineaments. In which northern most lineament separates Bundelkhand granite and Vindhyan basin. In the south of this lineament another one major lineaments separates Vindhyan with Gondwanas. In further south major shear zone marked by lineament passing through Mainpat plateau. A lineament followed by Son and Tapti valley lies in the south of study area. Different parts (plateaus) of Surguja area belong to the Central Indian Craton (CIC). CIC is bounded by folded belts: (i) Raigarh folded belt to the east (ii) Delhi folded belt to the west (iii) Indogangetic plain to the north and (iv) Eastern Ghat Mobile Belt to the south.

Keywords *Deccan Traps, Maipat Plateau, Structural Evolution, Surguja District India*

1. Introduction

The area of study Mainpat Plateau falls in Surguja district in Chhattisgarh state, India. It is located in the Survey of India toposheet numbers 64 N/1, N/5 and N/6 lying between longitudes E83°08' to 83°25' and latitudes N22°41' to 22°55'. The plateau is located about 45 km SSE of Ambikapur, the District Headquarter of the Surguja. The area is conveniently approachable in all seasons by well connected by road, from the District Headquarter (45 km) and that reaches up to the top of the plateau. The nearest rail head is Bishrampur (SE Railway) situated at a distance of 65 km from the study area and nearest airports is Raipur (Chhattisgarh) and Ranchi (Jharkhand). Sitapur is the main townships and subdistrict headquarters 28 km from the study area.

The study area is occupied by Mainpat plateau which is covered by Deccan Traps. The average height of the plateau is 1080 m and maximum height is 1165 m above MSL at Parpatia village on Mainpat in the western side of the plateau. The top of the whole plateau is covered by laterite and bauxite. Laterite and bauxite is the residual product of extreme chemical weathering of preexisting aluminous rocks under favorable geomorphic, climatic and hydrogeological conditions. On Mainpat plateau, the basalts of Deccan volcanism are the rock which had undergone chemical weathering. Mobility of an element is a function of solubility, supportive phenomenon and translocation (Dennen *et al.*, 1977). The highly mobile and soluble constituents like Si, Mg, Ca, Na and K are leached out from basalt and least mobile chemical constituents like Al, Fe and Ti remain in place. This geochemical processes of lateritisation and bauxitisation can be summarized as a selective mobilization, leaching and partial re-precipitation going hand in hand with hydration of the elements that remain in the weathering profile. It is, therefore, quite essential to study the geochemistry of parent rock and residue in respect of major and trace elements which will ultimately lead to understanding the process of lateritisation/bauxitisation in that particular area (Figure 1). The plateau has a dendritic drainage pattern of its streams because of the undulating flat nature of plateau top. Otherwise it is showing a radial drainage pattern from its slopes.

