

荷電粒子照射による宇宙風化再現実験で明らかにする氷衛星の内部進化

木村 智樹 [1]; 木村 淳 [2]; 吉岡 和夫 [3]; 村上 豪 [4]

[1] Tohoku University; [2] 阪大・理・宇宙地球; [3] 東大・新領域; [4] ISAS/JAXA

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

Tomoki Kimura[1]; Jun Kimura[2]; Kazuo Yoshioka[3]; Go Murakami[4]

[1] Tohoku University; [2] Earth & Space Science, Osaka Univ.; [3] The Univ. of Tokyo; [4] ISAS/JAXA

In our solar system, several icy bodies have liquid water ocean underneath solid surface, while only Earth has ocean on the surface. The subsurface ocean is potentially universal habitable environment. Differentiation of the icy body's interior is an unsolved big problem for the subsurface ocean and also for the possible life that has likely been evolving there. We try to pin down the differentiation process based on the space weathering on the icy body's surface that is driven by irradiation of space plasma. In this study, long-term space weathering at Ganymede that reaches Giga years is modeled by ion irradiation to the possible surface material, epsomite, with laboratory beam experiment. Chronology for Ganymede's surface material is made based on the altered spectrum of surface material. Dependence of surface material age on the intrinsic magnetic field strength of Ganymede is investigated based on comparison of our laboratory experiment with the surface spectroscopy by the Galileo explorer. We discuss the age of Ganymede's magnetic field and the differentiation process of molten interior that drives the magnetic field. In this presentation, we report current status of our laboratory experiment made with an ion injector at the Wakasa-wan Energy Research Center.

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