OBITUARY

T.S. Balakrishnan
(1927-2018)

Shri T.S. Balakrishnan, Former Director (Geophysics) of Oil & Natural Gas Corporation (ONGC) passed away on 8 August, 2018 in Bengaluru, after a brief illness at the age of 91 years. He was born on 5 October, 1927 at Thrissur, Kerala. He was a Life Fellow of the Geological Society of India.

Shri Balakrishnan was educated in Bombay and after getting his Master's Degree in Physics in 1947 from Allahabad 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. He was a member of the first team of exploration Geophysicists in ONGC. In 1958 – 1959 he went to the USA to study multifarious methods used in oil exploration. He initiated and supervised geophysical exploration programmes in several sedimentary basins. He was a pioneer in ONGC's hydrocarbon exploration. He took the challenge to plan, organize and conduct ONGC's first offshore venture in the Gulf of Cambay where he also initiated ONGC's first offshore drilling project in 1970-71. In 1973 he was called upon to organize and carry out ONGC's first foreign seismic operations in Iraq. 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. In 1982 he joined Bombay Offshore Project as Director of Geophysics and worked there until his retirement in 1986. After superannuation he continued to live in Mumbai with his wife Jaya. He was very active in this phase too and continued to work on data interpretation and received recognitions: Association of Exploration Geophysicists presented him the actively engaged geoscientist award in 1997, the Society of Petroleum Geophysicists awarded him the Gold Medal for Lifetime Achievement in Petroleum Geophysics in 2000 and he was featured in the Journal of Indian Geophysical Union under Living Legends in 2016.

I had the opportunity of interacting closely with Shri Balakrishnan since the days he started writing the Book "Major Tectonic Elements of the Indian subcontinent and contiguous Areas: A Geophysical View" published as a Memoir by the Geological Society of India in 1997 and supported by the Indian Institute of Geomagnetism (IIG). His hallmark was to integrate large, extensive and intensive datasets available; the topographical, gravity and to a large extent the geological data meet this requirement; he used seismic, bore hole, MT and other geophysical data as controls. He personally worked on large transparent sheets and put everything on scale 1:4,000,000, the scale of the Atlas using different colours to highlight information. It was very interesting to see that incorporating seismic sections, he did not necessarily go by the interpretation of other authors but rather looked at the seismic sections and made his own interpretations. Where ever he lived he always had his large drawing board. He was a Physicist at heart and thanks to his extensive field experiences, he had great appreciation for the extensive geology of the subcontinent. He described Palghat

Gap, St. Mary's island, Dauki fault, etc with such animated involvement that you could visualise the same.

Shri Balakrishnan mentions in the Introduction of this Memoir "Another gap in the present compilation is that adequate attention has not been paid to the detailed magnetic data available in the various regions". It was to bridge this gap that soon after the publication of this Memoir we started working on a DST Funded project entitled: "Geophysical studies of the Indian subcontinent and its contiguous region for understanding the complexities of the deep crust" with Shri Balakrishnan as Principal Investigator and me as Co-PI (1997-2001). It was under this project that we first started acquiring degree sheet aeromagnetic maps from Geological Survey of India. With Project Fellows S.P. Anand (currently in IIG) and P. Harikumar (currently in ONGC), we formed a part of a long standing association of literally three generations, with Shri Balakrishnan having an uncanny vision of looking beyond the data. Shri Balakrishnan visited IIG regularly carrying his characteristic map case with his huge tectonic maps that kept getting better as more and more geophysical data got incorporated into the map. Very often Shri Balakrishnan's interpretation appeared hand waving but brain storming sessions would reveal that lot of experience and information, not spelt out, have been inbuilt into the interpretation. In 2003 IIG moved from its Colaba campus to Panvel; his visits to IIG reduced and so often we would visit him at his residence for discussions. His wife Jaya was a very warm person and extremely hospitable. In the period 2000 to 2006 in addition to the Project completion report we had co-authored five papers. The last one was "Composite Magnetic anomaly map of India and its contiguous regions" published in the *JGSI* in 2006, where we put together all available ground and marine magnetic data published by different agencies to complement the available aeromagnetic data over India and its contiguous region to produce a composite magnetic anomaly map. He firmly believed that with fresh data, new ideas and interpretations would keep cropping up. His next 'Tectonic map of India and contiguous region' was published with ONGC group, in the *JGSI* in 2009. In this tectonic map some magnetic data was incorporated and the resultant changes are visible.

After the passing away of his wife Jaya in 2006, he moved to Bengaluru to live with his daughters Meera and Rohini. He continued working on his tectonic maps and regularly kept sending me his notes on the different tectonic blocks by email. Our last meeting with Shri Balakrishnan was in May 2018 at Rohini's residence. He discussed changes that he had incorporated in his Tectonic map and also talked about the possibility of India tapping the vast amount of available geothermal energy. He will always remain an inspiration for people who want to be actively involved in research till the end of their lives.

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