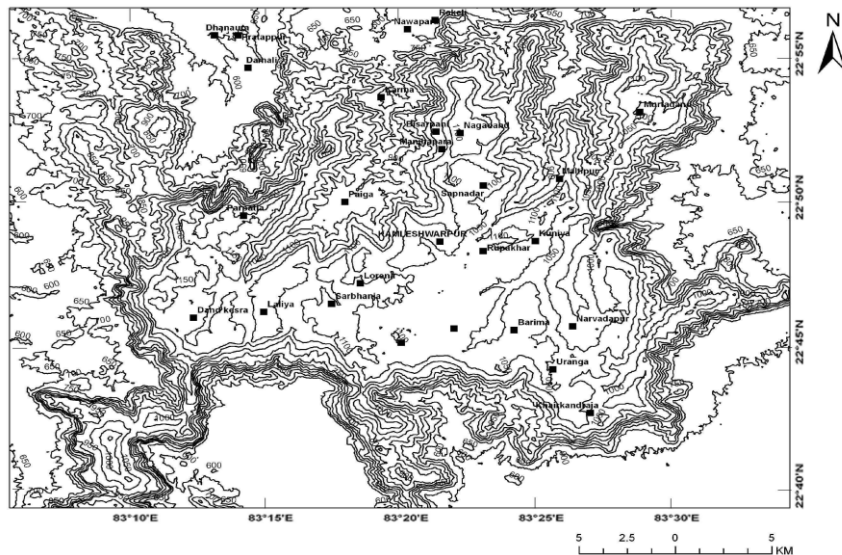


Figure 1: Contour Map of Around Mainpat Plateau, Surguja District

2. Regional Geology

Regionally, the area comprises predominantly the rocks of Precambrian and Gondwana Supergroup. The Metasedimentary rocks (Sausar Group) are characterized by pilots, quartzite, chlorite schist, quartz chlorite schist, quartz sericite schist and intra-formational conglomerate etc. The entire succession is equivalent to Sausar Group. The phyllite and schist sequence is occasionally intruded by amphibolite/dolerite dykes. In the area rocks occurring in and around Lakshmanpur belong to the Surguja metamorphic belt, which is the western extension of the Chhotanagpur Gneissic Complex (Majumdar, 1998). In contrast to the Sausar group of rocks, these metamorphoses comprise quartzites, schist, crystalline carbonate and Calc silicate rocks older metamorphic; metagreywacke, conglomerate, phyllite and amphibolite (Mulay, 1968) of Precambrian age (Figure 2). These are followed by granitoids comprising genesis complex and granites. The gneissic complex includes biotite gneiss, porphyritic microcline biotite gneiss, albite-oligoclase gneiss and hornblende gneiss. Granite and granodiorite occur as small plutons intruding the gneissic meta-sediments (Mulay, 1968). Pegmatite, aplite and quartz veins occur within the above rocks. The metamorphites and granitoids are overlain by lower Gondwana sequence.

The Gondwana Super Group rocks rest uncomfortably over the metamorphites and granites (Table 1).

Table 1: Stratigraphic Succession of the Study Area

Period	Supergroup/ Group	Litho-Units
Recent to Sub-Recent		Alluvial soil, Laterite and Bauxite
Upper Cretaceous to Lower Paleocene	Deccan Trap	Basaltic flows
Cretaceous	Lameta	Earthy Greenish to White Sandstone
upper Carboniferous to Lower Cretaceous	Barakar	Coarse grained sandstone with Coal Seams, Fine grained sandstone, siltstone, green Shale
	Talchir	
Middle to upper Carboniferous	Gondwana	Conglomerate, sandstone
Precambrian	Chhattisgarh	Granite-gneiss, phyllite, quartzite etc.
Archaean	Basement	Granite/Gneiss, Phyllite, Quartzite, Acid and Basic intrusions

