The Influence of Salinity and Shape on Magnetic Induction in Ocean Moons

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The magnetic fields induced within the oceans of icy moons can be used to characterize the properties of the oceans. To date, only the Galileo spacecraft has measured induced fields from extraterrestrial oceans—in Europa and possibly Ganymede and Callisto—and in those cases only weak constraints were placed on the thickness and salinity of the oceans. For Jupiter's large icy moons, and for the inner 3 large icy moons of Uranus, we will describe an exploration of the parameter space of ocean thickness and composition, and corresponding induction response at multiple periods of the externally imposed fields.

To date, the modeled induction responses have been limited to nested concentric conducting shells and have neglected motional induction. We will describe recent work examining effects due to deviations from spherical symmetry and secondary magnetic fields induced by fluid flows within the oceans.

Results from this work will be important for exploration of Jupiter's moons by the Europa Clipper and JUICE missions, and by a future mission exploring the moons of Uranus.

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