

## BOOK REVIEW

**APPLIED GEOCHEMISTRY IN THE COMING DECADES**, Editors K. Surya Prakash Rao and V. Divakar Rao. Special Volume 4, No. 2A (2002), Journal of Applied Geochemistry, published in honour of Dr. S.M. Naqvi by the Indian Society of Applied Geochemists, Hyderabad, pp.77-426.

The Indian Society of Applied Geochemists, housed at Osmania University Hyderabad, is committed to the advancement of science of applied geochemistry by way of publications, conducting symposia, seminars and technical meetings. It organized an International Symposium on "Applied Geochemistry in the Coming Decades" between 10th and 12th August, 2001 and collated the proceedings in the form of a special volume of its flagship publication "Journal of Applied Geochemistry". The Society has brought out this volume in honor of an eminent scientist Dr. S. M. Naqvi on his 60th birthday. In a short foreword, Dr. V.P. Dimri draws attention towards Dr. Naqvi's original contribution to the Dharwar Craton and his role in developing an active school in geochemistry at NGRI that has found international recognition over the years. Dr. Naqvi's profile that follows the foreword presents a summary of his four-decade long journey in the rugged Precambrian terrain of South India and his enviable ability to impress scientists from all over the globe to study different aspects of Precambrian Geology through the rocks of Peninsular Indian shield. The enthusiasm of the scientists from India and abroad in contributing thirty-one papers to this volume reflects the respect and recognition Dr. Naqvi evokes among the earth science fraternity. The papers cover wide-ranging topics within the ambit of geochemistry. A succinct review of the papers in the volume is given here.

The tectonic development of Archaean greenstone belts that constitute the repository of the earth's major metalliferous deposits, is a subject matter of continued speculation among the geochemists. In a key-note address, R. Kerrich, D. Wyman, A. Polat and Y. Jia invoke a plume-arc interaction model for the evolution of greenstone belts. They have also suggested that the giant shear zone hosted lode gold deposits are formed along proto-arc, terrane-terrane accretion structures, VMS in proto-arc and back-arc extensional regimes and diamonds are precipitated from the reactions of carbonatitic liquid with peridotite-type and eclogite-type cratonic lithospheric mantle. Santosh Kumar, using calculated differentiation trends, has explained that the fractional crystallization was a dominant process in the

evolution of tholeiitic and alkaline series of Phenai Mata Igneous Complex. There are three papers on mineral-specific studies. G. Parthasarathy and T.N. Gowd have evaluated the structural, thermal and electrical resistivity of cummingtonites from Kola Super Deep Borehole (KSDB) and Kudremukh area. They conclude that the cummingtonites of KSDB has P2, /m space group which is different from C2/m of surface samples (from Kudremukh area). The IR band intensity reversals in tremolites are the subject matter of a paper by L.P.Sarma, P.S.R. Prasad and T.N. Gowd. On the basis of the XRD and DTA studies on graphite samples from Schirmacher Oasis, East Antarctica, G. Parthasarathy, S.R.Sharma and S.M.Hussain infer a peak metamorphic temperature of ~ 700°C in this area. Based on palaeomagnetic studies, G.V.S. Poornachandra Rao, P. Kataria, A.B. Roy and K. Jaya Prasanna Lakshmi deduce an Upper Cretaceous age to Amet komatiites of Rajasthan. Two contributions discuss geochemistry of granitoids, one on Bundelkhand granitoids by M.E.A. Mondal and the other on Pudukottai granite of Tamil Nadu by M. V. Subba Rao, G.L.N. Reddy and V. Divakara Rao. The former study suggests the source of the granitic melt to be contaminated basaltic crust whereas the latter one envisages melting of felsic assemblages at lower crustal level and subsequent emplacement in an extensional regime. The geochemistry of supracrustals is addressed in two papers. M. Raza, M.S. Azam and M.S. Khan have studied the geochemistry of Khetri amphibolites and favour continental lithosphere over a subduction zone as source for their protoliths and ensialic rift basin in a back arc setting as the environment for their emplacement. K.S. Mishra favors euxenic marine environment along an active continental margin/arc setting for the deposition of carbonaceous metasediments from Dalma metavolcanic belt.

