NEWS AND VIEWS
National Seminar on
Applied Geochemistry in Marine Sciences: Current and Future Trends and
Annual General Body Meeting (AGM) of Indian Society of Applied Geochemists (ISAG), Hyderabad
24-25 February 2010

National Seminar on “Applied Chemistry in Marine Sciences: Current and Future Trends” and Annual General Body Meeting: 2010, Indian Society of Applied Geochemists (ISAG) have been organised in the Department of Ocean Studies and Marine Biology, Pondicherry University, Brookshabad Campus, Port Blair during 24-25 February 2010.

The National Seminar was inaugurated by Dr. M. Sudhakar, Advisor, Ministry of Earth Sciences, New Delhi.

Inaugural Session. L to R: Dr. T. R. P. Singh, Dr. M. Sudhakar, Dr. K. K. Dwivedy, Prof. K. Surya Prakash Rao and Prof. P. M. Mohan

One hundred and twenty eight scientists, research scholars and students from different national organizations and academic institutions from local and mainland India have participated in the events. Twenty one research articles and five invited lectures were presented in relation with marine chemical science research.

Further, Dr. M. Sudhakar, Advisor, Ministry of Earth Sciences, gave keynote address on “Marine Mineral Resources of International Seabed Area: Current Trends and Legal Regime” and requested the young researchers and students of marine sciences to take up their carrier on deep sea studies and in particular marine chemistry, which is essential to develop future development on resources and energy need of the mankind.
Dr. K. Umamaheswar from the Atomic Mineral Division, delivered an invited talk on “Seawater as a secondary resource for Uranium: a Review” which enlightened the audience on the possible methodology for the extraction of Uranium from seawater and its economics for our future utilization.

Prof. P. Seralathan, Department of Marine Geology and Geophysics, Cochin University of Science and Technology dealt with how interstitial waters play an important role in regulating the interaction between overlying waters and sediments.

Prof. C. Unnikrishnan Warrier, Centre for Water Resources Development and Management, Kozhikode, presented the results of his four year (2005-2008) study on isotopic composition of precipitation from two locations across Southern India, namely Kozhikode (Kerala) and Hyderabad (Andhra Pradesh).

Dr. N. Ramanujam from Pondicherry University discussed the carbonate mineralization in corals with reference to the chemistry of sea water.

Ms. P. Dhivya, Department of Ocean Studies and Marine Biology discussed the Meiofaunal relationship and its distribution with the organic carbon and carbonate concentration in the marine sediments.

Dr. P. M. Mohan, Department of Ocean Studies and Marine Biology elucidated the physico-chemical characters of the Andaman open sea environment and its cyclic variation with its distribution.

Ms. Mehmuna Begum, scientist from National Institute of Ocean Technology, Port Blair explained the distribution of physico-chemical and biological aspects of seawater in and around Car Nicobar islands.

Mr. P. Ragavan reported the dissolved organic carbon variation and its characterization in the deep waters of Bay of Bengal and Andaman Sea around Nicobar Group of islands.

Lead and Zinc geochemistry in the inner shelf off Tuticorin was discussed by Dr. V. Ram Mohan, Madras University.

Dr. S. Srinivasalu, Anna University explained the shallow water records of Tsunami 2004 in the southern part of Indian coast.

During the Annual General Body Meeting too, a number of delegates made presentations in Applied Geochemistry.

Dr. V. Balaram discussed the Platinum Group of Elements (PGE) resources in ocean sediments and its process for the recovery. He also stated that the future resource generation of these elements mainly falls in the ocean and the newer and better technology has to be developed by the budding scientists for progress in this scientific arena.

Dr. Ajit C. Kapadia, Vice-President, energy consultant gave an invited talk on “Roadmap to energy security for India – One possible solution” which enlightened the status of the nation on the energy and how this can be achieved by the different non-renewable ways and energy conservations.

Dr. D. V. N. S. Murthy, Dr. N. V. Chalapathi Rao, Dr. K. Satyanarayana and Sri. Syed Zakaulla presented the award winning lectures on gold mineralization, Kimberlite, major, minor and trace elements in nuclear uranium oxide and uranium exploration in Cuddapah, respectively.
Dr. D. V. N. S. Murthy, Dr. N. V. Chalapathi Rao, Dr. K. Satyanarayana and Sri. Syed Zakaulla received medals for their excellent work in their respective fields.

The ISAG honoured Prof. G. Victor Rajamanickam, Dr. M. Sudhakar, the Chief Guest, Dr. K. Umamaheswar, Additional Director, Atomic Minerals Directorate for Exploration and Research (AMD), Dr. T.R.P. Singh, Guest of honour and the Conveners of National Seminar and AGM-2010 Professors P. M. Mohan and K. Surya Prakash Rao.

The following resolutions were passed during the concluding session:

1. The marine chemical studies have to get face lift for future development.
2. More manpower should be generated.
3. The coastal Universities and Institutes should be augmented with more sophisticated equipment on marine chemical study and people should be trained tirelessly to handle these equipment.

The Organising Committee thanked The Ministry of Earth Sciences (MoES), Department of Science and Technology (DST), Council of Scientific and Industrial Research (CSIR) and Pondicherry University for sponsoring the event. Thus the mega event, the first of its kind, held in Port Blair, Andaman successfully concluded.

Dr. V. Balaram, Scientist-G National Geophysical Research Institute (NGRI), proposed the vote of thanks.

Prof. K. Surya Prakash Rao
ISAG, Hyderabad
The Annual General Body Meetings (AGMs) for 12 years have been sponsored by various national earth science organizations including National Institute of Oceanography (NIO), Wadia Institute of Himalayan Geology (WIHG), Geological Survey of India (GSI) (WR), University of Madras, University of Mysore and others and for the third time an academic institution, the Pondicherry University, Port Blair came forward to sponsor the AGM-2010. This is a good sign indicating that the Society is getting due recognition from the earth science community.

In the 13th AGM, a two day National Seminar was held on “Applied Geochemistry in Marine Sciences: Current and Future Trends”. As many as sixty speakers from different organizations participated in the fruitful deliberations. It was heartening that almost all earth science students, research scholars, teachers and delegates from related fields from the Pondicherry University and other Universities and neighbouring states took part in the two day proceedings and AGM-2010. Other Universities have shown interest to sponsor the future AGMs.

Dr. M. Sudhakar, Advisor, Ministry of Earth Sciences (MoES), New Delhi inaugurated the National Seminar. Dr. K. K. Dwivedy, President, ISAG presided over the function.

The Pondicherry University, Indian Society of Applied Geochemists (ISAG), Ministry of Earth Sciences (MoES) and others have sponsored the National Workshop. The following items were discussed and resolutions were passed unanimously.

**AGM AGENDA**

3. Adoption of Annual Report and Accounts.
4. Presentation of Awards.
6. Invited lecture by the Chief Guest.
7. Any other matter with permission of the Chair.
   Vote of Thanks

**SECRETARY’S REPORT: 2008-2009**

It gives me great pleasure in presenting the thirteenth Annual Report and Financial Statement of ISAG for the year ending 31 March 2009.

On behalf of the Executive Council (EC) and my own self, I welcome you all to this Annual General Body Meeting-2010, being held at this centre situated in this beautiful historic city of Port Blair.

Freedom fighters deported from the mainland India were kept in inhuman conditions in the Cellular Jail, Andaman. Few famous freedom fighters of Cellular Jail to quote were Dr. Diwan Singh Kalepani, Maulana

In March 1868, 238 prisoners tried to escape but were caught by the security personnel. One of them committed suicide and of the remainder 87 were hanged as ordered by then Superintendent Walker. We are enjoying the fruits of their sacrifices.

