

Getting Under Europa's Skin: Robots, Radar and the Search for Life

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Europa is one of the most enticing targets in the search for life beyond Earth. With an icy outer shell hiding a global ocean, Europa exists in a dynamic environment where immense tides from Jupiter potentially power an active deeper interior and intense radiation and impacts bathe the top of the ice, providing sources of energy that could sustain a biosphere. The detection of plate tectonics on Europa, and evidence for shallow water within the ice implies that rapid ice shell recycling could create a conveyor belt between the ice and ocean. Exchange between Europa's surface and subsurface could allow ocean material to one day be detected by spacecraft and will be mediated by ice-ocean interactions. Beneath ice shelves on Earth, ice-ocean exchange has been difficult to observe given the harsh environment and thickness of the ice. Here, processes such as accretion, melt and circulation impact ice dynamics and are an important element of the climate system. Thus exploring the cryosphere can form the foundation of our understanding of other ocean worlds.

In this presentation, we will explore environments on Europa and their analogs here on Earth. NASA will launch a mission to Europa in 2021, but while we wait to get there, we are looking to our own cosmic backyard to help us to better understand this enigmatic moon. I will describe our work on the McMurdo Ice Shelf under the SIMPLE program, as well as our upcoming Ross Ice Shelf program, RISE UP. Using a combination of remote sensing and under ice AUV/ROVs, we are working to improve climate and planetary science, and develop techniques for exploring Europa, an ice covered world not so unlike our own.