

Laboratory reproduction of earthquake faulting beneath the internal ocean of Enceladus

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The discovery of the Na-rich ice particles erupting from the surface of Enceladus indicates the presence of hydrothermal activity in Enceladus' ocean. Knowledge of water chemistry of the interior ocean is crucial for exploring planetary habitability and life. Two different processes of water-rock interaction can define the water chemistry in Enceladus' ocean: one is the static chemical interaction at the hydrothermal regions over geological timescale, and the other is the dynamic chemical interaction associated with seismogenic faulting induced by tidal force between Enceladus and Saturn or neighboring satellites. In this study, we focus on the later short-time disequilibrium interaction between water-rock during faulting. By using high-velocity friction experiment, we plan to reproduce faulting processes that are expected to occur in the interior of Enceladus, and then evaluate quantitatively the effect of the disequilibrium interaction during faulting on the water chemistry of the interior ocean. In the poster, we will present outline of the apparatus and pilot results of the experiments using San Carlos olivine and synthetic chondrite as starting materials.

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