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Study of Archaean mafic-ultramafic rocks from a partly preserved ophiolite complex of Bangriposi and Kuliana areas, Orissa, eastern India

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Three types of mafic-ultramafic rocks are found exposed in the metasedimentary rocks and sheared granite dominated region surrounding Bangriposi (22° 9' N: 86° 32' E) and Kuliana (22˚ 4' N: 86˚ 39' E). The first type is a modally layered gabbro-anorthosite suite emplaced within metasedimentary rocks and is composed of several cumulate layers grading from pyroxene rich mela-gabbro in the lower part to plagioclase rich leuco-gabbro varieties in the upper part. Devoid of any evidence of deformation, these rocks display no occurrences of either feeder dyke connection or chilled margin rocks in the surrounding region. The exposed succession can be classified into ten modal layers grouped into two cycles (I and II) (Chakraborti et al., 2015). Both cycles begin at the bottom part with gabbroic varieties grading upward to more plagioclase rich types (anorthositic gabbronorite/gabbro). Modal layering is associated with cryptic and mineral layering. Textural evolution of the Kuliana gabbro-anorthosite suite was punctuated by the two overlapping grain growth mechanisms- adcumulus growth and textural coarsening, and a transitional relation between them was established. Relatively flat and unfractionated REE patterns of these mafic rocks resemble cumulate gabbroic rocks of ophiolite sequences.

The second type consists of a series of medium-fine grained mafic dykes intruding variably sheared granitic terrain, occurring to the north of the Kuliana layered mafic suite. These dykes are mostly NE-SW trending, doleritic in nature, and exhibit almost no evidence of deformation and metamorphism. Typical intergranular and sub-ophitic textures of plagioclase and pyroxene characterize these rocks.

East of the layered mafic complex, around Banakati (22° 8' N: 86° 34' E) and adjoining areas, foliated, serpentinized ultramafic rocks found to consist of dunite, wehrlite and lherzolite represent the third type. Olivine, clinopyroxene, orthopyroxene, Cr-Spinel and magnetite are the major constituent minerals. The olivines in these ultramafic units are highly magnesian (Fo content ≥ 92) suggesting mantle character for these ultramafic rocks. Cr-Al zoning- a product of solid state diffusion creep (Ozawa, 1989) is observed in the relatively larger Cr-spinel grains. These rocks exhibit LREE enriched patterns and along with evidence of reaction textures and mineral assemblages, a possible event of melt infiltration and reaction in the mantle can be envisaged.

These mafic-ultramafic rocks of the study area show no evidence of intrusive nature and trace elemental composition of the mathematically modelled parent liquid revealed enriched MORB nature. Apart from the mafic-ultramafic rocks, the metasedimentary rocks of the study area composed of quartzite, phylonite, mica schist, banded magnetite quartzite, suffered at least two phases of deformation and at places are extremely sheared and mylonitized. It has been reported that the approximately north-south shear zone of present study is the southward extension of Singhbhum Shear Zone (Naha, 1960) which initiated as intraplate subduction zone (Saha, 1994; Sarkar and Saha, 1962). It is also known as Singhbhum Thrust Zone. Overall, the whole assemblage consisting of layered mafic rocks, dolerite dykes,

tectonized peridotite rocks, together with deformed metasedimentary package can be considered as a part of an Archaean ophiolite complex.

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