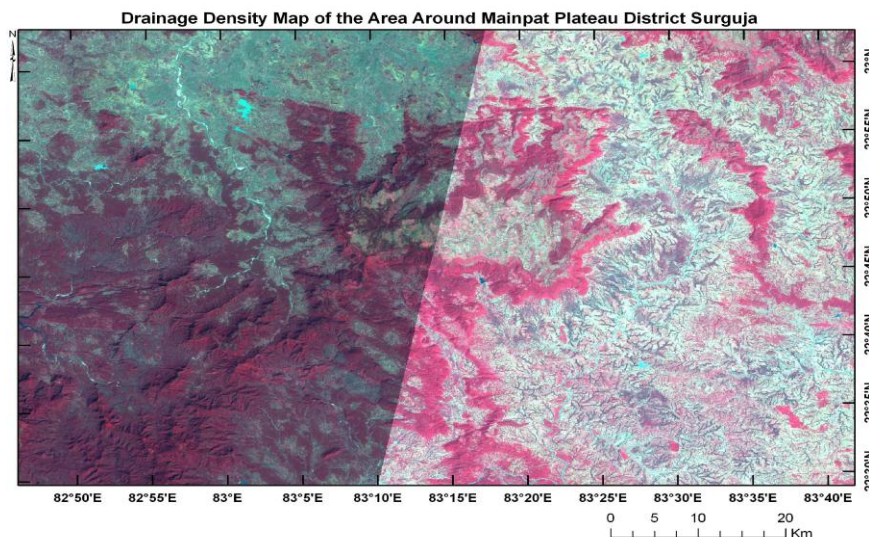


Figure 2: Drainage Density Map of Around Manipat Plateau, Surguja District

3. Lineament Pattern

Different parts (plateaus) of Surguja area belong to the Central Indian Craton. The Mainpat plateaus area also belong to the Central Indian Craton is bounded by folded belts: (i) Raigarh folded belt to the east (ii) Delhi folded belt to the west (iii) Indogangetic plain to the north, and (iv) Eastern Ghat Mobile Belt to the south. Stratigraphically, Central Indian Craton (CIC) consists of older granitic and/or gneiss complex, mid- to neo- Proterozoic sedimentary sequences, Paleozoic to Mesozoic sedimentary sequences and younger basaltic flows. Bauxitic/lateritic plateaus of Surguja area developed over Deccan trap basalt, which conformably overlies on Gondwana sequence. Talchir boulder bed marks the older-most unit of Gondwana sequence which uncomfortably rest on older granites. The regional geotectonic units include lower Proterozoic Chhotanagpur Gneissic Complex (CGC) and metasediments of Gangpur Group of rocks in north-central part, the middle-upper Proterozoic rock of Chhattisgarh Supergroup in the southern part, lower Gondwanas along NW- E trending and Lameta-Deccan Traps in northern western part (Figure 3).

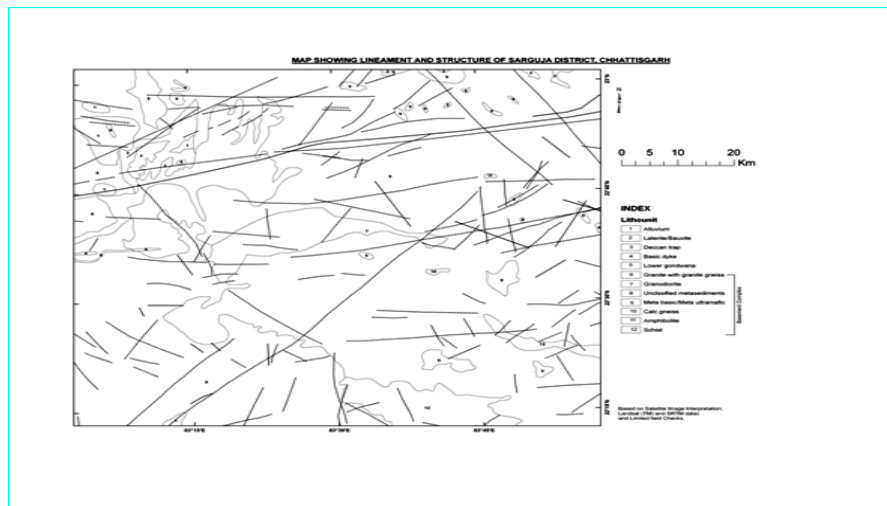


Figure 3: Lineament and Structural Map of Surguja District in Chhattisgarh, India

4. Structural Setup

The Central Indian Craton (CIC) has four major NE-SW trending major lineaments. In which northern most lineament separates Bundelkhand granite and Vindhyan basin. In the south of this lineament another one major lineaments separates Vindhyan with Gondwanas. In further south major shear zone marked by lineament passing through Mainpat plateau. A lineament followed by Son and Tapti valley lies in the south of the study area.

Major structural elements include the Tapti lineament and related fractures and shear (Tanshear) passing through the northern part of the area. Major lineaments are trending in E-W direction; NE-SW and NW-SE trending lineaments were also observed. Major shear zones between 22°20'-22°40' latitudes are associated mineralization in the area. The western part of the Tapti Lineament zone is thoroughly studied with a field check along lineament, fault and fractures (Mishra *et al.*, 2008).

However, basic rocks are seen in the NE of Bandana, north of Bagicha, east of Kuramkela, north of Retva, north-west of Poprenga, east of Tatkela, east and south of Batuali, north-west of Saraswatipur, north of Phuldih and east of Nankana village. Mainpat Plateau is tectonically uplifted about 450 m from the general ground level. The general elevation of the Plateau is around 1060 m msl. The Mainpat Plateau as a whole is a mesa landform, rising more than 450 m high from the foothills.

5. Conclusion

Based on an aerial photo and satellite image interpretation, four major lineament trends are identified in the area i.e. N - S, E - W, NNW - SSE and NE - SW.

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