The ISAG is extremely happy to organize this the National Seminar and AGM-2010 in this sacred place.

We have been organizing the AGMs’ successfully at different places in India, thanks to the Indian earth science organizations and academic institutions sponsoring these fruitful and memorable events. This AGM off the mainland India is the first of its kind and occupies a special place in the short history of the ISAG. This credit goes to the Pondicherry University and to Prof. J.A.K. Tareen and particularly Prof. P.M. Mohan.

In the past, AGMs were hosted, rather traditionally, by earth science organisations like NIO (Goa), WIHG (Dehradun), GSI (Jaipur) etc. The first academic institution to sponsor the AGM-2008 was Centre for Natural Hazards and Disaster Studies, University of Madras, Chennai, followed by the Department of Studies in Geology, University of Mysore. And now, it is the turn of Department of Ocean Studies and Marine Biology (DoOSMB), Pondicherry University, to host the AGM.

The AGMs have been clubbed with a one day Workshop, either sponsored or conducted by the ISAG, as an indelible academic mark of AGMs. Furthermore, it popularizes the Society’s commitments for the cause of earth scientists and academicians of this great country. We sincerely hope that this patronage continues and other centers in India will invite the future AGMs of ISAG, thereby benefiting both the host- and the guest- organizations.

On behalf of the Executive Council (EC), and my own behalf, I thank Prof. J.A.K. Tareen, Hon. Vice-Chancellor, Pondicherry University for according permission for this 13th AGM-2010 and National Seminar in this prestigious Department of Ocean Studies and Marine Biology. I thank the Department for providing an opportunity for ISAG to interact with a cross section of earth science community in the region.

I am happy to share with you that during the last Annual General Body Meeting held during February 2009, highly scintillating and informative lectures were delivered by invited experts from reputed institutes like Atomic Minerals Directorate for Exploration and Research (AMD), Bhabha Atomic Research Centre (BARC), Central Ground Water Board (CGWB), The Singareni Collieries Company Limited (SCCL), Geological Survey of India (GSI), National Geophysical Research Institute (NGRI), National Mineral Development Corporation Limited (NMDC) and various Universities.

The articles presented during the last Workshop were published after mandatory peer review in the July 2009 issue of Journal of Applied Geochemistry (JAG). The articles of this National seminar will be published in JAG after peer review. Please submit full articles on or before 31 March 2010 to the Editor, JAG or Prof. P. M. Mohan.

Executive Council: The Executive Council met six times during 2008-09 to discuss, plan and execute the academic activities of the Society.

Administration: There is considerable increase in the daily workload of the Society during last twelve years, especially during and after the Symposia and Workshops. The Secretary is managing the day to day office work with two assistants, appointed during 2007 and 2009 and an office boy. The staff is still in the learning process.
Finances: The total income of the Society for the financial year 2008-2009 is Rs.6,25,978=00 and expenditure Rs.5,48,518=00. The statement of accounts shows marginal improvement in the financial position of the Society but at the same time the savings are not enough to sustain the increased academic activities of the Society.

At this stage I would like to share one important issue with the honorable delegates. Till the end of 2007 the finances of the Society were looking fairly good but the inflation, political turmoil for separate statehood for Telangana especially in Hyderabad led to delays in schedules and consequent cost escalation, the Society found itself in financial restrictions. However, we are trying to continue a steady improvement in all academic activities.

The audited statements have been circulated to all the fellows and few copies are kept in the auditorium for the perusal of Members and Delegates. The Society will try to cut the expenditure and be economical as far as possible, without compromising the quality of the academic activities.

Permanent Accommodation: I am happy to inform that the Society has planned to purchase a under construction two bed room flat for office accommodation and request the delegates to see the appeal kept in the hall for details. I request the honourable delegates to participate in the noble cause.

Grant-in-aid: Department of Science and Technology (DST) sanctioned a grant-in-aid of Rs.1,25,000/- for the financial year 2008-2009 for the publication of the Journal. The EC is grateful for the much needed financial help from DST. However, the EC has requested DST to enhance the grant-in-aid for 2009-2010 financial year in view of inflation.

Financial Support: The Society is extending financial support to “young scientific talent”. Under this programme the Society may support, to a limited extent, the endeavour by active members to participate in national/international conferences where the applicants R and D work is accepted for presentation.

Publications: One of the major activities of the Society is the publication of a bi-annual Journal, the Journal of Applied Geochemistry (JAG) and theme based Special Volumes. In this respect the Society is planning to release shortly a Special Volume on “Groundwater-quality evaluation and control”.

In 2009, two issues of the Journal were released on time and the copies of the Journal are exhausted in a short time. I am happy to inform to this august gathering that the Society continues to receive appreciations about the quality and get-up of the Journal. The editor is working hard on each issue of JAG to show improvement. In this respect a modern printing press “Karshak Printers” has been chosen from 2010 to improve the quality of printing.

The Journal is receiving good number of articles for publication. We are happy to share with you that the number of articles we receive on environmental issues are more than the articles on experimental geochemistry, exploration geochemistry, applied geochemistry etc. We hope that in future the situation will change and we receive applied geochemistry related articles abundantly.

The response for the Journal is very encouraging. If the present trend of increase in number of articles continues with your continued support and patronage, the Society will consider publication of the Journal quarterly instead of half yearly subject to financial limitations.

News and Views: However, I must repeat here that the News and Views section introduced in the Journal long back has unfortunately not received adequate patronage because of lack of interest and participation.
from all sections. We have already mentioned that any preliminary result of scientific importance can be submitted albeit lack of full support to interest the scientific community. This in future may become viable and useful and may form a basis for future research.

**Colour Photos:** A major problem the Society is facing is that the authors are submitting articles with colour figures and photos. The printing press charges extra for multi-colour printing and the authors have to bear the expenses. As far as possible, one should submit original black and white pictures and for multi-colour printing the authors must be ready to pay actual printing charges in advance.

**Institution of Medals:** Institution of four Medals by three individuals through our Society from 2005, 2006, 2007, 2008 and 2009 shows the credibility of the Society and also acts as an incentive to the group workers to bring out good results and better publications. The medals are:

2. Venkata Subbamma - Subba Rao Medal for **Major contribution in the field of Geochemistry applied to mineral resources during last ten years before the year of AGM** instituted by Prof. K. Surya Prakash Rao in memory of his parents late Smt. Ketharaju Venkata Subbamma and Sri Subba Rao in 2005.
3. Sita Devi - Rama Rao Memorial Medal for **Major contribution in the field of Analytical Geochemistry during last ten years before the year of AGM** instituted by Prof. K. Surya Prakash Rao in memory of his in-laws (wife’s parents) late Smt. Manthiripragada Sita Devi and Sri Rama Rao during 2005.
4. Udas - Dwivedy Medal for the **Best research paper published in the field of Radioactive Minerals during last ten years before the year of AGM** with effect from 2006 instituted by Dr. K. K. Dwivedy in memory of his research supervisor Dr. G. R. Udas.

**Future Activities:** The Society is planning to institute few more Medals to recognise and encourage active scientists in earth and allied research fields and enthusiastic sponsors would be considered on first-first basis:

i) Young Indian Scientist Award.

ii) Best research paper in Petroleum Geochemistry.

iii) Best research paper in of Nuclear Sciences.

iv) Best research paper in Marine Geochemistry.

v) Best research paper in Environmental Sciences.

vi) Best research contribution in Mineralogy, Petrology and Geochemistry.

