



Magnetic Signature of Oceans in Icy Moons

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Electromagnetic induction is a powerful technique to study the electrical conductivity of the interior of solar system bodies. Combined with other geophysical and cosmochemical information, the electrical conductivity structure can provide strong constraints on the associated internal composition of planetary bodies. Here we give a review of the basic principles of the electromagnetic induction technique and discuss its importance for the search for liquid water outside of Earth. Magnetic field measurements by the Galileo spacecraft provide strong evidence for a subsurface ocean on Europa and Callisto. The induction technique will provide additional important constraints on the possible subsurface water, when used on future Europa and Ganymede orbiters. It can also be applied to probe satellites such as Titan, Enceladus and Triton. We show that the plasma environment, in which the bodies are embedded, generates in addition to the induced magnetic fields competing plasma magnetic fields. These fields need to be treated appropriately to reliably interpret magnetic field measurements in the vicinity of solar system bodies.