

In this issue

Special section: Geochemistry

The study of the chemistry of earth materials including minerals and rocks, soils, sediments and dust, and water and life is an important field in the subject of Earth Sciences. This sub-discipline of earth sciences, also known as geochemistry, uses abundance and association of chemical elements and their isotopes in all kinds of earth materials to study (1) their distribution on earth, (2) time, source and physical conditions of their formation, (3) remobilization history since formation and (4) the physical and biological processes that were involved in their formation. This special section has seven papers – three on rocks, three on sediments and one on water. All the seven papers show how the abundance of elements and isotopes is used to infer the sources and/or processes of their formation.

Vijaya Kumar *et al.* (page 184) modelled major and trace element concentrations in igneous rocks of the Eastern Ghat Belt from Kondapalli and Prakasam regions to show that these crustal rocks in adjacent regions were formed in different tectonic settings during the Proterozoic (subduction versus rift) from two different mantle sources; the former with extraneous crustal component and the latter with indigenous melt component. The observation goes to show that fluxes, internal or external to mantle sources are required for magma generation (fluxes could be fluids or melts). Rao and Daga (page 198) used again major and trace element data on leucosomes in migmatites and intrusive granite plutons of the Shyok Suture Zone in the Himalaya to show how the plutons and leucosomes are genetically related to the same crustal sources; leucosomes represent channels of melt which by segregation and intrusion gave rise to the plutons. Awasthi *et al.* (page 205) determined the age of the volcanic ash beds in the Andaman and Nicobar islands by $^{40}\text{Ar}/^{39}\text{Ar}$ method and found them to be much younger than what was thought to be (0.73 versus 2.3 m.y.). Using Sr and Nd isotopic data, they have shown that the ashes were related to the volcanoes of South Sumatra islands.

Paul and Dutta (page 211) studied the organic geochemistry of coal-bearing Cretaceous sediments of the Kutch basin using gas chromatography–mass spectrometer techniques. Identifying various

organic compounds in the sediments, they conclude that the coal included in the sediments was derived from coniferous forests. Pramod Singh *et al.* (page 218) studied sediments of the Cauvery delta region with multiple geochemical techniques. The samples were obtained from sediment cores drilled at two different places in the delta. All data were analysed to show that the deltaic sediments were deposited after LGM in middle to late Holocene in response to changing sea level. The southern part of the delta includes sediments derived from local Tertiary uplands, whereas that of the central and northern parts from Western Ghat highlands. Geochemical immaturity and youthfulness of the sediments are considered to be determinants of the fertility of the legendary Cauvery delta. Shynu *et al.* (page 226) studied the suspended and bottom sediments of the Mandovi and Zuari estuaries in Goa for their organic geochemistry. They report that whereas the organic matter in the Mandovi sediments is sourced in terrestrial plants, that of the Zuari is sourced from soil organics. Using carbon and nitrogen isotopic characteristics of sediments they were able to discriminate natural from anthropogenic sources to the organic matter in these sediments.

Satya Prakash *et al.* (page 239) determined N isotopic composition in the Southern and Equatorial Indian Ocean waters and suggested that the Southern Indian ocean supports a higher primary production by new nitrate uptake, unlike the Equatorial ocean which has more secondary nitrogen sources. This nitrate uptake in the Southern Indian Ocean promotes higher atmospheric CO₂ sequestration, relative to the Equatorial Indian ocean.

These seven papers clearly demonstrate how chemistry is used in geology.

V. Rajamani
— Guest Editor

INSPIRE

An idea seeds every child. Let it grow. Let it grow.

Gold earrings. The peak of his cap turned sideways. The Manipuri lad says, 'My innovative physical balance is cheap and portable.' He presses his palm on the

weighing pan, the spring coils taut, and the needle swivels on a calibrated 'kilogram' scale. How much do those palms, which can barely clutch an apple, weigh?

CUT TO:

Braided hair curved like the horns of a proud ram, the girl from Jharkhand affirms, 'Save electrical energy with muscular power.' She pedals the contraption she has engineered. The back wheel revolves, turning a fan that not only charges a cell phone, but also, akin to an electric motor, spews water through a pipe. She is only 16 years old.

CUT TO:

'I thought,' a 30-year-old researcher reins his tears in, 'Considering my [poor] background I will never be able to pursue science research as a career...But with the INSPIRE fellowship—' Overwhelmed, he breaks off. How much do those tears weigh?

CUT TO:

These three video clips on the internet allude to a Department of Science and Technology initiative that marks a new epoch in India's timeline. An initiative whose sole objective is to encourage the young to pursue the natural sciences:

The INSPIRE programme.

Targeted at about 10 lakh people aged between 10 and 32, the programme will award them 2000 crore rupees through fellowships, prizes, and scholarships over the next five years. In fact, by the end of the 12th five year plan the programme will have touched 25 lakh Indians. The sheer magnitude of INSPIRE is unprecedented. Yet, even after seven years since its inception, the programme struggles to realize its full potential.

But why? What hinders it?

To answer this, Madhu *et al.* hitchhiked through India. Equipped with only a video camera, they (i) interviewed INSPIRE stakeholders living in different regions; and (ii) documented the events of the INSPIRE programme. Thus, their journey generated 80 hours of video data whose analysis reveals —...

TURN TO:

General Article, page 170.

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