

What Needs to be Done?

In the background of the recent calamities, it is high time that we stress on assigning jobs to appropriate agencies with specialisation, rather than flooding different agencies with the same job. One of the best models in disaster management set up is in the US, where earthquake monitoring is vested with the US Geological Survey, and tornadoes, hurricanes, tsunami etc. (atmospheric and marine disasters) are monitored by the National Oceanographic and Atmospheric Administration (NOAA) agency. Thus tsunami is predicted, earthquakes are properly monitored and calibrated for their magnitude, geographic location and focal mechanism, and warning on cyclones, blizzards, tsunami etc. is given in sufficient advance. Need based reorganisation of our scientific establishments and responsibility assignment are the need of the hour, if we have to safeguard our populations living in the hinterland as well as along the coastal tracts of India. There must be a clear-cut distinction of geological hazards on one side and atmospheric-marine disasters on the other, with provision for accurate data generation and timely data sharing. India's analogue to NOAA shall be a combined effort by the Department of Ocean Development, India Meteorological Department, and one or two research institutions associated with them with appropriate inputs from ISRO, Survey of India and Hydrographer's Office of the Indian Navy, which are currently under different ministries. Since the onland changes, taking place as part of our development scenario are bound to influence the subterranean dynamics of the surrounding oceans, we need to monitor the ocean bottoms around the country in a systematic manner, and in

cooperation with our neighbours. Being a larger country, and sourcing much of the land fluxes into the adjoining seas, India has a larger responsibility; in scientific terms, towards the welfare of our neighbours also. That, if we discharge, will be much in line with the east-looking policy of the founding fathers of the Indian foreign policy. This will also give the much needed international fillip to the Indian science.

Scientific inputs are needed in our Coastal Regulation Zone Act, for projection of inundation levels in low-lying areas (e.g. Ranni of Kachchh, Kuttanad etc in the West Coast, coastal plains of the eastern States) in the event of sea-level rise or tsunami hit.

Similarly, we in India need to think about 'microseismic zonation' of major population and industrial centres considering not only the local seismicity, but also the impact from far away seismic shocks, as happened during Bhuj and Sumatra earthquakes in the rest of the country. The latter may not have found a place in the existing seismic zonation map prepared by the Bureau of Indian Standards (BIS) recently.

In disaster management, we need a holistic approach, different from the present fragmented efforts with immediate reorganisation of the establishments on a pragmatic manner. Disaster related matters also must be included in the school curriculum. In a nutshell such a beginning is needed in operationalising the disaster management scheme on the anvil in the country.

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CONTACT PROGRAMME ON ISOTOPE GEOLOGY AND GEOCHRONOLOGY — Rb-Sr SYSTEMATICS

A Contact Programme on Isotope Geology and Geochronology with special reference to Rb-Sr systematics was conducted at the Department of Earth Sciences, IIT Roorkee from 5th to 25th February 2005 with the support of DST. The programme was inaugurated by D.N. Avasthi, Chairman PAMC, DST, New Delhi and Dr. Prem Vrat (Director, IIT Roorkee) presided over the function.

The whole course was designed in such a manner that participants got the theoretical knowledge as well as the practical experience in Rb-Sr systematics. Forenoon of each day was devoted to a lecture of 2 hours followed by practicals. Each participant was given a sample (either whole

rock fraction or a mineral fraction of either biotite or muscovite). Each participant was involved from the sample preparation to chemical analysis, instrumental work, data acquisition and interpretation. To begin with Dr. Sandeep Singh (IIT Roorkee) gave an insightful lecture on sample preparation, which is the backbone of any geochemical analysis, starting from the field sampling to homogenization, grinding, powdering etc. and their representation on the geological map. In lecture-2 the basics of geochronology/isotope geology were dealt by Prof A.K. Choudhary (IIT Roorkee). His lecture threw light on decay laws, age equations and general aspects of geochronology with various