**Membership:** At this stage, I would like to bring to your kind notice a few aspects of the Society. Members are the strength of any scientific Society to grow. Although there is a steady growth in Membership of ISAG, it is not adequate. The Society has more number of Life Fellows than Annual Members. We would like to increase both the categories so that the Society is able to maintain economy in printing Journal of Applied Geochemistry (JAG). We request the academicians/scientists to enroll as Members and the existing members should try to mobilize new Members. One of the objectives of holding AGMs outside Hyderabad is to encourage scientists to become Members of the Society. We invite the honorable delegates to enroll as members of the Society, preferably as Life Fellows. The Applications for membership are kept in this seminar hall for your convenience or you may contact me later.
Institutional Membership: The Society is pleased to inform that the libraries of Atomic Minerals Directorate for Exploration and Research (AMD), Geological Survey of India (GSI), National Geophysical Research Institute (NGRI), National Mineral Development Corporation Limited (NMDC) and Post-Graduate Science College, Osmania University at Saifabad, have become Institutional Members of the Society. I appeal to the other earth science organizations and Departments of earth sciences of Universities to enroll as Institutional Members of the Society to extend the services of the ISAG better. We invite industries to take Corporate Membership for mutual academic/professional benefit.

International Symposium-2009: The Society has organized an International Symposium on “Carbon Management & Climate Change and Role of Applied Geochemistry in Mineral Exploration” during 25-27 November 2009, at the National Geophysical Research Institute (NGRI), Hyderabad. The Symposium was inaugurated by Shri Rana Som, CMD, NMDC, Hyderabad. The EC is grateful to NGRI for providing infrastructure for the International Symposium. We express our gratitude to NMDC, ONGC, CSIR, DST, OIL, DATACODE etc for financial and academic support. The EC appreciates the patronage of Dr. A. K. Balyan, HRD, ONGC and Dr. V. P. Dimri, Director, NGRI for their support for the symposium and the Society. Thanks to Prof. J. Ratnakar (Chairman, BoS in Geology, Osmania University) for reviewing the ‘Abstracts’ of International Symposium-2009 despite his busy academic and personal commitments, during that period.

Fellowship: The number of Fellows of different categories as on 31st March 2009 is:

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Fellows</td>
<td>237</td>
</tr>
<tr>
<td>Annual Fellows</td>
<td>011</td>
</tr>
<tr>
<td>Institutional Members</td>
<td>008</td>
</tr>
<tr>
<td>Libraries (Annual)</td>
<td>011</td>
</tr>
<tr>
<td>Honorary Life Fellows</td>
<td>012</td>
</tr>
</tbody>
</table>

Review of Manuscripts: The following referees have reviewed the manuscripts sent for publication in JAG:

- Das, S.
- Dipankar Shah
- Divakar Rao, V.
- Dwivedy, K. K.
- Kuldeep Chandra
- Madhvan, V.
- Muralidharan, D.
- Murty, D. S. R.
- Nambiar, C. G.
- Prakash Narsimha, K. N.
- Ram Mohan, V.
- Rama Rao, P.
- Ramamohan Rao, T.
- Ramana, M. V.
- Ratnakar, J.
- Sarkar, B.
- Shakeel Ahmad
- Sudhakar Reddy, Y.
- Surya Prakash Rao, K.
- Viswanathan, S.

The Society profusely thanks these reviewers for sparing their valuable time in reviewing the articles.

Acknowledgements: I thank the Executive Council, especially Dr. K. K. Dwivedy, for his whole-hearted and invaluable support and expert advice from time-to-time. I thank Shri Rana Som, Dr. V. Balaram, Dr. M. Sudhakar, Dr. K. Umanaheswar, Dr. T. R. P. Singh, Dr. Ajit C. Kapadia, Dr. Kuldeep Chandra, Dr. S. K.
Bhushan, Dr. P. Rama Rao, Prof. J. Ratnakar and Dr. A.G.S. Reddy for their services and support to the Society.

We requested Dr. M. Sudhakar at the last minute to be the Chief Guest and inaugurate the workshop. He is the right person for inaugurating the workshop. He travels extensively within and outside the country but he very kindly accepted our request and also supported financially. Sir, we appreciate your support for this event.

Dr. T.R.P. Singh is a very busy personality dealing with national and international consultations. He sometimes takes breakfast at Delhi, Lunch at Bhubaneswar and dinner at Bombay. And such a tireless busy person could agree to be here amongst us. Dr. Singhji, we appreciate your kind gesture and hope that you would continue to support ISAG in future.

We will be failing in our duty if we do not thank Prof. J.A.K. Tareen, Hon. Vice-Chancellor, Pondicherry University and Prof. P. M. Mohan and other friends for their cooperation, support and services extended to the present National Seminar and AGM-2010.

The ISAG gratefully acknowledges the services of Dr. K. Sarojini Devi, former Director of Medical Education, Government of Andhra Pradesh, for providing free furnished office space for ISAG with basic amenities for and, also for her keen interest in Society’s academic endeavours.

Besides these, a large number of Fellows have helped the Society in several ways and the EC is grateful to all of them.

There is a consistent demand for organising National Seminars, Workshops and AGMs of ISAG and decision of okeying goes to first-come-first cases!!

Thank you
25-02-2010

K. Surya Prakash Rao
Hon. Secretary
NAME AND ADDRESS OF THE ASSESSEE:

INDIAN SOCIETY OF
APPLIED GEOCHEMISTS,
P.B NO: 706,
JAMAI OSMANIA, HABSIGUDA
HYDERABAD-500 007

PREVIOUS YEAR
01.04.2008-31.03.2009

ASSESSMENT YEAR
2009-2010

STATUS
SOCIETY

PAN
AAATI 1561 L

STATEMENT OF TOTAL INCOME

INCOME FROM BUSINESS:

Excess of Income over Expenditure

Amount in Rs.

77,460

Tax on Rs. 77,460

0

Tax exempted vide letter no. DIT(E)/ HYD/36(02)/80G/06-07 Dtd 16/05/2007

Tax Payable

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NIL

For NEMANI & ASSOCIATES
Chartered Accountants

N.S.S. PRASAD
PARTNER
M. No. 088789

Secretary
ISAG
P.B. No.: 706, Osmania University,
1-2-7/1, "ROJA", Kakatiyanagar,
Habsiguda, Hyderabad-500 007,
A.P., India.

He started professional career in 1981 as Geologist (Trainee) in Coal India Ltd, Dhanbad and subsequently joined as Scientist (Trainee) at National Institute of Oceanography (NIO), Goa in 1982 and occupied various positions such as project leader and scientist.

He served during the last 28 years in two premier institutions of the country, i.e., NIO and National Centre for Antarctic and Ocean Research (NCAOR), Goa in research and development, survey, planning, teaching and administration in the field of oceanography/offshore surveys/polar sciences/marine technology.

He joined the Department of Ocean Development at Antarctic Study Centre (Goa) as Principal Scientific Officer and achieved career progression as Scientist-F and G/ Group Director of Ocean Sciences and Services Group at NCAOR.

Presently he is serving as Advisor to the Govt. of India, Ministry of Earth Sciences (MoES), New Delhi and heading the Outreach and Awareness Programmes of the Ministry.

He has dealt with all the major projects of the DoD/MoES and has been the Project Leader of major programmes such as the Polymetallic Nodules Programme, Legal Continental Shelf Demarcation, Multibeam Swath Bathymetric EEZ Surveys, Southern Ocean and Polar Sciences.

