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MAZUMDAR, B K (1981) First Coal Scientist Award Lecture (1979) System, structure and behaviour of coal Jour Mines Metals & Fuel, Nov 1981, pp 330-337, Dec , pp 367-378

MISHRA, B K and BHAGWAN, D (1994) Susceptibility to spontaneous combustion of Indian coals and lignite an organic petrographic autopsy Intl Jour Coal Geol , v 25, pp 265-286

MISRA, S K , PANDYA, K L and SAHOO, R K (2002) SGAT bulletin Jour SGAT, v 3, pp 11-25

MOHANTY, J K , MISRA, S K and NAYAK, B B (2001) Sequential leaching of trace elements in coal A case study from Talcher coalfield, Orissa Jour Geol Soc India, v 58, pp 441-447

NIYOGI, C (1989) Studies of spontaneous combustion of coals of Talcher coalfield, Orissa Unpubl Ph D Thesis, Indian School of Mines, Dhanbad

RAJA RAO (1982) Coalfields of India Bull Geol Surv India, Ser A, No 45

GEOCHEMISTRY OF ULTRAMAFIC LENSES IN THE GRANITOIDS OF THE SOUTHEASTERN FLANKS OF SHIMOGA SUPRACRUSTAL BELT [KARNATAKA] WITH A NOTE ON THE DISTRIBUTION OF PLATINUM GROUP ELEMENTS AND MINERALS by T.C. Devaraju, T T Alapieti and R.J. Kaukonen. Jour. Geol. Soc. India, v 63, (4), 2004, pp.371.386

K.T. Vidyadharan, S. Paranthaman, Geological Survey of India, Bangalore and **K.N. Rao**, Geological Survey of India, Hyderabad comment

We compliment the authors for documenting the geochemistry of ultramafic lenses in the granitoids of the southeastern flanks of Shimoga supracrustal belt, Karnataka with a note on the distribution of platinum group elements and minerals The ultramafics are described as chromitites, dunites, peridotites, pyroxenite with original textures as well as mineralogy of rocks considerably modified by pervasive deuteric and low grade metamorphic alterations Chlorite and antigorite and Fe-Cr oxides are ubiquitous minerals Amphibole is abundant only in hornblendite Geochemically the ultramafics are described as of high Cr, high Mg, High Al and high Fe types with dominant high Cr and high Mg types and high Al and Fe types as local variants. The authors with the REE chemistry also describe the komatiitic bulk composition of parental magma as indicated by some high Cr and Mg ultramafites The chromite-dunite-peridotite-pyroxenite association strongly suggest that the ultramafic lenses of this area constitute parts of tectonically emplaced layered body The authors have reported PGE from the layered ultramafic body from east of Rangapura probably representing the early phases of deep-seated crystallization which entrapped as later crystallized chromite and silicates The ubiquitous hydrothermal alteration and low-grade metamorphism have not apparently caused significant migration of PGE

We have the following points to offer pertaining to this part of the supracrustal belt

1 Chromite bearing ultramafic lenses of this area were reported by earlier workers
2 Geological Survey India during the course of the programme on specialized thematic mapping in parts of toposheets 57C/1,2,6 & 7 falling in Chitradurga, Hassan and Chikmagalur districts, recently delineated a long linear belt called the "Antarghatta belt" (Paranthaman and Vidyadharan, 2004a,b) northwest of Arsikere-Banavara up to the southeastern part of the Shimoga Schist belt extending for more than 50 km in strike and 500 m average width with intrusive and extrusive ultramafic bodies within the Peninsular Gneissic Complex
3 While the intrusive ultramafics show chromite layering and tholeiitic nature, the extrusive variants exhibit excellent pillow, nodular, ocellar structures (rare spinifex texture also) indicating undoubted komattiite affinity Associated with these mafic-ultramafic variants of the two suites meta- pelites like fuchsite-magnetite quartzites are also recorded from this area Pre-tectonic gabbro and post-tectonic dolerite dykes traverse the ultramafic belt
4 EPMA mineralogy of samples from this layered body indicated ferro aluminous, magnesio ferriferous and magnesio chromites, chrome magnetite, magnetite and magnesio manganese ilmenite Tremolite, serpentine,

aluminous serpentine and chlorite, clinochlore are also identified from the layered untramafic suite. Pyrite and pentlandite are the main sulphides identified. Though the sections from Rangapura were checked for chromite and line analysis done on few opaque grains for V and Pt the signal to noise ratio was found very low indicating that the two elements are below detection limits. EPMA studies are being continued.

