data across various mobile belts in India and their integration with other geophysical and geological data, signatures of Archaean-Pro terozoic collision was identified and their role on evolution of various cratons and their structures were highlighted

In group (in), three presentations were made highlighting role of satellite altimetry for marine gravity Sea floor spreading magnetic anomalies *m* conjugate Arabian and Somali basins, were identified and stages of ridge propagation and formation of oceanic crust during magnetic chrone 28-21 (62 5 Ma- 48 Ma) was provided A combined crustal section computed along 17th parallel across Arabian Sea, Indian continent and Bay of Bengal is presented based on free air anomaly in oceans from satellite altimetry and Bouguer anomaly over the continent to highlight the differences in ciustal structures under these three distinct units Structure and evolution of continental margins of India and 90 East Ridge were also discussed

In group (IV), five presentations were made related to density and magnetic structuies along selected profiles across Himalayas and rheology of Himalayas and Peninsular Shield including effective elastic thickness and thickness of hthosphere and their significance to geodynamics Seismotectonics related to Bhuj earthquake of January 26, 2001 and changes in elevation and gravity field before and after this earthquake and causative fault model computed from them was piesented and discussed As gravity field is intrinsically related to geology and tectonics of an area, an overview of geology and tectonics of Peninsular shield with special reference to mafic and ultramafic volcanic rocks of greenstone belts of Dharwar craton and western Himalaya were presented

In the last gioup (v), nine presentations were made highlighting the role of gravity method for hydrocarbon and mineral exploration Role of isostasy and modern approaches to Regional-Residual separation were also discussed in this session Participants from ONGC discussed the role of gravity surveys for exploration of hydrocarbons in Himalayan fold belts (western part) They suggested that it is one of the most viable geophysical method which can be used in these regions Participants from GSI projected the role of gravity surveys in mineral exploration and presented some case histories where it has been successfully applied NGRI gravity group presented the results of their investigation for hydrocarbon exploration in Saurashtra and Kutch They also suggested a low density body in upper mantle under eastern Saurashtra and Cambay basin based on regional gravity field separated from the observed Bouguer anomaly in these regions In the end, future programs and collaborations between different geo-scientific organizations were discussed in a Panel Discussion It was suggested that as NGRI and GSI collaborate to bring out a levised Bouguer anomaly map of the country and more such collaborative ventures between different organizations should be taken up Collaboration between Universities and National Institutes was suggested by several participants to help the continuity of research programs in Universities Participants from ONGC and NGRI agreed to formulate a collaborative program of hydrocarbon exploration in frontal basins of Himalayan fold belts

The workshop coincided with the superannuation of Dr D C Mishra, who was felicitated by his students and colleagues

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NATIONAL SEMINAR ON COAL SCIENCE AND TECHNOLOGY - VISION 2020

The National Seminar was organized at C FR I, Dhanbad on 20th and 21st April, 2003, as a part of the CSIR Diamond Jubilee celebrations This note highlights and summarises the scientific presentations at the Seminar brought out as an abstracts volume

The list of papers for presentation has been classified and grouped into five Technical Sessions 1A Exploration - Coal IB Exploration - Coal Bed Methane IIA Coal Petrology - Basic Coal Petrology and Applied Coal Petrology, IIB Coal Characterisation IQ CoalBeneficiation, IV Environmental Issues and Waste Management VA Carbonization and Carbon Artifacts, and VB Combustion, Gasification and Conveision

A total of 100 papers including invited papers weie abstracted They emanated from vanous governmental organisations, public and private sector undertakings, Natioanl Laboratories, Academic Institutions dealing with coal science and technology