He has lead and guided a large team of 15 researchers/scientists of various capacities at NCAOR working on Polar and Southern Ocean/Tropical Indian Ocean/EEZ surveys/Polymetallic Nodule Programme/Seabed sediments of paleoclimatic significance including the Scientific and technical management of MoES owned/chartered vessels such as ORV Sagar Kanya, A.A. Sidorenko and A.Boris Petrov during 1996 to 2009

He has been a major interface to the scientists in the country; implemented/supported a large number of field campaigns of National Thrust Programmes of MoES/DST/ISRO/CSIR/Universities and other International Collaborators during this period.

His major contributions to Earth Sciences, viz., delineation of major nodule deposits in Central Indian Basin and demarcation of potential areas for resource development of these deposits (1982-93); discovery of a
large pumice field – provided first evidences for intraplate volcanism (1993); discovery of zeolite deposits and their relation to nodules and volcanics–provided first evidences of incipient hydrothermal mineralization in Central Indian Ocean Basin (1994-95 and 2006-07); discovery of impact microcraters on Australasian microtektites, the first terrestrial analogs identified akin to lunar microcraters (1996-98); discovery of minitektites in the Australasian strewn field (1999); mapping of Andaman Trench and fore-arc configuration by multibeam swath bathymetry and gravity studies (2005); mapping the seabed and charting the bathymetry of Prydz Bay area for approach to the India’s proposed Third Station in Larsemann Hills, East Antarctica (2006); mapping of Afimasy-Nikitin Seamounts in Indian Ocean for Cobalt-rich crusts resource potential (2006 and ongoing); discovery of a long underwater river channel in Central Bay of Bengal (2007 and ongoing). He is currently working on in-house research problems related to ocean circulation, paleoclimatic record reconstruction, isotopic composition and aerosol distribution studies in Southern Ocean (2004-2008; and ongoing).

He has spent about 1200 days at sea onboard research ships for Polymetallic Nodule Programme, Southern Ocean and other projects often as the leader of the scientific expeditions and represented India at the United Nations Law of the Sea and negotiated for allocation of Pioneer Area to India for Polymetallic Nodules Exploration/Exploitation in Indian Ocean (1987). He was nominated by the Govt. of India in 2006 for election to the Legal and Technical Commission (LTC) of the International Seabed Authority (ISBA), United Nations at Kingston, Jamaica. He was elected and currently serving as an expert in LTC (ISBA) on a five year term till 2011. He is a member, Scientific Committee on Ocean Research (SCOR) of Indian National Academy of Sciences (2008-2012).

Dr. Sudhakar is associated with many professional bodies like Geological Mining and Metallurgical Society of India (Member), elected Life Fellow of Indian Geophysical Union, Executive Member of Indian Geological Congress, Life Member of The Geological Society of India, Ocean Society of India, Mineral Engineers of India and Mining Engineers of Association of India. He has been a resource person of International Ocean Institute, Malta, Member, Research Council of National Ship Design Research Centre (NSDRC), Visakhapatnam, Board of Studies in Marine Sciences, Goa University and Board of Studies in Geoinformatics, Mangalore University.

He has planned and executed as Leader the location, search and recovery of GSLV F02 sub-systems off Sriharikota in Bay of Bengal during 2006 at the request of ISRO. Such a pioneering effort to locate, search and salvage operations underwater was first of its kind in India and second in the history of Space Sciences in world.

He has been serving many National Standing Committees, Technical Committees as Member/Member-Secretary as well as represented the Director, NCAOR in Steering Committees of the Govt. of India.

He published 50 Papers in refereed international/national journals and Conference proceeding volumes and presented about 50 papers Conference/Seminar/Symposia/Workshops and has 23 technical reports to his credit. Currently, editing a Special Section for publication in Current Science on the results of Southern Ocean and Larsemann Hills Indian scientific expeditions.

The Executive Council (EC), is happy to honour him as Life-time Honorary Member of the Society.
Applied Geo-chemistry in marine sciences is one of the important components of study and research. The chemical variation in the marine environment with reference to the biota, chemical elemental variation, extraction of bioactive component from the different life forms which are in the infant stage of this realm of world of science and in particular to the Indian context as well as in the regional scale requires more attention. This “National seminar on Applied Geochemistry in Marine Sciences-Current and Future Trends” brings out the scientist to pool their thoughts on these aspects and also deliver the status of this field of science on the modern day concept. Further, it may also provide an opportunity for scientists to meet in one forum to exchange their ideas on this aspect of science and motivate the youngsters in these aspects.

The GEOSECS (1970) provides the first view of the global oceanic distributions of several dissolved chemical species. This fundamental understanding of ocean chemistry helps to delineate ocean circulation and biogeochemical cycles with reference to $^{14}$C, $^{210}$Pb and $^{226}$Ra and its distributions (Broecker and Peng, 1982). Recently, to understand the various ocean processes, new traces like Th and Pa isotopes (Cochran, 1992) and submarine ground water discharge short lived Ra isotopes are identified. Fe sulfide minerals form in the shallow-water hydrothermal system in Luise Harbor, Lihir Island, Papua New Guinea, due to the interaction of hydrothermal gas or liquid with sea-water and Fe-rich sediments. Upon contact with oxygenated seawater, hydrothermal $\text{H}_2\text{S}$ is oxidized and forms $\text{H}_2\text{SO}_4$ leading to the simultaneous dissolution of primary Fe-rich sediment grains and the neoformation of marcasite and pyrite (Pichler, et al. 1999). The development of “clean techniques” revealed “Oceanographically consistent” distribution of many trace elements which leads to understand cycling of trace elements within the ocean (Bruland and Lohan, 2003). The development of new technologies has also provided an insight into the physical and chemical speciation of many trace elements and their associations with organic components and colloids (Bruland and Lohan, 2003).

The role of Fe with reference to the control of ecological ecosystems as an essential component for the present day of exploration of oceans was felt (Jickells et al., 2005). However, understanding the fundamental biological implications on tracers is gathering momentum in the present day research (Measures, 2007). Moffett et al, (2007) reported dissolved iron and Fe(II) in oxygen minimum zone of the Arabian Sea associated with denitrification for nitrate and nitrite reduction under metallo enzymes requirements. The study on the distinction between Fe (II) and Fe (III) suggested that a better calculation of the flux of “bioavailable” Fe to the open ocean sea surface (Nimmo, et al. 2008). The development of the use of TEI distribution in the modern ocean improved our understanding of palaeoceanography through proxies (Henderson, 2002). For example, Cd/Ca ratio is used as analogue of phosphate concentration in the palaeocean and Mg/Ca ratio is considered for the palaeotemperatures.

Pattan et al, (1994) reported that manganese macro and micro nodules and sediments from Cen-
Central Indian Ocean Basin consist of higher REE due to the retention of bottom water REE pattern. The study on the tracers of Arabian Sea suggested that N\textsubscript{2}O isotope production coupling between nitrification and denitrification processes (Naqvi et al., 1998). The study of trace elements in near shore sediments along the east and west coast of India indicated that there were significant differences in the concentrations of Cu, Zn, Ni, Fe, Mn, Al, and TOC (Paropkari et al., 1999). Somayajulu and Bhushan (1999) reported that Indian Ocean deep waters show $\Delta^{14}$C-$\Sigma$CO$_2$ – salinity relationships show better correlation in the western sector due to high biological productivity. Sarkar et al. (2000) reported that based on the stable oxygen and carbon analysis of sediment coarse from the Arabian Sea the excess of evaporation over precipitations steadily appears and then shows decrement during the last ~10,000 to ~2,000 years.