5. The ultramafic lenses shown by the authors in the map seems to be of larger dimension. Actually these bodies are much smaller in dimension.
6. Authors have not identified the extrusive komatiite rocks showing pillow, nodular structures. Around east of Antarghatta, Sankalapura, west of Kurubarahalli, Gijikatte and Basavapura area, excellent outcrops of pillowed, nodular, ocellar ultramafics are recorded in addition to chromite bearing layered ultramafic suite. Udugere, Vaddarahalli, Dodda Annegere, Sankalapura, Doddapayyanahalli, Adigerahalli, Mallenahalli, Basavanahalli, north of Shivaganga gudi, Bhairagondanahalli, Yeredegere and Rangayyanuru expose extrusive ultramafics with excellent pillow structures.
7. Kallangavi-Rangapura chromite shows excellent fold structures in addition to layering indicating the deformation episode. Violet coloured kammererite chlorite mica is associated with the chromites analysed 2 to 3.5% Cr_2O_3.
8. Around the village Donnakaranahalli, 2 km southeast of Rangapura dunite with layered chromites are recorded with remobilized chromite veins cutting across the layers.
9. In the classical plots of chromite composition including that of Barnes and Roedder (2001) the chromites of Rangapura-Kaliangavi fall in the Archaean layered suite with tholeiitic affinity (Cr-Al dominant).
10. This belt also is similar to the Nuggihalli schist belt. Both extrusive and intrusive suites are found. Titaniferous-vanadiferous magnetite bodies are absent. This schist belt is smaller in dimension and host only smaller bodies of chromite. Devaraju et al. opine that the primitive phase of ultramafics is represented by high Cr and Mg variants and the evolved phase by the Fe enriched meta- clino-pyroxenite with considerable gap between the emplacement of two phases.

    Even the dunite, peridotite, pyroxenites of the layered suite if plotted in Jensen or Viljoen and Violjoen diagram will show komatiitic chemistry for the rocks. Though the authors described high Mg, high Al, high Fe and high Cr ultramafic variants they have not discriminated them into tholeiitic or komatiitic suites from this area. Field characters like layering in chromite bearing dunites and pillow/nodular structures and spinifex texture (rare) in extrusive suite clearly brings out the two types of ultramafic suites in the area. In fact dunite, peridotite rocks of the layered suite as well as the peridotitic komatiite of the extrusive suite show higher Mg numbers. Since in pyroxenites MgO is comparatively low the Mg number also is reflected accordingly.
11. Our field observation has confirmed the presence of layered mafic-ultramafic suite with chromite bearing (dunite- peridotite- pyroxenite) intrusives with a characteristic tholeiitic affinity and an undoubted pillowed, nodular, ocellar perodotitic komattite suite co-existing in the same belt (rare spinifex texture also recorded at places). Nowhere the relationship with the intrusive and extrusive suites are clearly exposed though the two suites occur as enclaves within the PGC in close proximity at places like Shivani, Gijikatte and other localities.
12. The PGE incidence at Kaliengavi-Rangapura may be a feeble peripheral signal. Since the intrusive/ extrusive [representing mantle material and signifying "mantle witness" (Arndt, 1994)] ultramafic phases in early Archaean (Sargur ensemble) within the PGC are recorded from Nagamangala, Yediyur, Karighatta, Mayasandra, Banasandra, J.C.Pura, Haranahalli, Kalyadi, Antarghatta (present area), Kummanghatta, Ghattihosahalli areas with Nuggihalli and Holenarsipur belts towards southeast and south of the area, this important and significant geological milieu over an extensive area is to be test checked for PGE/Ni association, mineralisation with geophysical/geo-chemical exploration tools. Since sulphide bodies were located at Kalyadi and Aladahalli areas associated with similar suites a re-look or critical study may prove the source for Ni or PGE (Thermal erosion model of Huppert et al. 1984, 1985; Devapriyan et al. 1994).
13. In Karnataka and Goa mafic-ultramafic rocks of the intrusive type occur both in the Sargur as well as Dharwar milieu associated with dunite-peridotite-pyroxenite-anorthosite-gabbro-titanomagnetite association. In Shimoga (Taveregere-Masanikere-Magyathahalli), North Kanara (Kaiga-Mothimakki-Suryakaylanigudda) and in Goa (Usgaon) the mafic-ultramafics are associated and co-folded with the rock types of Dharwar Supergroup.

