

Observing the Potential for a Diversity of Metabolic Pathways in the Ocean of Enceladus

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Abstract

The Cassini Ion Neutral Mass Spectrometer (INMS) and the Cosmic Dust Analyzer (CDA) revealed a salty ocean^a environment at Enceladus with a pH of ~ 9 ^{b,a} and an abundance of molecular hydrogen^c in the ocean to support a methanogenic metabolism. The measurements also suggested that the ocean may be fed by extant hydrothermal systems found at the interior rocky interface with the ocean^{c,d}. These environmental attributes suggest that the interior ocean of Enceladus is habitable. However, methanogenesis is not the only possible metabolism in this environment. Oxidants produced on the ice surface layer by electron bombardment can penetrate the ice layer and produce additional oxidized species that may well support alternative metabolic pathways^e. In this presentation we review the observations provided by Cassini INMS and CDA in terms of metabolic pathways at Enceladus, and we explore measurements that might be provided by a future mission to Enceladus that would revolutionize our knowledge of potential metabolic pathways in the interior ocean of Enceladus.

References

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