The atmospheric production rate of silica was consistent with the low activities of the dissolved silica in the three oceans which were modulated to some extent by radioactive $^{32}$Si during the sequestering of particulate silica in sediments before regenerations in bottom waters (Craig et al., 2000). Rixen et al. (2005) reported that Si concentrations fall below two micromole per litre leading to the disappearance of diatoms from the plankton community. $^{228}$Ra appears a good tracer to derive rates of mixing water between low salinity in the north and their high salinity in southern counter parts of the western Bay of Bengal (Rengarajan et al., 2002).

The study of $\delta^{18}$O isotopes on the foraminifera of Pulleniata obliquiloculata and Globigerina bulloides suggested that a drastic climatic shift at ~4ka was noticed in the Arabian Sea (Naidu and Niitsuma, 2003). The aerosol dissolution of iron was usually considered as the dominant source for availability of same in sea water and some other works (Elrod et al., 2004) suggesting that sediment remobilization could play a significant role for the surface concentration.

The study of carbon budget for the Eastern and Central Arabian Sea suggested that two vertical boxes respectively in surface as well as deep waters existed with the influence of strong seasonal variability (Sarma et al., 2003).

Closely comparable time series $\delta^{15}$N records across the Arabian sea suggest basin wide homogenization of the isotopic signal during Holocene period due to combined monsoon dependent surface water mixing because of reversing surface circulation and intermediate water mixing due to North South salinity gradient (Banakar et al., 2005). Gopinath et al. (2005) reported that the influence of nutrient forms (nitrogen/phosphorus) and parameters like pH and organic carbon were significant for the distributional characters of Fe and Mn in different sedimentary micro environments of coral reef ecosystem of Lakshadweep Archipelago.

Stable isotopic composition of surface particulate organic nitrogen (PON) in Bay of Bengal appears to be a mixture of particulate matter from the continent and marine phytoplankton (Sanjeev Kumar et al., 2005). Arabian Sea is one of the world three large oxygen deficient zones (ODZ). The low values of in the ODZ are the result of denitrification and it is evidenced by enrichment in heavy isotope of both N and O (Devol et al., 2006). A comparison of the perennial, mesopelagic oxygen minimum zones (OMZ) in the open north western Indian ocean was made with a shallower oxygen deficient system which develops seasonally (during late summer and autumn) and intensified in recent years presumably due to anthropogenic nutrient loading from land (Naqvi, 2006). Xiao et al. (2006) studied the isotopic composition of boron ($\delta^{11}$Bc value) and elemental concentrations of B, Ca, Mg, Fe and Al in growing coral from Sanya Bay, China and Kavaratti lagoon India. A new isotopic fractionation factor ($\alpha_{B}$) between B(OH)$_4$ and B(OH)$_3$ for growing corals, coexisting sea water and pH of sea water was established.

Study of radiocarbon dates on selected planktonic foraminiferal species from the equatorial Arabian Sea revealed that Indian and East African rainfalls declined from 35,000 calendar year BP upto the last glacial maximum with the maximum El Nino frequency (Tiwari et al., 2006).
The coral which derives its nutrients from symbiotic activities is another important aspect in the chemical study which needs to be studied in detail to reveal its mechanism.

The removal of elements and energy - including water, without disturbing its equilibrium has an important task to probe in detail for the development of human kind.

The above review, clearly states that a study on the marine environment from chemical point of view needs a lot of attention by the scientific departments of the country.

Further, the coastal university departments and colleges should concentrate high level manpower development along with sophisticated analytical laboratory which are essential for future growth of Indian economy as well as scientific temper.

The major funding agencies like the Department of Science and Technology (DST), Council of Scientific and Industrial Research (CSIR), Ministry of Earth Sciences (MoES), Department of Atomic Energy (DAE) and other nodal agencies should come forward to provide enough funds to establish such a sophisticated laboratory which otherwise is extremely difficult.

To achieve these goals, the youngsters should also be motivated to study the chemistry in relation with marine environment with a special programme which should be developed by the different organization like Indian Society of Applied Chemists (ISAG) and others.

Acknowledgements

The author conveys his gratitude for the Indian Society of Applied Chemists (ISAG) and other funding agencies like DST, CSIR, MoES and the authorities of Pondicherry University for providing the facilities and funds to organise the seminar entitled “Applied Chemistry in Marine Sciences – Current and Future Trends” in Pondicherry University, Port Blair.

References


GEOSECS., (1970). Geochemical Ocean Section Study - Reports, Scripps Institution of Oceanography, University of California, La Jolla, USA.


This volume contains sixteen detailed papers – all by scientific officers of Atomic Minerals Directorate mostly relating to Uranium mineralization as well as the exploration strategies with special reference to India.

The volume begins with two reports of uranium mineralization associated with quartz-pebble conglomerate (QPC) in the Iron Ore Group (IOG) of Singhbum craton. Mishra et al. (pp. 1-14) report uraninites in pyritiferous QPC from Balia-Rankia area of Daitari-Tomka Basin of Jajpur district of Orissa bordering the tectonic contact of Eastern Ghat mobile belt and IOG. This constitutes a first report of sub-rounded to rounded detrital uraninite grains from the Daitari-Tomka basin of the IOG. The host QPC is found by authors as ferromagnesian nature. The authors believe that the area is having potential for hosting QPC type uranium mineralization and they are carrying out exploration studies presently. Chakrabarti et al. (pp. 15-31) describe radioactive QPC from Taladhi, Sarlanga, and Soyamba areas occurring along the western margin of Koiri basin and overlying the Bonai granite that is equivalent to Singhbum granite. They identified that samples from later two regions are affected by post-depositional hydrothermal activity while those from Taladhi area are influenced only by a mild alteration using the disequilibrium among radio and trace elements. The authors also pointed out that the provenance for the QPC may contain evolved granitic basement. In a detailed geochemical study on Kulipal granite that is intrusive into the Proterozoic Singhbum Group, Sen et al. (pp.179 - 199) arrive at a conclusion that this body is highly favorable for radoelemental mineralization. They suggested that this granite body is a A-type contradicting the earlier view and therefore fertile for enrichment of many trace metals. In a study on rare metal (especially Nb, Ta and Be) enriched pegmatites of Jharsuguda district of Orissa Singh and Pandey (pp. 125-129) measured the triclinicity of alkali feldspars using XRD technique. The measured high values for triclinicity of 0.83 to 0.97 indicate maximum microcline suggestive of slow cooling rates coupled with falling temperatures of crystallization. This was interpreted by authors as indicative of pegmatite crystallization in deep-seated plutonic conditions.

Three papers describe uranium and REE mineralization from Central India. Gupta et al. (pp. 33-53) describe the U-mineralization along the unconformity between the basement granites and sediments of the Chandrapur Group of the Chattisgarh Supergroup, especially along the northeastern margin. The U content has been found to be higher in basement granites followed by sediments (subarkose, arenite, shales). The basic dykes intruded into the basement granites have also been found to be mineralized. Their description of this mineralization is akin to the Proterozoic unconformity related, epigenetic, hydrothermal type. Sinha and Jain (pp. 119-124) describe uraniferous rhyolitic vein within the Sambalpur granitoid forming an inlier in the basement at the eastern margin of Singhora basin. The authors note that this rhyolitic vein is in close vicinity to the already reported uranium sulfide mineralization in the overlying Singhora sediments. In another study Singh and Reddy (pp. 55-76) describe light REE (LREE) and heavy REE (HREE) mineralization in the Precambrian Chotanagpur granite gneiss complex of Central India. Authors relate two phases of LREE miner-
alization to the ages of granite emplacement at 1005 Ma and 815 Ma. According to them the HREE mineralization accompanies the second phase LREE mineralization at 815 Ma.

