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## EXPLORING EUROPA AND ENCELADUS: A COMPARATIVE STUDY

**Abstract**

Europa, Enceladus, and other icy ocean worlds have redefined our understanding of habitability and extended our search for life elsewhere in the solar system.

Enceladus, a moon of Saturn, is a notable contender for habitability in the solar system for its profuse water volcanism, organic compounds, and accessible plumes. Cassini confirmed the presence of an ice shell with a global subsurface ocean on the icy moon, whose depths await further exploration. Although it is true that the life supported by Enceladus's paralyzing temperature is most likely limited to microorganisms, exploring Enceladus could provide the first indicator that we are not alone.

Europa, one of Jupiter's Galilean moons, has one of the youngest surfaces of any known solid object in the Solar System(1). Its surface made up of a global shell of ice that seems to be undergoing continual resurfacing(1). Despite its hostile surface environment, Europa is widely considered to be one of the most promising places in the solar system for habitability. Not on its surface, but beneath it. The magnetometer of the Galileo spacecraft detected an induced magnetic field on Europa(2), consistent with a conductive global sub-surface liquid ocean.

This work assesses the potential habitability of both icy satellites by considering our most recent understanding of the surface and sub-surface properties of both moons. We assess data from past missions including Galileo and Cassini. Finally, we assess current, historical and novel technologies to explore these icy ocean worlds in a whole new light.

1. Kattenhorn and Prockter (2014) – Nature Geoscience: 7-762
2. Kivelson et. al (2000) – Science: 1340-1343