Indian Institute of Science
Centre for BioSystems Science and Engineering
BSSE Seminar

21st October 2019 (Monday), 11:00 AM, CES Seminar Hall, 3rd floor, Biological Sciences Building

Microbes in Space

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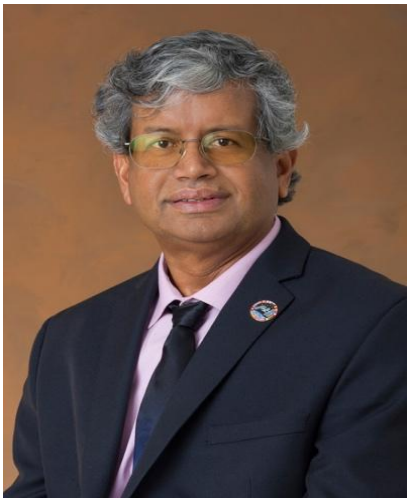
ABOUT THE SPEAKER



Dr. Kasthuri Venkateswaran is a Senior Research Scientist at NASA Jet Propulsion Laboratory at California Institute of Technology, Pasadena. He received his M.S. degree in Marine Biology and Ph.D. degree in Marine Microbiology from Annamalai University, in 1977 and 1982, respectively. He also earned a doctorate in Agriculture, Food Microbiology and Hygiene from Hiroshima University, Japan in 1990. He is currently working as a Senior Research Scientist in the Biotechnology Planetary Protection Group, JPL since 1999. He has over 250 peer reviewed publications. He has received the NASA Exceptional Scientific Achievement Medal in 2017 and Exceptional Technology Achievement Medal in 2017. He is also the recipient of the first 'One NASA Peer Award', awarded in 2005 and JPL Center–One NASA Peer Award in 2005. He also received the NASA Space Act Award in 2003 and Novel Technology Report Awards (>25), from 2000 till present day.

ABSTRACT

Microbiome of environmental surfaces and atmosphere samples in the International Space Station (ISS) were characterized in order to examine the relationship to crew and hardware maintenance. The Microbial Tracking projects generated a microbial census of the ISS environments using advanced molecular microbial community analyses along with traditional culture-based methods. Since the "omics" methodologies generated an extensive microbial census, significant insights into spaceflight-induced changes in the populations of beneficial and/or potentially harmful microbes were gained. Lessons learned from ISS missions on the microbial prevalence using iTag sequencing, metagenomes, and resistomes will be discussed. In addition, while characterizing ~500 bacterial and fungal strains several novel species were discovered, and characterization of these novel species will be presented. The virulence characteristics of fungi as well as production of secondary metabolites that are of biotechnological importance will be revealed. The findings from the *Environmental "Omics"* project (basic science) should be exploited to enhance human health and well-being of the closed system. In other words, the microbial tracking research aims to "translate" findings in fundamental research into medical practice (pathogen detection) and meaningful health outcomes (countermeasure development). The "omics" data sets were placed in the NASA GeneLab bioinformatics environment—consisting of a database, computational tools, and improved methods— that would subsequently be made open to the scientific research community to encourage innovation.