Management (official Jour of the South Asian Association of Economic Geologists), v 2, pp 139-144

DEVARAJU, T C , ALAPIETI, T T , KAUKONEN, R J and SUDHAKARA, T L (2007a) Chemistry of Cr-spinels from ultramafic complexes of Western Dharwar Craton and its petrogenetic implications Jour Geol Soc India, v 69, pp 1161-1175

DEVARAJU, T C , ALAPIETI, T T , KAUKONEN, R J and SUDHAKARA, T L (2007d) Petrological and PGE mineralization study of the Channagiri mafic-ultramafic complex, Shimoga supra-crustal belt, Karnataka Jour Geol Soc India, v 70, pp 535-556

ALAPIETI, T T , DEVARAJU, T C and KAUKONEN, R J (2008) PGE mineralization in the late Archaean iron-rich mafic-ultramafic Hanumalapur Complex, Karnataka, India Mineral Petrol , v 92, pp 99-128

NATIONAL FIELD WORKSHOP IN THE NEOGENE SUCCESSION OF MIZORAM by R.P. Tiwari

A National Field Workshop on the Neogene Succession of Mizoram was organised during November 1–3, 2007 in order to highlight the importance that this sedimentary succession holds in the context of India-Myanmar collision This was sponsored by the ESS Division of the Department of Science & Technology, Govt of India, New Delhi The target of the workshop was marine to continental succession (Surma - Tipam Group rocks) excellently preserved and exposed in Mizoram This sedimentary succession was deposited in response to the Indo-Myanmar collision and subsequent withdrawal of the sea Consequently, it holds a great potential for information on various aspects of collision such as biotic, sedimentologic, geochemical, tectonic, palaeoclimatic, orographic, sea level changes, etc This information needs to be recorded and interpreted in terms of geodynamic modelling Coordinated by Prof R P Tiwari of Mizoram University, this field workshop was basically held with the aim of letting the earth scientists of the country appreciate the academic and economic importance potentiality of the succession and help evolve integrated research programmes to address the above referred issues

The workshop was spread over 3 days of field work There were on-the-spot interactions and discussions in the field followed by detailed discussions in the evening at the venue There was no formal presentation excepting the one by Prof I B Singh on the topic "Sedimentation dynamics in the Delta System" Participants freely shared their ideas and observations in the field as well as in the discussion meetings that followed the day's field work Some of the best preserved and excellently exposed sections in the area were shown to the participants These sections fall in the Aizawl and Kolasib districts of Mizoram

Since the objective of the workshop was to study the multidisciplinary aspects of the earth science viz , stratigraphy, palaeontology, magnetostratigraphy, sedimentology, geochemistry, palynology, coal geology, isotope geology and structural and tectonic aspects of the Surma -Tipam sequence of Mizoram, twenty-two earth scientists specializing in the above sub-disciplines of geology were invited and all participated in the workshop A few specialists who have spent several years working in the Neogene succession of the Northeastern India region and elsewhere were especially invited as resource persons for the benefit of the participants in the field These included Prof Ashok Sahni of Panjab University Prof I B Singh and Prof A K Jauhri of University of Lucknow, Prof P K Saraswati of IIT Powai, Prof R P Kachhara of Nagaland University, Prof S J Sangode of University of Pune and Prof S Bardhan of Jadavpur University Dr U K Sharma represented the DST All experts and participants freely shared their observations, knowledge and experience during the field workshop, i e both in the field as well as during discussion each evening Some participants also showed keen interest in formulating the project proposals for funding by the DST

STRUCTURE AND RHEOLOGY OF THE LITHOSPHERE by M. Jayananda

An excellent review of recent developments over last decade on structure, rheology and evolution of lithosphere that contributes to our understanding of geological histories of oceans, ancient shields and young orogenic belts is provided by Jackson et al (2008) in Journal of Geological Society of London, v 165, pp 453-465 The paper is timely and is of great interest to researchers working on structure, dynamics and evolutions of lithosphere particularly on the seismicity in young orogens and ancient continental shield areas A wide range of observations from great diversity of geological, geophysical and geochemical disciplines are reviewed and provide a consistent and coherent picture This synthesis starts with discovery of plate tectonics in 1960's followed by various models based on structure of lithosphere, earthquake depth distribution and ability of the lithosphere to support loads Two models including 'Jelly Sandwich Model' that envisage a weak lower crust sandwiched between a relatively strong upper crust and strong upper mantle and more recent view of long term strength of the continental lithosphere contained wholly within crust