Vanous aspects for developing Coal Bed Methane

(CBM) resources have been brought out. Jharia, East Bokaro, Raniganj and North Karanpura basins are regarded to be the most potential areas (S.K.Acharyya). Slim hole drilling undertaken in Jharia, Raniganj and Banner basins indicated the quantity of gas in each coal seam and the effective yield of CBM (V.K.S. Visen et a!.). The conversion of methane to value added chemicals have been examined (K.K.Tiwari et al.). The CBM potential in the northern part of Cambay basin has been reported (V.A. Mendhe et al.). The status of development of CBM in the country in the background of global scenario has been attempted (B.C. Bhattacharya et al.). In Sohagpur basin, no distinctive stratigraphic variation in ash content between the coal seams has been considered, thereby suggesting that, during the Lower Permian, similarity existed in depositional setting of the various coal seams (U. Chakrabarti et al.). In the Talchir coalfield, geometry and compositional variations of coal seams, based on proximate data has been presented (R.N. Hota et al.). Studies on the coal from Langrin coalfield have indicated utility of coal in various industries and a medium-sized coal-based refinery has been suggested at Borsora (M.N. Dutta). Besides these, there were papers on the various other aspects including spontaneous combustion of coal during storage, environmental aspects of coal mine fires, and evaluation of hydraulic fluids used in coal mining industry to avoid fire hazard in underground coal mines.

Coal Petrology having commenced in detailed and systematic studies of the Permian, Cretaceous, and Tertiary coals and of Tertiary lignites, regularly, since 1951, is now in the waning phase with shrunken job opportunities. Data has accumulated on petrographic compositions, vitrinite oil reflectance and fluorescence properties of various solid fuels of the country and has been successfully applied in seam correlation, by petrographic profiles and trace element geochemistry, estimation of palaeodepth and palaeotemperature, as well as cover loss, UCG, CBM, coking and industry (H.S. Pareek). Application of coal petrography in research and industry was highlighted (S.G. Chaudhuri). The coals of North Karanpura coalfield were studied for their vitrinite reflectance, maceral and microlithotype proportions, their utilization potentialities delineated in metallurgical industry and in combustion (J. Maitra et al.). Petrographic constitution of lb-Valley (Sonali Guha et al.) and Talcher (Alok K. Singh et al.) coals were described, and trace elements in lithotypes of Talcher coal (J.K. Mohanty et al.), as also mineral spectrum (S.K. Misra et al.) and trace element affinities of lb-Valley coals (Sonali Guha et al.) reported. Petrography of the Tertiary coals of Makum (R.K Sarmah et al.) and West Daranggiri (S.Phukan et al.), and trace elements in Makum coals (S.Mukherjee et al.) have been brought out. Density measurement by nitrogen and helium for coal and lignite were discussed (S. Saha et al.). Studies on liptinite macerals in coals and lignites helped in ascertaining their prospects in industrial utilization (B.K. Misra et al.). PIA system has proved advantageous for rapid results through automation (H.K. Mishra et al.). FTIR spectroscopy of coals has highlighted valuable information on Indian coals (Raja Sen et al.).

Combustion efficiency is described to decrease with increase in rank (Atul Kumar Varma et al.). Combustion behaviour of the coals using petrographic and thermo-analytical parameters has been evaluated (P. Sarkar et al.). Relationship of microlithotypes of coal and chars produced was established (NanditaChoudhury et al.). Coke formation from blended coal has been discussed (N.K. Ghosh et al.). A new microstructural classification system for natural cokes of Jharia and its future industrial utilization has been devised (Ashok K. Singh et al.).

The use of coal with ash < 34 % for power plants, has been mandated and therefore suggested to be reviewed making coal companies responsible to prepare their product within quality parameters (R.K. Sachdev). Use of high ash coal by power plants leads to fly ash generation, amongst other problems, and beneficiation is the only solution (S.K. Sen et al.). To yield high quality clean coal, the use of advanced techniques for utilizing non-coking coals in metallurgical industries and beneficiation is highlighted (V.N. Misra et al). An Optical Image Processing system for coal petrography was suggested (A. Ghosh). Beneficiation by dry techniques (P.S.R. Reddy et al.), and wet grinding (P.C. Borthakur et al.), flocculation studies on coal washery waste water (L. Besra et al.), flotation characteristics of a coking coal (Md. Zahid Ahmad et al.), non coking coal fines (S.K. Biswal et al.), non coking coal (B. Das et al.), beneficiation of non-coking coals for ash levels of 34% (S.V. Bagal et al.), and desulphurisation of high sulphur oxidized coal (P. Gogoi) were presented

Impact assessment of coal quality for clean power generation highlights networking of concerned labs, of CSIR to accomplish the task of assuring coal quality and reduction in ash levels (Kalyan Sen et al.).

