NEWS AND VIEWS

SCIENCE NEWS

***The Bermuda Triangle — a region in North Atlantic Ocean** — is notorious for ships and aircraft disappearing under mysterious circumstances without a trace, baffling researchers and general public alike. It is a subject of various conspiracy theories that attribute the phenomenon to paranormal activity and extraterrestrial beings.

A possible explanation has arisen since the discovery of giant underwater craters at the bottom of Barents Sea, off the coast of Norway. Researchers from the Arctic University of Norway have found craters up to half a mile wide and 150ft deep, believed to have been caused by build-ups of methane off the coast of natural gas-rich Norway, probably a cause of enormous blowouts of gas. The scientists explained that explosions causing the craters to open up could pose dangers to vessels travelling through the area, explaining the disappearance of ships and aircraft. Russian scientist Igor Yeltsov of the Trofimuk Institute, explained, "There is a version that the Bermuda Triangle is a consequence of gas hydrates reactions. They start to actively decompose with methane ice turning into gas. It happens in an avalanche-like way — like a nuclear reaction — producing huge amounts of gas. That makes the ocean heat up and ships sink in its waters mixed with a huge proportion of gas."

***Volcanic Ash Disperses After an Eruption**

Volcanic ash affects not only air transit but also public health and agriculture in nearby communities. How particles scatter after an eruption is incredibly complex and chaotic because of the different behaviour of particles of different size and the uncertain distribution of particles at the source. Some particles can linger in the air for just a few minutes, whereas others can remain airborne for years, travelling thousands of miles around the world. Researchers investigate how particles from a volcanic plume disperse and what factors govern the uncertainties associated with dispersal. Using a Lagrangian particle dispersal model, which computes the trajectories of a large numbers of volcanic particles on the basis of their physical properties, the researchers investigated how uncertainty in the initial size distribution of particles and their sphericity—a measure of how round an object is—affected how each particle scattered following a volcanic eruption. This model also accounted for realistic conditions such as wind. The scientists found that the uncertainty in the distribution of particles greatly reduces with distance from the source because of the effective segregation imposed by the atmospheric dispersal process. Moreover, rounder pieces of volcanic ash experienced less drag in the air, so they slipped out of the atmosphere sooner and didn't travel as far. Conversely, particles that weren't as spherical experienced more drag and remained in the atmosphere longer. As a consequence, sphericity mostly controls the grain size distribution at a given distance from the source. The authors also found much more variation in the size of particles that stayed aloft compared with those on the ground.

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***Predicting Changing Human Preferences in Water Basin Management**

Humans are now more than ever active participants, rather than passive bystanders, in the natural hydrologic system. To assist with making long-term strategic decisions about water management within this new context, socio-hydrologists are developing models that incorporate social processes into their study of water use. Coupling these very different systems and their feedbacks, however, is challenging; despite recent studies that highlight the importance of the trends in our changing societal values, these variables have yet to be fully incorporated into human-water system models.

To address this gap, researchers developed a simple conceptual model that simulates the socio-hydrologic interactions in Florida's Kissimmee River Basin from 1948 to 2012. In response to extensive flooding there, the community decided in the 1960s to channelize downstream portions of the river. By the 1990s, however, a shift in priorities led to the ongoing restoration of both the river and the affected wetlands. The researchers hypothesized that these expensive modifications resulted from changing societal values as well as a disparity in power between the more numerous and wealthier upstream urban residents—who prioritized the restoration of wetlands—and the more rural downstream residents, who prioritized protection from floods. To simulate this complexity, the team included a "community sensitivity variable" in this system

that quantifies the differences between the two portions of the basin, as well as the two-way environmental and societal feedbacks.

After calibrating the model to reflect the basin's historic trends, the researchers incorporated projected population data to predict changes in this basin from 2013 to 2032. Under a constant-precipitation scenario, the results show that over the next couple of decades the wetlands will continue to recover and the community sensitivity will return to neutral. This study demonstrates the potential of socio-hydrologic models to describe complex interactions using straightforward concepts and simple mathematical equations. These models have the potential to become important planning tools to minimize the unintended and expensive consequences of changing societal preferences.

(*Water ResourcesResearch*,doi:10.1002/2015WR018194, 2016)

LIVING LEGENDS

Shri T.S.Balakrishnan

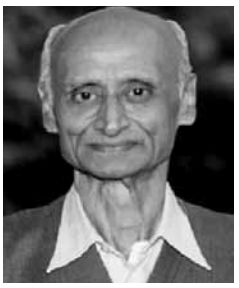
Shri Balakrishnan born on 5.10.1927 was educated in Bombay and Allahabad. He took his Master's Degree in Physics in 1947. Thereafter he worked as a Research Scholar in the Indian Institute of Science, Bangalore in Dr. C.V. Raman's laboratory. In 1953 he joined the Geological Survey of India and two years later he switched over to the then newly formed Oil and Natural Gas Commission, as one of its first scientific officers. For the next three years he carried out geophysical exploration in Cauvery, Jaisalmer and Punjab basins. In 1958 he went to the USA under the Technical Cooperation Mission plan to study multifarious methods used in oil exploration. After returning from USA in 1959 he continued exploration programmes in Punjab, U.P. and Bihar. Being a member of the first team of exploration geophysicists in ONGC, he initiated and supervised such programmes in several other sedimentary basins. The first successes were visible in Gujarat and Assam.