The volume includes four papers on the geochemistry of oceanic materials. The paper by H. Joao and A.L. Paropkari addresses geochemistry and mineral resources of oceans, A.K. Das presents the case of metal speciation in marine water and sediment samples, S.M. Ahmad, V.M. Padmakumari, A.M. Dayal and G.A. Babu have presented seawater  $^{87}\text{Sr}/^{86}\text{Sr}$  record for Miocene

and VM Padmakuman and S M Ahmad gives details of Sr and Nd isotopes in Miocene sediments. The latter two studies are from Ocean Drilling Programme site 758A in the eastern Indian Ocean. The Multivariate Discriminant Analysis of chemical data on carbonates from Precambrian, Jurassic and Pleistocene has helped K Mahender to devise a statistical classificatory technique. There are two papers that deal with the issue of immediate societal importance. The pedogeochemistry. According to M Satyanarayana and P Penakah, the profile development around Salem magnesite mine is controlled by sub-tropical climate, relative humidity, limited precipitation, latensisation and chemical leaching. The other paper on pedogeochemistry by P Raja, D B Malpe, S G Anantwar, PM Tapaswi and M Velayutham address some aspects of soil development in Purna Valley, Maharashtra. T M Mahadevan in his paper on 'Lithosphere-mantle interaction, continental growth and metallogeny' calls for networking between geology, deep geophysics, geochemistry and geochronology that would revolutionize modelling of lithosphere and mantle evolution and the current concepts of metallogeny.

The section on mineral exploration begins with an overview on 'Mineral exploration into the new millennium' by R P Viljoen. He addresses subjects like (i) historical aspects of metal and mineral mining and extraction (ii) modern exploration programmes, (iii) philosophical aspects and driving forces behind mineral exploration and (iv) importance of geological models for the success of exploration programmes. There are four papers that deal with geochemical, genetic, exploration and exploitation aspects of gold metallogeny. These include paper on gold in (i) Ajjanhalli BIF by S M Hussain, S M Naqvi, K T Ramachandra and R H Sawkar, (ii) in volcano sedimentary sequence of Gadag area by A G Ugarkar and (iii) in granites of Upparlappalle area, A P by K Sreeramachandra Rao and Santanu Bhattacharjee. R H Sawkar and D Srinivasa Sarma have presented a succinct account of exploratory mining, pilot plant studies and design of open pit mines and scale of operations with special reference to BIF hosted gold in Karnataka. K L Rai has discussed applied geochemistry in relation to exploration, mining, milling and environment at and around the copper deposit of Malankhand porphyry copper deposit. S K Verma, K Hemant, M Prashanthi and H V Rambabu have presented details of magnetic and electro-magnetic exploration for diamonds in India. Genetic

and exploration aspects of chrysoberyl from Eastern Ghats by A Bhaskar Rao, V Divakara Rao and C Kasipathi and trace elements as a tool in gemological exploration by A Bhaskara Rao and M S Adusumil are the subject matters of two papers. A V Chugave, YG Safonov and IV Chernyshev have presented new Rb-Sr, Sm-Nd and K-Ar ages from Kolar gold deposits. They have dated scheelite from the ore bodies at  $2440 \pm 120$  Ma by Sm-Nd isochron, muscovite and biotite at 2.1 - 2.3 Ga by Rb-Sr and K-Ar methods. The new isotopic data suggests a prolonged evolutionary history for gold mineralisation at KGF. They infer a late stage recrystallisation and re-deposition of ore and gangue minerals. Tnlok Chand and A K Sethu Madhavan have presented statistical approach to utilize source rock data as input in genetic modelling for quantification of hydrocarbons generation, migration and entrapment. They have concluded that the Mackenzie-Quigley model of prospect appraisal gave more realistic results than the Peter Clay-poor model. The dendrogram method of averaging is the best method to handle the heterogeneity of source rock data in comparison to simulation, coefficient of skewness and arithmetic mean methods. There are three papers on instrumentation techniques in this volume. A brief review on the latest advances in ICP technology is given by P S Jain. The paper by K Chandra Sekhar, C T Kama!a, K Rajni Supnya and MRP Reddy presents analytical assessment of two sequential extraction schemes for speciation of heavy metals in soils. C R M Rao has provided the analytical details of determination of trace metals in sea-water by GF-AAS method.

The volume is well printed with a large number of useful illustrations of good standard. A glaring shortfall, however, is the lack of thematic organization of papers in this volume, for example, two papers on sea-water are interspersed with a paper on pedogeochemistry. The two best things of the volume are (i) large mass of new data and (ii) several new concepts in the field of applied geochemistry that address problems pertaining to crustal evolution and metallogeny. The book would be a useful addition to earth science libraries and would be welcomed by all earth scientists interested in this subject.

*AMSE Wing  
Geological Survey of India  
Bangalore*

FAREEDUDDIN