Papers on wetlands for reducing pollution load (P.K.Mishra), clean coal, technology initiatives (Malti Goel), fire problem of the Jharia coalfield, in particular (T.N. Singh), environment and coal mining activity

(P.K. Singh et al.) and several other contributions by C.F.R.I. and C.M.R.L, were presented.

Papers on role of GAC in water treatment and industrial streams (G.S. Natarajan), source material used for the preparation GAC, having significant effect on pore structure and adsorption capacity (Shripal Singh et al.), and removal of metal ions with GAC (D. Satapathy et al.) were discussed. Impact of coal composition on combustion and gasification processes (D.N Reddy et al.), LTC of Meghalaya coal (S. Phukan et al.) and of Bapung coal for conversion to petroleum oil, due to high hydrogen content (M. Nath), briquettes of Myanmar lignite (P.N. Sinha et al.) proved interesting contributions. S.C.I, method was devised instead of CI (A.K. Sharma et al.). Increase of carbonisation time resulting in improvement of coking characteristics (K.K. Singh et al.) and other several contributions on diverse aspects were presented.

COAL 2003, thus presented the achievements in work on coal science studies undertaken on various aspects during the past half a century, besides approaches currently in vogue. The Abstracts Volume brought out will be referred to in India and abroad for all the recent developments in Indian Coal Science and Technology. It is hoped that the full text of all the papers will be compiled into a benchmark volume befitting the multidisciplinary data presented at the Seminar. Dr. Kalyan Sen, Director, CFRI deserves full credit for his vigorous organizing calibre, coupled with managerial competence to have so successfully conglomerated together, for the first time, in the country, geologists, geochemists, geophysicist, chemists, engineers, metallurgists, drilling engineers, academicians, manufacturing company representatives and industry magnates, and made the deliberations meaningful and purposeful.

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IMAGE ANALYSIS SYSTEM (IAS) ATTACHED TO A POLARISING MICROSCOPE

Image Analysis Systems (IAS), attached to a high-resolution transmitted and reflected light polarising microscope have been in vogue for some time now but its potential has not been fully utilised in petromineralogical, sedimentological and related studies. IAS comprises essentially hardware consisting of a lens (1/2" or 3/4") that is to be put at the trinocular eyepiece of the microscope, image capturing facility connected to a CCTV monitor, PC and printer, and software, required for different applications. As this lens gives only 15-20% of the microscopic field of view on to the monitor, a C-mount lens system is to be placed in between the above lens and trinocular eyepiece so as to get nearly complete field of view on to the monitor. Notable applications of IAS, attached to a microscope, and their relative advantages over the conventional modes are briefly outline below.

Petrography

Textures and structures of rocks and ores can be photographed and printed on an ordinary or quality paper for better contrast with a high-resolution printer. The system has the additional facility of editing a picture for better contrast of features, sharpness, zooming, indexing and putting bar-scale (see 'coloured photomicrographs in the paper by Dhana Raju et *alJGSl*, v.59(4), pp.299-321,2002). This mode of taking photographs dispenses with time-consuming, cumbersome, multi-stage, costly and unsure procedure using a camera as attachment to microscope, taking photographs either on a negative or diapositive film, its development-printing and cartographic work on photoprints for indexing and putting bar-scale. Furthermore, in the camera-mode it is rather difficult to get always the true colour of ore and gangue minerals, whereas this is not so with IAS.

Determination of 'Mode'

Modal composition (in vol.%) of a rock, ore or other geological material in a thin/polished-thin section or polished slab can be determined, taking advantage of the differences in the grey levels of constituent minerals. In case the grey levels of two or more minerals like quartz and feldspars are very close, there is a possibility that IAS may not be able to differentiate them resulting in counting them as one mineral. To obviate this, sufficient care is to be taken to make the system understand the conspicuous differences of such minerals by resorting to features like shape, relief, alteration, cleavage, interference colours and by giving even false colours using software to differentiate minerals. The modal