

Searching for habitable worlds in the solar system

SEKINE, Yasuhito^{1*}

¹Department of Earth and Planetary Science, University of Tokyo

New observations from spacecraft missions enable us to examine habitability in the solar system. The icy satellites with geological activity, Europa and Enceladus, are considered to possess subsurface liquid oceans beneath the icy crusts. Recent findings of water-rich plumes erupting from Enceladus would allow us to investigate biogeochemistry of the subsurface ocean. Mars is also highly likely to have been another habitable terrestrial planet in the first several hundred million years after its formation. The combinations of in-situ geological and geochemical analyses by the rovers and high-resolution remote sensing by the orbiters help us to understanding the drastic environmental changes on early Mars. Future explorations of these habitable worlds in the solar system would provide insights into understanding not only the possibility and variety of life in the universe but also the concrete pathways of chemical evolution toward life, which was occurred on early Earth. Here, I will review recent progresses in the search for habitable worlds in the solar system and discuss the scope for the assessment of planetary habitability by spacecraft missions.

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