

Evolution of Icy Moon's Interior Uncovered by Laboratory Experiment: Modeling of Space Weather by Ion Irradiation

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In our solar system, several icy bodies have possibility for a liquid water ocean underneath a solid ice shell, while only Earth has ocean on the surface. The subsurface ocean could be potentially universal habitable environment. Duration of the subsurface ocean is an unsolved big problem for evolution of the icy body's interior and also for the possible life that has likely been evolving there. We uncover the evolutions of subsurface ocean based on the space weathering on solid surface that is driven by irradiation of energetic plasma around planets. Long-term space weathering at Ganymede that reaches Giga years is modeled by plasma irradiation to surface materials with laboratory beam experiment. Chronology for Ganymede's magnetic field excited by molten metallic core can be suggested based on a dependence of the space weathering on the Ganymede's magnetic field strength. We are going to pin down the subsurface ocean evolution from the magnetic field chronology. In this presentation, we report current status of our laboratory experiment made with an ion injector at Wakasa-wan Energy Research Center.

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