Shri Balakrishnan was a pioneer in ONGC's hydrocarbon exploration. The discoveries of oil and gas in Gujarat and Assam led ONGC to consider the prospects in the offshore areas. Here again, despite total inexperience in this field, Shri Balakrishnan was called upon to plan, organize and conduct ONGC's first offshore venture in the Gulf of Cambay. It took some time to study the material requirements and imported them from abroad. Simultaneously, there was a search for a suitable vessel to operate in that area. The high tidal range, swift currents, sand bars etc. posed an unusual challenge. Ultimately a shallow draft vessel was located in Bombay. This was rigged up with accommodation and equipment so as to make it suitable for seismic surveys, and christened M.V. Mahendra. Actual surveys commenced late in 1963, and within the next few months the first offshore structures of Alia Bet and North Tapti were mapped. Shri Balakrishnan also initiated ONGC's first offshore drilling project in the Gulf of Cambay in 1970-71. In the intervening period he worked as Superintending Geophysicist in charge of 10 seismic and 6 well logging crews. He was Project Manager of Cauvery Project from 1972 to 1973.

In the latter half of 1973 he was called upon to organize and carry out ONGC's first foreign seismic operations in Iraq. It was here that the technique of distributed surface charges was introduced to overcome the shot hole drilling problems. This was subsequently replaced by the vibroseis method. After an eventful stint in data acquisition, he took over as Head of Exploration in ONGC's Institute of Petroleum Exploration in Dehra Dun, where he worked for 8 long years from 1974 to 1982. During this period he initiated the task of consolidation and interpretation of geoscientific data on a regional scale over the Indian subcontinent. He realized the potential of non-seismic methods such as gravity and magnetic data for understanding regional tectonics and deep seated features. He worked towards the integration of offshore and onshore gravity, magnetic and seismic data. In 1982 he joined Bombay Offshore Project as Director of Geophysics and worked there until his retirement in 1986. He was responsible for the acquisition of ONGC's second seismic survey vessel. Even during his Bombay posting he continued working on data interpretation. Even after superannuation he continued to be active on consolidation and interpretation of data, particularly in upstream areas to produce a rational model for exploration. This was his personal hobby, and not at the instance of any organization. His initial Tectonic Map was published by the Geological Society of India in 1997. From 1977 to 1979 he continued his studies in collaboration with Dr.Mita Rajaram of the Indian Institute of Geomagnetism, Bombay. The result was the publication of the composite magnetic intensity map of the Indian subcontinent including the shelf areas.

Even today he is active and recently, the concept of isostasy has been brought into play and integrated into the analysis. This brings out the correlation between topography and other geophysical parameters. It is strikingly successful in delineating the deep structure of the Nepal Himalayas and S.Tibet. Overall the effort has been stupendous. Shri Balakrishnan is known for his uncompromising yardsticks for quality of scientific investigations, and is an upright geoscientist with a comprehensive insight into the tectonic framewonk of India. As an administrator and scientist his contributions are par excellence. The Association of Exploration Geophysicists presented the "Actively Engaged Geoscientist Award" during the Twenty Third Annual Convention, 1997, in Shillong. The Society of Petroleum Geophysicists at its Delhi Meeting in February 2000 awarded him the Gold Medal for Lifetime Achievement in Petroleum Geophysics.

Prof. R. Vaidyanadhan



Rajagopala Vaidyanadhan, born on the 21st September, 1931 had his schooling in Vijayawada (A.P.) and obtained his M.Sc. and Ph.D. degrees in Geology from the Andhra University, Visakhapatnam. He taught Geology of India, Geomorphology and Remote Sensing for 20 years from 1953 to 1973 at the Geology Department and Photogrammetry, Geomorphology and Remote Sensing for 18 years at the Geography Department from 1973 to 1991, when he superannuated as Professor in the Department.

He had his training in Photogrammetry and Photo-interpretation at the Institute of Cartography, Geodesy and Photogrammetry, and Geomorphology at the Geology Department of the Ohio State University, Columbus, Ohio, USA on a Smith-Mundt- Fulbright Scholarship during 1959-1960, followed by training in Photogeology at the United States Geological Survey, Washington D.C.

He served as Professor in Geology at the Geology Department, University of Dar-es-Salam, Tanzania for a period of two academic years during 1981-1983. He conducted training Work Shops in Geomorphic Mapping for students selected from different parts of India and professional geologists, sponsored by the Department of Science and Technology and Geological Survey of India, respectively.

He has about 70 papers published in national and international journals, with his scholars being the lead authors in most of them. He had supervised 12 students for their Ph.D. degrees both from the Geology and Geography Departments of Andhra University and professional geologists from the Geological Survey of India and the Oil and Natural Gas Commission. Some of his notable publications are: edited volume on the "Quaternary Deltas of India" (Mem. Geological Society of India, 1991), a Monograph titled "Geomorphology of the Indian Subcontinent" published by the Indian Society of Remote Sensing, Dehra Dun(2002), a 2-volume book on the "Geology of India" with Dr. M. Ramakrishnan (of the Geological Survey of India) published by the Geological Society of India (2008) and revised in 2010, an ATLAS on "Landforms of India from Topomaps and Images" published by the Geological Society of India (2014) with Prof. K.V. Subbarao (formerly of IIT, Bombay and UOH, Hyderabad). Dr. B.P. Radhakrishna was his mentor during the latter part of his life and mainly responsible for the encouragement provided for all the publications that emanated from the Society. He was Editor of the Journal of the Geological Society of India during 1992-1995 and Vice president of the Society during 1998-2004 and again now for the period 2013-2016.

He has carried out projects sponsored by UGC, CSIR, ONGC, DST, ISRO, Ministry of Defence, Planning Commission etc. He was in the Evaluation Committees of UGC, CSIR, WIHG and ISRO.

He is the recipient of the Best Teacher Award (1983) from the Government of Andhra Pradesh, and the Golden Jubilee Honour for contribution to Earth Sciences from the Geological Society of India (2008).

P.R.Reddy