at a place where the actual depth is between 14 and 50 m. Manifestations of CR_2 are absent in this map and WT_2 is not traceable. Whether the plateau reflects any buried mass is not known. Such marked discrepancies were also observed while comparing the profiles drawn from the inner-shelf to the western slope across the Lakshadweep Ridge (S. V. Hegde, pers. commun.). Since these two areas fall on the continental crust, our apprehension is about the algorithm used to convert the gravity data obtained over the continental crust and oceanic crust. Hence, care must be taken while using altimetry data of near-shore areas. A detailed paper on this will be presented at the National Seminar on Quaternary Climatic Changes and Landforms in Tirunelveli.

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Response:

We thank Dinesh *et al.* for appreciating the satellite altimetry-related bathymetry prediction activity as a fast and effective method. We have tested the model in a deeper ocean near the Andaman offshore and received appreciably satisfactory results. The known ship-borne bathymetry technique is old, requires a number of corrections and is highly time-consuming. Even today, a huge area in the Indian offshore remains unexplored by ship-borne bathymetry. In this respect, satellite altimetry delivers a fast and comparatively accurate method for prediction/delineation of bathymetry, particularly over the deeper oceans.

For generation of gravity using altimeter data, one has to first generate the marine geoid (the hypothetical surface nearest to the sea surface, free of any external disturbances, e.g. tides, sea-surface winds, ocean gyres/eddies, etc.) from sea surface heights. The same can be converted to free-air gravity using a simple formulation as given by Chapman[1]. The detailed method gets complicated due to a number of corrections, and other necessary parameter estimations. Geoid undulation (geoid height with respect to the reference ellipsoid) is used as one of the parameters for bathymetry estimation using the concept that the changes in the geoid (static component) are caused by bathymetry anomaly in this region.

We are also pleased to note that a ship-borne bathymetry map was prepared to compare the sea-floor morphology with that of the bathymetric data derived by satellite altimetry within the territorial waters off Tuticorin in the Gulf of Mannar. Now coming to the intricate details that are expected in the case of a few near-shore anomalies, it would have been better if they had given the profiles with the bathymetry anomaly plotted. However, one point here is important in that the prediction of bathymetry becomes invalid in the near-shore region due to the signal processing limitations. By Nyquist theorem, two samples per cycle will completely define a band-limited signal or the sampling rate must be twice the highest frequency component of the signal (Shannon's sampling theorem). So, if the area falls within the limit of two sampling intervals (~30 km), in the present case data resolution ~15 km, it will not be possible to predict the bathymetry. With higher resolution datasets (currently ~3.5 km), this problem will be limited to within 7 km near the coast. However, the technique is valid in the deeper oceans. Details of intricate sea-floor morphology, particularly coral ridge, etc. should get reflected in the predicted bathymetry profiles, provided they are in deeper oceans and sufficiently large in extent.

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Is phytoremediation the solution for arsenic contamination of groundwater in India and Bangladesh?

Groundwater which is not present in abundance in nature is one of the most important sources of drinking water. The contamination of groundwater with arsenic is a serious problem encountered in northern India and Bangladesh[1]. To understand the magnitude of the arsenic calamity in West Bengal, a detailed study spanning seven years was made in North 24-Parganas, one of the nine arsenic-affected districts[2]. Area and population of North 24-Parganas district are 4093.82 km^2 and 7.3 million, respectively. Nearly forty eight thousand water samples were analysed from hand tube wells of North 24-Parganas which are in use for drinking. 29.2% of the tube wells were found to have arsenic above 50 µg/l, which is beyond the maximum permissible limit of World Health Organization (WHO) while 52.8% had arsenic above 10 µg/l, which is slightly above the WHO recommended value of arsenic in drinking water. Out of the 22 blocks of North 24-Parganas, arsenic has been found in 20 blocks above the maximum permissible limit and so far in 16 blocks people have been identified as suffering from arsenical skin lesions. From the data, it is estimated that about 2.0 million and 1.0 million people are drinking arsenic contaminated water above 10 µg/l and 50 µg/l level, respectively in North 24-Parganas

alone. Extrapolation of the data indicated that about 0.1 million people may be suffering from arsenical skin lesions in North 24-Parganas alone[2]. Studies conducted by UNICEF and Jadavpur University showed that 14 districts in Bihar, 11 districts in Uttar Pradesh, two each in Assam and Chattisgarh and one in Jharkhand display large-scale arsenic contamination[3].