systematics like Rb-Sr, Sm-Nd, U-Pb- Th, K-Ar, Ar-Ar. In the 3rd lecture he elucidated the principles of mass spectrometry. In lecture-4 Dr. Sandeep Singh talked on basics of Rb-Sr systematics: whole rock and mineral dating. He discussed the properties of Rb, Sr and Rb-Sr decay principles and plotting of isochron and measuring of an errorchron. Knowledge of mineral and whole rock dating was also shared by him. He stressed on "not to be dishonest in omitting certain points from the isochron purposely". Prof. RM. Manickavasagam (IIT Roorkee), introduced the subject of ion chromatography in a lucid manner. He explained the geochemistry involved in sample preparation and the chemistry behind the ion chromatography. He talked about ion exchange principles, resin structure and its properties. In lecture-6, Dr. Sandeep Singh introduced participants about various types of mass spectrometers like TIMS, SIMS, ICP-MS, LA-ICP-MS, MC-ICP-MS, AMS, GS-MS. He gave a full demonstration of Thermal Ionization Mass Spectrometer (TIMS) which has been installed in IIC, IIT Roorkee. Rb-Sr dating was discussed by Dr. Sandeep Singh in the 7th lecture. Prof. A. K. Choudhary in the 8th lecture gave an introduction to strontium isotopes in petrogenesis. He talked about BABI, lunar chronology and behavior of Sr isotope in various types of rocks.

Dr. Sunil Kumar Singh (PRL, Ahmedabad) talked in the 9th lecture about the Sr isotopic analysis in water system. He gave an idea that Sr in water system has been used to study the weathering and erosion and to understand the geochemical cycles of carbon and other elements. Dr. Sunil Bajpai (IIT Roorkee) devoted his lecture to historical geology. It was made clear that Isotope geology can also be utilised in the dating of fossils. He elaborated on the utility of Sr isotope study in deciphering the habitat and migration of various paleo-animals. It can also be used for forensic science. In the 11th lecture, Dr. A.R. Vijan (KDMIPE, ONGC, Dehra Dun) told that Sr isotopes can be used extensively in dating of sedimentary rocks with certain precautions. Prof. K. Gopalan (NGRI, Hyderabad)

introduced the vital part of geochronology i.e. isotopic dilution. The 12th lecture on isotopic dilution by him was extremely helpful for every type of geochronological analysis. In the 13th lecture Prof. Kailash Chandra Mittal (IIT Roorkee), explained the fundamental of electronics, instrumentation of the TIMS. The 14th lecture by Prof. A.K. Choudhary was on the new frontiers in isotopic research. He talked about microchronology and uses of Sr isotopes as tools of investigation. The last lecture was by Prof. A.K. Jain (IIT Roorkee), where the class was taken into the mysteries of Himalayan collision. There was an active interactive discussion on the closure temperature and exhumation of terrain. The exhumation history is now hotly debated as people are eager to know the relative roles of the tectonic activity vis-à-vis the weathering process.

During the course the participants were acquainted with all the steps starting from sample preparation to chemical analysis, instrument handling and data acquisition and interpretation. We started with five whole rock samples and three mineral separates and worked hard even sometimes late into the night and plotted an isochron and got a good result. At every step, Prof. Jain, Prof. Choudhary, Prof. Manickavasagam and Dr. Sandeep Singh guided us. In addition to that, we were made familiar with AAS, ICP-MS and EPMA at IIC, IIT Roorkee which are helpful in studying isotope geology. The helping hand lent by Dr. Tamal Ghosh, Biswajayee A. Patra, Nikunja Bijari Singha and Chandramouli Kulashreshtha made the programme even more beneficial.

In the valedictory function Dr. Ch. Shivaji (DST, New Delhi) congratulated all the participant and the team behind the contact programme for its grand success and wished the best of luck for future.

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FAST DECLINE OF WATER LEVELS IN URBAN TIRUPATI, CHITTOOR DISTRICT, ANDHRA PRADESH

For all the fairly good amount of rainfall in India, large amount of it is lost through runoff in the absence of sufficient sites for storage and impounding. There is thus an imbalance between recharge and groundwater development in many parts of the country. Tirupati, Madanapalle and Punganur

municipalities are located in Chittoor district of drought-prone Rayalaseema region of Andhra Pradesh. Geologically, these areas are characterised by granites and dyke rocks of Archaean age and are overlain by recent alluvium. The average annual rainfall observed in the Chittoor district is