51st IAA SYMPOSIUM ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) – The Next Steps (A4)
Interactive Presentations - 51st IAA SYMPOSIUM ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) – The Next Steps (IP)

Author: Mr. Paras Adlakha
University of Petroleum and Energy Studies, India

BIOPOTENTIAL ASSESSMENT THROUGH DEVELOPMENT OF UNIVERSAL PLANETARY BIOEVOLUTION INDEX AND SETI SUBMARINE MISSION ON ENCELADUS

Abstract

From chemical interactions between inorganic chemicals on a hostile Earth, the synthesis of Amino acids is what eventually led to the development of prokaryotes and eukaryotes which finally led to further speciation and variance even through vertebration via Balanoglossus till Homo sapiens became the apex species. As interesting as it is to locate regions where humanity can propagate beyond Earth, it is equally important to understand other potential extraterrestrial life, predicted as a possibility through the Drake Equation and astronomical studies so far, for scientific and ethical reasons.

Enceladus is the gem hidden within Saturn's rings, possessing the potential to nurture life, as proven by the data from Cassini Huygens mission, having the basic elements to create life, the appropriate temperature gradients and planetary activity.

This work delves into an in-depth case study where the evolutionary life cycle of both life and the Earth are studied and correlated to produce a planetary evolution index, indicating the potential stage of biological evolution for a given stage of planetary evolution and environmental conditions. This planetary index was then utilised to evaluate the data generated about Enceladus to identify the potential stage and nature of biological evolution in Enceladus, along with missing data requirements to validate the need for a preliminary SETI mission into the unexplored oceans of Enceladus.

With the technological heritage of exploring Earth's deepest ocean biospheres such as the Mariana Trench and advancements in archaeobiological studies, the missing data requirements were used as mission drivers to formulate a submarine mission to Enceladus to study the underwater environment, including the geothermal vents, potential temperature gradients, scope for chemosynthetic reactions, amongst other payload objectives, by designing a low-cost low-time optimized trajectory with potential submarine release opportunities into the "tiger stripes", vehicle and payload engineering, operations and budgeting of the mission.

The results strongly motivate and advocate a preliminary SETI mission to Enceladus to swiftly assess the present lifeforms, an approximate time frame for the environment to suit human life, and primary phase of constructing habitats for settlements, to be done in unison by various space agencies and companies for the common goal for furthering humanity beyond the stars.