Almost in every home in the northern district of Bangladesh, there is a child or an adult suffering from a mysterious disease. Many have died and the villagers have lost count of the casualties, most of them small children[1]. The symptoms are frightening: watery eyes, chronic indigestion, colds and stomach cramps in the early stages and swollen limbs with bleeding gangrene-like wounds in severe cases. This silent killer is arsenic which has contaminated the drinking water of many villages in northern Bangladesh.

Phytoremediation, the use of plants to help clean up toxic waste sites, is not only a growing science but also a growth industry[4]. Researchers have created an engineered *Arabidopsis* plant that safely takes up the toxic arsenic element, and hope to use it to restore soils that are too contaminated for human use[5]. Once arsenic is concentrated in the leaves or stems of plants, the plants can be harvested cheaply and incinerated safely. Genetically engineered, deep-rooted perennial trees are well suited to remove arsenic from soil. So far no plant which is capable of absorbing the arsenic from deep soil has been designed and proved effective outside the laboratory. Plants (trees) carrying the genes for detoxification of mercury present in polluted soil have been developed and it has been proved that these plants absorb mercury from the soil and vaporize it effectively to the atmosphere in non-toxic forms[5]. People are using the engineered Indian mustard plants (*Brassica juncea*) to clean up selenium deposits in California's Central Valley[6]. Drinking water throughout the North Indian region has been contaminated by soils polluted naturally and by spills and drainage from factories. There is an urgent need to develop and apply phytoremediation technology using genetically engineered plants to decontaminate the polluted soils and water bodies in India. This will be effective in bringing new resources and technology to solve environmental problems, and in India human resource expertize in biotechnology is not lacking.

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NEWS

MEETING REPORT

Emerging technologies in resistance dynamics in insect–plant interactions*

Inaugurating the meeting on Resistance Dynamics, the Vice-Chancellor of the University of Madras, S. P. Thyagarajan outlined the various strides made in the field of biotechnology and opined that genomics and genomic medicine form the interface between environmental risks and environmental protective factors. He mentioned that proteomics and functional genomics find relevance in every field of science. He also indicated that emerging fields of science such as nanosciences and nanotechnology are reliable tools in the diagnosis of ailments. K. V. Peter (Vice-Chancellor, Kerala Agricultural University, Thrissur) in his keynote address dwelt on the beneficial aspects of insects to man, as also the chemical inputs involved in the resistance of crop plants against insects. S. Natesh (Department of Biotechnology, New Delhi) in his special address discussed the economic, ecological and ethological perspectives of insects and commented that the loss of yield in crops by insects should be viewed seriously. He said that transgenics should be a part of IPM technology and efforts should be made to convert biotechnology into economic wealth.

Introducing the theme of the discussion meeting, T. N. Ananthakrishnan said that insect-resistant cultivars provide a substantial or sound approach to crops with constitutive resistance possessing genetically inherited traits and induced resistance occurring when the defence system of a plant is stimulated by external physical or chemical stimuli. The effects of insect-resistant cultivars are cumulative; the longer the insect-resistant plant genes are employed, greater the benefits with decreasing amounts of wild germplasm available for using many crop plant species. It becomes all the more necessary for better preservation of existing global plant crop germplasm collection. Interdisciplinary research between entomologists and plant breeders would certainly augment diversity, enabling collection of new genetic materials that can be incorporated into diverse crop plants. Additional types of insect resistance genes sources such as *Bt* genes, lectins, proteinase and amylase inhibitors have

*A report on the VI Discussion Meet on Resistance Dynamics held on 2 December 2005 at COSTED, Chennai.