

Speaker Series

Speaker: Kasthuri (Venkat) Venkateswaran

Topic: Report on the First Manned Operation of the Recently  
Discovered Indian Ocean Hydrothermal Vent Systems

Date: Friday, April 26, 2002

Time: 1:30 - 3:00 p.m.

Location: JPL Bldg. 306-302

Abstract:

In 1999, Researchers from the Japan Marine Science and Technology Center (JAMSTEC) discovered a new hydrothermal vent system in the Rodriguez triple junction of the Indian Ocean. Remote operation vehicles explored this Indian Ocean hydrothermal vent system during 1999 (Japan) and 2000 (U.S.). In early 2002, JAMSTEC invited JPL to participate in the first manned operation of the site. During this talk, Venkat will present some of the characteristics of this hydrothermal vent system with preliminary results. In addition to the in situ exploration of the site, the Biotechnology and Planetary Protection Group's interests in such extreme environments center around the development of systems involved in the collection of hot water samples, while maintaining the integrity of the sample and avoiding contamination from the surrounding deep-sea water.

Hydrothermal vent plume samples from several chimneys, sediments, and animal communities of the Kairei fields (25°19.2154'S, 70°02.3931'E, Depth: 2,500 m) were collected using the "Shinkai 6500" submersible. The samples were analyzed by several methods. The main objective of this 2002 expedition was to extract DNA on-board the R/V Yokosuka using an automated DNA extractor (Instant Genetics, Inc., CA). This allowed the team to

determine whether any genetic information was lost during prolonged sample storage conditions. Isolation of microbes resistant to UV and H<sub>2</sub>O<sub>2</sub> were also carried out, and the incidence of aerobic cultivable microbes tolerant to 80 °C was studied. Hydrothermal vent water at the mouth of the Kali chimney was collected for gas analysis. The temperature of water from this chimney was 363.4 ± 0.4 °C during the 40-min. sampling period. This is the first time the actual vent water temperature was able to be measured for an extended period of time.

Biography:

Dr. Kasthuri Venkateswaran joined JPL in 1998 with Ken Nealson and was subsequently absorbed by the Biotechnology and Planetary Protection Group (Sec. 354). Since then he has been involved in developing procedures to clean and sterilize spacecraft components and has introduced several simple and rapid methods to validate cleanliness. In addition, he has been instrumental in mapping and archiving the microbial diversity of various spacecraft assembly environments at JPL and KSC. Venkat loves to "baptize" bugs, and the latest addition to his "baptism" efforts is a radiation-resistant *Bacillus nealsonii*, isolated from JPL-SAF, which he named after his mentor, Ken Nealson. Venkat graduated from Annamalai University, India (1981) and Hiroshima University, Japan (1990) in marine and food microbiology, respectively. He has published 65 research articles, received 5 patents, and has worked in several government, academic and industrial organizations in India, Japan and the U.S.

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