There were a total of four papers describing uranium mineralization associated with various geological settings from Northeastern India. Ajay Kumar et al (pp. 87-100) report Mesoproterozoic U-mineralization from Ampulli area of Arunachal Pradesh in the metasediments of the Bomdila Group. The host rocks are schistosed containing garnet, muscovite, biotite, quartz indicating effects of K-meta-

somatism. Authors invoke both syngenetic and epigenetic types of mineralization in the area. Nagendra Kumar et al. (pp. 137-149) discussed the U-mineralization in the Barapani arenites of the Pro-
terozoic Shillong basin from East Khasi hills of Meghalaya. They suggested that U-enrichment along the alteration zones is probably brought out by K-metasomatism. Significant U-mineralization in the NE-SW trending shear zone in the Barapani for-
mation was reported by Gupta et al (pp. 151-154), this again suggested to be artifact of hydrothermal alteration associated with younger igneous events. Mahendra Kumar et al (pp. 101-108) described interesting occurrence of U-mineralization with Upper Cretaceous feldspathic sandstones of the Mahadek formation from East Khasi Hills of Meghalaya. Two distinct mineralized horizons within the sandstones were identified and the U-minerals seem to be associated with carbonaceous matter.

Four papers described U-mineralization from Northwestern India. Saini et al (pp. 109-117) presented detailed petrographic and geochemical account of U-mineral hosting ~2.6 Ga Berach granite – basement for the Mangalwar complex from the Belwa, Devtalai and Gudelia areas in the Aravalli mountain belt of Rajasthan. This area is also known for copper mineralization. Detailed studies by the authors revealed that the pink colored phase of Berach granite is U-mineralized while the grey phase is barren. They also found a structural control for mineralization as it follows Bharatpur-Mount Abu lineament. Panigrahi et al (pp. 131-136) in their work on shear zone cutting across the basement for the Delhi Supergroup of rocks from Dhanai Basri area of Dausa District, Rajasthan reported anomalous U and Th contents than in the country rocks opening up a potential hydrothermal vein-type and/or unconformity-related U-mineralization. In an interesting discovery Yadav et al (pp.155-160) reported occurrence of U-bearing calcrites from areas of Jodhpur district in the vicinity of Thar environs. Secondary U minerals were found along cavities, vugs and fractures in calcrites. It is suggested that the Bap Boulder Bed and Badhaura sandstone could be the provenance for U supply into these calcrites. Maithani et al (pp. 161-178) described the U-mineralization associated with lamprophyre dykes that occur along the Deesa Sirohi lineament in the Neoproterozoic (835-720 Ma) Erinpura Granite. In their detailed petrographic and geochemical study they found that the lamprophyre dykes and associated brecciation coupled with ferrugenization played a key role in U-mineralization in these lamprophyre dykes.

The Cuddapah Supergroup became prominent for exploration activities for U-mineralization ever since the Tummalapalle deposits have been discovered. Basu et al. (pp. 77-86) addressed the potential of white quartzites of Banganapalle formation of the Kurnool Group near Nayagapalle for U-mineralization. The uranium mineralization was found along the bedding planes of white mostly monocrystalline quartzites. Although authors feel that the geological setting of the Banganapalle formation at Nayagapalle is not favorable for U-mineralization, its occurrence suggests unique ways of uranium mobilization attesting importance of unconformity related deposits in the Cuddapah Supergroup.

Overall the volume brings out significant developments in the exploration strategies, new discoveries of uranium mineral deposits from vari-
ous parts of India. These studies are important steps for self reliance of our country in nuclear energy particularly and for the energy security in general. They become all the more prominent with ever growing demand for clean energy sources.

Date: 20-04-2010

The book is very useful for the earth scientists and professionals alike working on the subject. I recommend the book for the libraries of earth science organisations and it will be a good addition to the academic institutions.

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BOOK REVIEW

Komatiite 2008.
Publisher: Cambridge University Press, Cambridge.
Authors: Nicholas Arndt, C. Michael Lesher, and Steve J. Barnes.
Number of pages: xiv + 488;
Price: Rs. 8,087.00


Part I of the book (p.1-232) gives background information and a description of the field characteristics, mineralogy, and geochemistry of komatiites, and has seven chapters: 1. A brief history of komatiite studies and a discussion of komatiite nomenclature. 2. Brief descriptions of six classic komatiite occurrences (Barberton greenstone belt in South Africa; Abitibi greenstone belt in Canada; Kambalda in Australia; Gilmour Island in Canada; Fennoscandia; and Gorgona Island in Columbia). 3. Field characteristics, textures, and structures. 4. Mineralogy. 5. Geochemistry. 6. Isotopic compositions of komatiites. 7. Experimental petrology.


The book has an exhaustive list of ‘References’ (44 pages) with more than 600 entries, 166 black and white illustrations, 4 colour illustrations, and 29 tables. The size of the book is 247 mm x 174 mm and its weight is 1.1 kg.

We have one criticism against the book: In Chapter 1, Table 1.1 (pages 7 and 8), the authors have listed, in alphabetical order, the localities of world-wide komatiite occurrences. The countries listed are: Australia, Brazil, Canada, Columbia, Finland, Guyana, Norway, Russia, South Africa, and Zimbabwe. It is indeed surprising and shocking, to say the least, that the authors have not cared to include India in the list. Within four years of the discovery of komatiites by the Viljoen twins, Morris and Richard, in the Barberton greenstone belt of South Africa, in 1969, Viswanathan and Sankaran (1973) discovered an occurrence of basaltic komatiite (‘komatiitic basalt’, in today’s nomenclature) in the Precambrian of Bihar. Viswanathan (1974a) discovered basaltic komatiite in the Kolar Gold Field and also discovered peridotitic komatiite (‘komatiite’, in today’s nomenclature) in the Nuggihalli greenstone belt in Karnataka. Viljoen and Viljoen (1982, p.14) referred to these discoveries in the following words: “In 1973, Viswanathan and Sankaran (1973) reported the discovery of komatiites in the Precambrian of India. Further papers by Viswanathan (1974a, b) dealt with komatiites from the Kolar goldfields and from the charnockitic terrains of India.”

Following these discoveries, geologists in India conducted intensive and extensive investigations in the Archaean terrains of the country to locate komatiite occurrences. As a result, the very first spinifex-textured komatiite in India was discovered by Viswanatha et al. (1977) at Ghatti Hosahalli in Karnataka. Srikantia and Bose (1985) discovered spinifex-textured komatiites at Banasandra in Karnataka. Komatiites and komatiitic basalts were also discovered in many other localities in India. Jayananda et al. (2008) obtained a Sm-Nd age of
3352 ± 110 Ma for the timing of eruption of komatiitic lavas in the western Dharwar craton of southern India.

Indian geologists, petrologists, and geochemists have published numerous papers on the komatiites of India in reputed national and international journals. In their 44-page list of 'References' containing more than 600 entries, Arndt, Lesher, and Barnes have not cared to cite even a single paper on the komatiites of India.

Nicholas Arndt, C. Michael Lesher, and Steve J. Barnes should take serious note of the deficiencies in their book, pointed out by us, and take remedial action to rectify them as and when a second edition of their book becomes necessary.

The following information may interest Fellows of ISAG and readers of JAG not familiar with komatiites: "Komatiites erupted billions of years ago as pulsating streams of white hot lava. Their unusual chemical compositions and exceptionally high formation temperatures produced highly fluid lava that crystallized as spectacular layered flows. Investigation of the extreme conditions in which komatiites formed provides important evidence about the thermal and chemical evolution of the planet and the nature of the Precambrian mantle."