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We are thankful to Vidyadharan et al for evincing considerable interest in our above cited publication and offering many detailed comments

We have duly quoted the reference of the previous reports on the chromite'bearing ultramafic lenses of the area As one would note it that our emphasis is on the geochemistry and whatever data we obtained on PGE distribution and occurrence of PGM specially in the layered ultiamafic body near Rangapura We have faithfully described those field features which we were able to distinguish Having examined only a part of the large complex, it is possible that we have missed some of the distinctive features of extrusive phases in association It is true that the sizes of the ultramafic lenses in our map are exaggerated

We have noted that GSI has undertaken an overall mapping of the ultramafic complex lying to the southeast of Shimoga belt (to which they have given the name of Antharaghatta belt) and they have several observations indicative of association of intrusive and extrusive phases constituting the complex We look forward to their publications of the map of the entire complex and also description and discussion of the various additional data/observations mentioned by them We wish the GSI good luck in discovering commercially important PGE mineralization, if any, in this complex

We might also add here that we have generated a large amount of EPMA data for Fe-Cr oxides occurring at various locations of the complex We are coming up soon with a separate publication based exclusively on our study of Fe-Cr oxides in Hanumalapura, Rangapura and Nuggihalli ultramafites

References

ARNDT, N T (1994) Archaean Komatiites *In* K C Kondie (Ed) Archaean Crustal Evolution

DEVARAJU T C , ALAPEIETI T T and KAUKONEN, R J (2004) Geochemistry of ultramafic lenses in the granitoids of southeastern flanks of Shimoga Supracrustal belt (Karnataka) with a note on the distribution of Platinum group elements and minerals Jour Geol Soc India, v 63, pp 371-386

DEVAPRIYAN G V, ANATHARAMU, T R , VIDYADHARAN, K T and RAGHU NANDAN K R (1994) Spinifex textured peridotititic komatiite from Honnabetta area, Nagamangala Schist Belt, Karnataka Jour Geol Soc India, v 44, pp 483-493

GSI NEWS LETTER (2004) Archaean komatiite and layered intrusive ultramafic Complex from an older schist belt - special issue of GSI, SR News v 20(2), v 21(1), pp-95-96/iv

HUPPERT, H E , SPARKS, R S J , TURNER, J S and ARNDT, N T (1984) Emplacement and cooling of komatiite lavas Nature, v 309, pp 19-22, Reply, Nature (1985), v 313, pp 247-248

PARANTHAMAN, S and VIDYADHARAN, K T (2004) Archaean komatiite and intrusive ultramafic complex from an older schist belt north of Arsikere, western Dharwar Craton, Karnataka Abstract page-35 submitted to International Seminar on Earth Resources Management at Kuvempu University, Shimoga 28-30th January 2004

EVOLUTION OF THE GREAT BOUNDARY FAULT: A RE-EVALUATION

by A Rai Choudhuri and D.B. Guha, Jour. Geol. Soc India, v.64, 2004, pp 21-31.

Amit Sahay, Department of Earth Sciences, IIT Roorkee, Roorkee - 247 667, **Email:** amitsdes@iitr emet in, comments

I would like to offer the following comments and seek clarification from the authors of the above paper

Structural Discordance Between the Hindoli and Ranthambhor Groups

1 'Structural Analysis in the Hindoli Group is based on the assumption of cylindrical F_3 folding (Fig 6A) As the Stereoplots of F_3 axes/L_3 lineations display a wide scatter, 60° (N 7-67°) in the NE quadrant, and 33° (N 211-244°) in the SW quadrant, it is evident that the F_3 folds are non-cylindrical If so, the β axis shown in Fig 6A does not indicate the attitude of F_3 axis in subarea-2

2 Contrary to the interpretation that F_2 and F_3 folds are coaxial, the lineations/axes of these folds do not overlap (Fig 6A)

3 The correlation of F_3 folds in the Hindoli Group with FV_1 folds in the Ranthambhor Group, and the inference