The paper discusses various models of seismicity of the Himalayan collision zone, which has always been a focus of debate on continental rheology It has been shown that earthquakes as deep as 80-90 km occur beneath parts of southern and NW Tibet, where seismicity is otherwise confined to the top 10-15 km of crust This vertical distribution of seismicity in Himalayas typify the bimodal 'Jelly Sandwich Model' More recent view suggests that the distribution of earthquakes throughout the region is consistent with generic global view of seismicity in which earthquakes occur in (a) 'wet' upper crustal material to a temperature of 350°C or (b) at high temperatures in dry granulite facies lower crust or (c) in mantle that is colder than c 600°C

The authors also discuss metastability, metamorphism and cratonization of young orogenic belts particularly in the context of Himalayan collision zone Granulite, if completely dry, can exist metastably at pressures and a temperature well beyond its normal stability limit, remains strong and retains original fabrics for hundreds of millions of years, and deforms, if at all by brittle fracture in earthquakes Water if present has dramatic effect, acting as a catalyst that allows the transformation to eclogite, accompanied by ductile deformation that removes all original fabrics The importance of these processes for the Himalayas is summarized as the foreland of India is strong and seismogenic throughout the crust as it is likely to consist of dry granulite It remains as metastable granulite beneath the 80-90 km thick root zone of the high Himalaya and southern Tibet and is responsible for the support of that elevation Further, the authors emphasize that strong lower crust of peninsular India underthrusting the Himalaya is responsible for supporting Himalayas and rheology of its underlying mantle is unimportant

Authors discuss cratonisation of young orogenic belts and should prove to be of special interest to those studying parts of the Indian lithosphere

CONJUNCTIVE USE OF SURFACE WATER AND GROUNDWATER – STATE OF ART* by S. Das

Surface water and groundwater are two phases of the hydrological cycle Development of either in isolation leads to imbalance, triggering environmental and ecological disaster So far the major and medium surface water irrigation projects in the country have not envisaged groundwater utilization Indiscriminate use of canal waters, canal seepage, return flows of irrigation together with cultivation of water loving crops, flat topography with poor drainage conditions have left large tracts in canal commands water logged with rising water table due to excessive recharge, and loss of soil fertility due to soil salinisation Paradoxically tail ends suffer from inadequacy of canal waters, resulting in overdraft of groundwater with falling water level Nearly 5 8 million hectare areas in the country are reportedly suffering from both water logging and soil salinity or alkalinity It is through management of water table or arresting its rise that the problem of water logging or soil salinity may be controlled

For optimal production, crops need requisite quantity of water at critical stages of growth But surface water supplies are often inadequate during the peak requirement Conjunctive use of surface water and groundwater not only serves as remedial measure for water logging and soil salinity, but also allows optimal use of total water resources, higher flexibility in supplies from stream flows in combination with groundwater pumpage, mixing of different quality waters to reduce salinity, and effects savings in evaporation losses from surface reservoirs, reduction in capital investments and operational expenditures, as also controls overdraft situation

Central Ground Water Board has undertaken Pilot project studies on conjunctive use in Hirakud command in Orissa, which has a cultural command area of 1, 57,018 hectares and irrigation intensity of 170% The latter was initially envisaged as 148% The average annual rainfall is 1169 2 mm The area is mainly underlain by weathered and fractured granite gneisses Detailed hydrogeological surveys, monthly groundwater monitoring, and exploratory drilling, aided by remote sensing studies and geophysical surveys, revealed that groundwater occurs under water table condition in near-surface weathered zone and circulates through underlying fractures and fissures Three to four water saturated fracture zones are encountered in boreholes within a depth of 100 meters Water logging condition (depth to water < 2 meters from surface) prevails in an area of 163 square kilometers during pre- monsoon (May 1994) and 7264 square kilometers during post monsoon periods (November 1994) The envisaged cropping pattern in the project included paddy cultivation of 68% in kharif and 30% in rabi seasons, which to the contrary is practiced as 98% and 68% respectively, leading to over use of canal water and excessive recharge to groundwater The crop yield of around 20 quintals per hectare in this irrigation command is far below all India average due to mainly lack of water management and water logging The discharge and specific capacity of dug wells ranged from 4-11 LPS and 0 012 – 0 041m^3/min/m respectively The yields of borewells and cumulative transmissivity of fractured rocks are in the range of 5-10 LPS and 9-134 m^2/day respectively

The utilizable groundwater resources in the kharif season were estimated as 508 million cubic meters (MCM) and in rabi season as 764 MCM, following methodology of GEC97 Monthly availability of groundwater resources, computed from well hydrographs included dynamic, potential and static resources available within a depth of 5 meters In order

* *Karanth Endowment Lecture delivered on 28th December 2007 at the Geological Society of India, Bangalore*