*Although Viljoen and Viljoen (1982) have mentioned the year of publication of this paper as 1974, it was actually published in 1975.

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BOOK REVIEW

Golden Jubilee Volume: Drinking water and food security in hard rock areas of India
Publisher: Geological Society of India (GSI), 2008, Bangalore
Editor: Subhajyothi Das
Number of Pages: 263
Price: Rs. 600.00

Geological Society of India, Bangalore recently published a couple of memoirs (67 and 68) on water related aspects. One of them, entitled Drinking water and Food Security in Hard Rock Areas of India, was edited by Sri Subhajyothi Das, former Regional Director of the Central Ground Water Board and the objectives of this memoir are the maximum judicious use of available water for inductivity and to pay more attention for the water quality of drinking water. Way back in 1977, in United Nations Conference held at Argentina, food and water quality in required quantity and quality was acknowledged as human right. The United Nations Conference on Environment and Development (UNCED), Rio de Janeiro (1992), initiated the international observance of World Water Day. All has accepted the significance and the United Nations General Assembly decided 22 March every year as the World Water Day. The theme for World Water Day 2010, chosen by Un-Water is Clean Water for a Healthy World and the aim is to rise the quality of water alongside quantity. As per researches, it is an alarming scenario where human activities are causing the decline of water quality. Amongst the most important issues, the rise in population, urbanization, pollution and climatic conditions are some dominant ones that affect the quality of the water. Keeping abreast with present day problems, Sri Subhajyothi Das could successfully bring out the Golden Jubilee Volume on Drinking Water and Food Security in Hard Rock Areas of India.

A large part of India’s hard rock terrain lies in the semi-arid drought prone region. Due to irregular and uncertain rains in this region, the hard rock areas suffer endemic water shortage. Majority of the rivers and streams dry up immediately after the monsoon. We have mostly in the Peninsular India monsoon dependent agriculture. Most of these rain fed areas raise only one crop. The situation calls for integrated management of rain water, groundwater and crop water planning. While the rainwater harvesting, crop water planning and judicious groundwater management could achieve success in meeting the required quantity of water on one hand, the efforts to improve the quality can save us from the hazards due to large scale pollution of drinking water on the other. With the above objectives in mind, a National Seminar was organized during April 2008 at Krishi Vigyan Kendra, Hulkoti on Drinking Water and Food Security in Hard Rock Areas of India through optimal utilization of groundwater, rainwater harvesting and and crop water planning with special reference to Gadag District, Karnataka.

This memoir is an outcome of the research findings presented in the said National Seminar. The deliberations mainly focus on the conditions prevailing in the Karnataka State at large and the Gadag District in particular. It is rather interesting to note that Gadag District of Karnataka was used an experimental laboratory for this purpose. The Editor has very systematically organized the Memoir by dividing the technical papers presented under the following major themes:

1. Groundwater resources and monitoring
2. Water, soil and crop management
3. Water quality and drinking Water

Papers such as “Groundwater resource management options for Karnataka with special reference to Gadag District” (Najeeb, K.M., Hunse, T.M., Manzar, A and Farooki, M.A and “Geological settings and analysis of groundwater levels of...
Gadag District, Karnataka” (Srikanta Murthy, D) are very much commendable as for the first theme is concerned. The former paper gives much stress on the alarming rate of decrease in groundwater levels. The lack of awareness, unscientific cropping pattern, traditional irrigation practices and the subsidized power supply, which all compounded to increase the intensity of exploitation causing fast depletion in groundwater resources. The groundwater in the semi-arid hard rock terrain. The problems of the groundwater management of Karnataka state are presented very well. The urgency to avoid the overdraft conditions of groundwater is stressed. Dr. Srikanta Murthy is very optimistic about the planning and development of the groundwater aquifer system in Gadag District with his critical analyses on time series data in groundwater levels in the Gadag District.

Under the second theme on “Water, soil and crop management”, the editor has selected nine papers altogether. The importance of increasing the soil fertility and the need for drip irrigation, artificial recharge to groundwater through remote sensing and geographical information system (GIS) are the need of the hour. The groundwater legislation to prevent the indiscriminate wastage of the perennial resource is of paramount importance. In his keynote address, What have we done to increase Soil Fertility and Productivity for Sustainable Agriculture in India?, Dr. G.K. Veeresh provides a concise report about the history of watershed management in India. His main stress lays in the organic farming through watershed development, which can be achieved by rainwater harvesting technologies, enriching the biomass and mixed cropping systems. In paper, a role of drip irrigation for water conservation, Ramappa and Shamsuddeen point out that the shifting from current flood irrigation practices to drip irrigation systems significantly improves crop yields, reduces water use, effects energy conservation, and consequently increases water efficiency. Remote sensing and geographical information system have varied and efficient applications in many fields for natural resources, management. “Analysis of Impact of Artificial Recharge to Groundwater through Remote Sensing and Geographical Information System- a Case Study in Basavapura Micro Watershed in Gauribidanur Taluk, Kolar District, Karnataka”. The authors have effectively carried out the interpretation of satellite data in conjunction with sufficient ground truth information for the purpose of identifying and outlining various ground features such as geology structures, geomorphic features and their hydraulic characters that may serve as direct and indirect indicators for artificial recharge to ground water and the changes in landuse/landcover patterns and soil nature between pre and post construction phases of artificial recharge structures. Central Ground Water Board (CGWB) carried out a pilot project in Kolar District for the purpose of the above studies by constructing Artificial Recharge Structure (ARS) in the study area. In his paper, Groundwater Legislation, T.N. Venugopal, Dept. of Mines and Geology stress the importance of legislating the groundwater resources in the state so as to avoid the indiscriminate use of groundwater and also for the sustainable development.

The third theme brings out the issues related to Water Quality and Drinking Water. Equitable distribution of drinking water has been stressed in Kulkarni’s paper. The implementation of the World Bank assisted Karnataka Rural Water Supply and Sanitation (RWSS) Project- I has set an encouraging trend of reforms. The Project named as ‘Jal Nirmal Project’ is very emphatic in rural water supply and sanitation sector. The mission has been carried out with a well-defined vision. The project resulted in both the improvement of quality and quantity of groundwater in selected study areas. Especially the fluoride level could be brought down from 1.5 to 1.00 ppm in the groundwater.

Five good papers are selected for the fourth theme, Mass mobilization and role of financial Institutions in water management, giving emphasis on rainwater harvesting through mass in-
volvement, watershed development, sustainable agriculture, financing for irrigation and last but not least, role of journalists in water literacy. These ingredients make the Memoir a wholesome contribution both from the theoretical and practical approach. The Editor has to be congratulated for the very fruitful efforts he had put in to prepare the Memoir.

Date: 10-05-2010

The Memoir will be very useful for the academicians, professionals, government and non-governmental organizations. Emphasis is made not only on saving water resources but also in introducing newer methods like drip irrigation. The Memoir is a monumental contribution and I assure that it would serve as a handbook to the experts who are all involved in the water resources related problems.

