NOTES

INTERNATIONAL SYMPOSIUM ON GRANULITE FACIES ROCKS

The Geologists Association of Tamil Nadu organised an International Symposium on Charnockite and Granulite Facies rocks at Madras (Chennai) from August 29 to September 2, 1996. It was intended to commemorate the centenary of the discovery of charnockites in St. Thomas Mount near Madras. The symposium was inaugurated by P.G. Cooray of Sri Lanka who presented in his address a historical review from the charnockite series to charnockitization. The major themes of the symposium included regional distribution, geomorphic and tectonic setting, mineralogy, petrography, metamorphic transformations, geophysical signature, geochemistry, fluid inclusions, isotope geology, genesis, regional correlation and metallogeny of charnockites and associated granulite facies rocks. Out of the 82 papers received 60 were presented. The symposium was well attended and there were15 foreign delegates from 7 countries.

During the hundred years that have elapsed since the discovery of charnockites by Thomas Holland, the concept has undergone a sea change in approach and understanding. Since the publication of Holland's (1900) classic memoir ninety six years ago on the charnockite series of Peninsular India, similar rocks have been discovered and described from many other parts of the world. The earlier view that charnockites were of igneous origin is not shared by many who favour the role of metamorphism in their formation at great depth under general dry condition from diverse assemblages of plutonic, volcanic and sedimentary rocks and the recent concept involving fluids rich in CO_2 in the formation of granulites has gained momentum providing a new line of research in the study of charnockites. However, doubts are surfacing in the last few years about the role of CO_2.

The symposium unfolded with the presentation of papers on the major theme of regional distribution, geomorphic and tectonic setting, mineralogy and petrography of charnockites and associated granulite facies rocks. The evolution, ages of metamorphism and exhumation of granulite blocks of southern India with special emphasis on the Late Archaean granulites (Janardhan) served as the inaugural presentation of the first session. The South African granulites received similar emphasis with a stress on the role of deep seated structure (Smit and Van Reeven).

The presentation on the tectonic evolution of granulites of Indian Shield covered the vast mosaic of diverse granulite occurrences of India (Ramakrishnan). The geology of Kollegal provided a link up of granulite occurrence of southern Karnataka with that of Tamil Nadu (Nagaraja Rao *et al*). The Eastern Gondwanaland presented a vast and complex granulite terrane (Yoshida). In northern India granulite facies of metamorphism and charnockitisation in the Delhi Supergroup provided signature of Proterozoic arc setting (Biswal). The southern Indian granulite terrane representing a major culmination zone is closely linked with the western and eastern tectonic zones of Karnataka with Eastern Ghat granulite belt forming an Antarctic rooted allocthonous unit and the granulite zone south of Achankovil shear representing Madagascar rooted block (Srikantia). Deformation history of granulite of south India brought out distinct structural and geodynamic factors (Srinivasan). Eastern Ghat belt received attention in two papers (Nanda and Pati; Augustine *et al*). The study of mineral assemblages in Chimakurti complex in Andhra brought out evidence of high grade metamorphism (Siva Kumar Babu).

The granulite occurrences in Chhotanagpur Gneissic Complex (Ghatak),

Chimalpahad complex of Andhra (Narasimha Reddy and Leelanadam) and Salem of Tamil Nadu (Chandrasekharan and Rajendran) received attention.

A two stage geochemical evolutionary model of the Eastern Ghat Mobile Belt was presented explaining the contrasting LILE geochemistry of different associations (Subbarao *et al*). Magmatic underplating as a process for the origin of granulites and large scale hybridisation of continental crust in South India was discussed (Jayanada *et al*). The duration of fluid-rock interaction and the role of fluids in metamorphic processes was demonstrated from Hida metamorphic belt (Wada). The Limpopo Belt of Africa provided an interesting example for metamorphic constraints on the tectonic significance of the North Limpopo Thrust Zone (Mkwell and Blenkinsop).

The theme of Geophysical signature of the granulites had few contributions. The extension of Pechenga volcanic sedimentary association and Lapland granulite belts into the Russian platform by geophysical data was presented (Mints *et al*). The charnockites from St. Thoms Mount have remanant magnetic direction (Poornachandra Rao and Mallikarjuna Rao) and a conjunctive investigation might help in utilizing the data.

The theme of geochemical studies on granulites including fluid inclusions invited many contributions. The geochemistry of anorthosites from Kadavur in the Tamil Nadu granulite terrain (Hussain *et al*), major and element geochemistry of the charnockites and gneisses of the South India granulite belt south of 12° N latitude (Ramachandran *et al*), fluid inclusions in gneisses and charnockites of the Plaghat Gap (Sukumaran *et al*), geochemical constraints and petrogenesis of charnockites from BGC of central Rajasthan (Gyani) were some of the interesting contributions. Chronology and some petrogenetic constraints in the evolution of charnockites was discussed (Sarkar) and isotopic composition and CO_2 abundance of granulite facies tonalites from Southern West Greenland (Kelly *et al*) provided a conjunctive theme.

An incipient charnockitisation was explained by the role of CO_2 fluids released from deep crustal rocks and transported to upper crustal level during shearing and uplift (Srikantappa).

Metallogeny of Tamil Nadu which is the chief granulite terrain of India also received some attention (Gopalakrishnan).

In the concluding session there was a general discussion on various aspects of charnockites and granulite rocks 1) Charnockite terminology: as a metamorphic rock should it have a formal name at all or the term should be restricted to only hypersthene granites, 2) Proper distinction of texture and structure in these granulite rocks, 3) P-T condition, 4) Recognition of the need of shear zones as conduits for fluid movement, 5) Nature of transition from granulites to amphibolites, 6) Need to define the Pan-African event: whether it is orogenic or anorogenic, 7) The role of magmatic underplating and crustal thickening, 8) Charnockites as windows for studying deep crustal processes, 9) Deformational processes at deep crustal level, 10) The role of deep crustal shears and 11) Metallogeny.

The curtain was drawn on this interesting symposium on the afternoon of September 2, 1996 with a validictory function presided over by Van Reenen of the Geology Department of Rand Afrikaans University, South Africa. He expressed that the South Indian granulite facies is a classic terrain in the world and the symposium provided the right focus. N.G.K. Murthy referred to the background of the symposium and R.N.K. Arogyaswamy on the role of pioneers.

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