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Publisher: Geological Society of India, Bangalore, 2009.
Author: R. Dhana Raju.
Number of pages: 494
Price: Not mentioned

The author of the book has long experience in the investigations on mineralogy and petrology which is reflected in the treatment of the subject matter of the book. As Dr. T. M. Mahadevan, former Director, AMD mentioned in the Foreword to the book, the author has “Inherited special competence to write this book by virtue of his long association with AMD- - - -” and the “Book is a useful compendium that places under one cover a concise account of various petro-mineralogical techniques and their application in mineral exploration”

After Introduction as section 1, the book is divided into two parts, Part I on Techniques and Part II on Applications. In Part I, there are sixteen sections each dealing with a particular technique or methodology. These sixteen sections are given serial numbers and titled as 2) Field Study 3) Sampling and Megascopic study 4) Density and other Petrophysical properties 5) Luminescence 6) Section Preparation, staining and Modal analysis 7) Microscopic study 8) Photography 9) Mineral separation 10) Mechanical analysis of elastic sediments 11) X-ray diffraction 12) Differential thermal analysis 13) Thermogravimetric analysis 14) Fluid Inclusion study 15) Radioactivity 16) Process Mineralogy and 17) Chemical Analysis. These cover about 300 pages. Part II: Applications comprise nine sections which are given continuation of the serial numbers and titled as 18) Nomenclature and classifications of rocks and mineral deposits 19) Mineral exploration-stages and spectra 20) Petro-mineragraphy in mineral exploration and exploitation and other related disciplines 21) X-ray diffraction studies 22) Geological thermometers 23) Provenance studies 24) Fluid inclusion study as a tool in mineral exploration 25) Luminescence study as a tool in mineral exploration and 26) Ore Petrology in characterization of mineralization. These nine sections cover about 170 pages. The book contains relevant references at the end each section and subject index at the end. Photographs of the equipment, field maps, figures, photomicrographs and a number of Tables of the characters of minerals and rocks useful for identification are also given.

The treatment of the subject in the book covers from the fundamentals to advanced topics, as the titles of the sections attest. The basic principles of the techniques are clearly described and the applications are well explained. In 1920’s, a book titled “Petrographic methods” by Arthur Holmes had brought out under one cover the then available techniques and methods. Over the years the geological studies particularly in mineralogy and petrology have utilized the newer concepts that came up in the fundamental sciences in physics and chemistry which are utilized in the advanced instrumental analysis of geological materials. The book by Zussman in 1967 entitled “Physical methods in determinative mineralogy” is an example. So also specialized books for various other instrumental analysis of geological materials have come up in the later part of 20th century. But the geologist never lost right of the basic tenets and tools of the study of the earth and its materials in the field or with the microscope. Thus the present book is a blend of the two streams of techniques. The allocation of about one hundred pages to the studies with microscope in the book further confirms the importance of this technique in geological studies. The author states (on pages 300 and 391) that a book titled “Hand book of Geochemistry: Techniques and applications in mineral exploration” which is a companion volume of the present volume by the same author will come out soon which will give more information of
the chemical analysis techniques. I understand that
the book has since come out.

The author has compiled data in Tables from
standard books, for example Table 7.2 on the diag-
nostic optical properties of some common ore min-
eral from Uytenbogaardt and Burke (1971) and Table
7.6 on the typomorphic ore mineral assemblage of
different genetic types of mineralization from
Ramdohrs (1980) are compiled from standard books
which are not easily available. This enhances the
importance of the compiled data and tables. The
photomicrographs in colour, 32 in number, repre-
senting the various rock types are very good. The
section 19 on mineral exploration – stages and spec-
tra and section 20 on petromineragraphy in Mineral
exploration are dealt in detail. Naturally, there is a
greater emphasis on exploration of U- mineraliza-
tion and rare element minerals in pegmatites in there
two sections, which is the area of investigation by
AMD. The elaboration on this important topic in
book is fully backed by citation and documentation
from field settings of target area such as
Tummalapalle in Cuddapah basin, Lambapur in
Nalgonda in A. P., Gogi area Bhima basin, (pp 470-
473), Chhattisgarh basin pegmatites (pp 376-378)
and also U-deposits exploration of Domiasiat area
in Meghalaya (page381).

I congratulate the author for the meticulous
care and tireless efforts taken in compiling the book.
The book is a ready reference for the student,
teacher, professional and practising geologist and I
recommend it to all of them.

Date: 29-12-2009

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BOOK REVIEW

Geostatistics with Applications in Earth Sciences (2nd Edition).
Author: D.D. Sarma
Number of Pages: 205
Price: Rs. 750.00

The book is the second edition on the same title with ten chapters. There are several new additions in this edition. The last chapter contains computer code for the methods described in the earlier chapters. The first four chapters deal with some of the more fundamental statistical techniques especially useful in geostatistics. The standard techniques are well illustrated by real time examples in earth sciences. Chapters 5 to 8 detail basic geostatistical concepts as propounded by Prof. Georges Matheron. The ninth chapter introduces the more advanced concepts in Geostatistics, newly introduced in this edition. These five chapters constitute the core of this book.

Chapter 1 gives an excellent motivation for students and practitioners of geostatistics towards the use of statistical methods. As compared to the first edition, section 1.1 has been significantly expanded where various aspects of sampling and exploratory data analysis are well explained and illustrated.

Chapter 2 deals with univariate statistical methods, fitting of frequency distributions, correlation and regression. Monte-Carlo methods of simulation are extremely useful in statistical analysis and it is quite interesting to see their application in mineral resource evaluation aptly illustrated in this edition of the book.

Chapter 3 deals with standard statistical distribution theory with special emphasis on lognormal distribution and is distribution is an important distribution in the context mineral occurrences and is well explained in this chapter. Section 3 gives examples of goodness of fit and the application by Chi-square test. These examples are with respect to good and not so good fits.

Chapter 4 deals with stochastic process concepts and the description of Box-Jenkins time series models. The formation of mineralization may be treated as a time-series phenomena. Basic models of time series analysis viz., AR(p), MA(q) and ARMA(p,q) are explained with examples.

Chapter 5 deals with Matheron’s theory of Regionalized Variables. Variogram models and modeling the same have been well explained. It is interesting to see examples of variogram computation in the case of irregular grid. It would have been better if this discussion is a little more elaborate.

Chapter 6 contains an analysis of variograms as applied to core samples of length L. This has been well explained for linear, exponential and spherical models. Geostatistics would be incomplete without grade tonnage computations and economics. This aspect has been well explained with examples from gold mineralization.

Chapter 7 deals with the concepts of dispersion, extension and estimation variances. A numerical example to compute the variance of point samples within a panel has been well brought out so also the subtle difference between extension variance and estimation variance.

Chapter 8 deals with Kriging variance and Kriging system of equations. The author have also discussed with examples punctual and block kriging. Students and practitioners of of geostatistics would certainly get motivated with this type of approach.

Chapter 9 is a new chapter introduced and deals with non-stationarity. The author has discussed briefly universal kriging and disjunctive
Kriging. It would have been better if more details are given. Kriging non-stationary data using median polish method is well explained and illustrated with an example.

Chapter 10 deals with computer software for some of the problems discussed in the book. The code is written in FORTRAN language. However, statistical software’s like SPSS are also available.

This book serves as standard authentic book on geostatistics especially when much of the literature on the Theory of Regionalize Variables is available in French language. The author is to be complimented for bringing the basic and advanced tools of geostatistics into readable and understandable form. At the end of each chapter the author added review questions for the benefit of the students. A noteworthy aspect of this book is a discussion on various statistical and geostatistical techniques with real-time examples and detailed explanation of these. The style is lucid and simple. The chapters are well knit. The font used and the printing are pleasing. The author’s vast experience in this area is clearly seen in the illustrations and explanations. Certainly it is a good book for use by students, teachers and practitioners in earth sciences and I have no hesitation to recommend this book to be kept on the racks of libraries of academic Departments of Statistics, Geology, Geochemistry and Geophysics of various universities and centers of higher learning.

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