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Magnetic fields in the vicinity of large icy satellites

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Galileo and Cassini have provided magnetic field observations from the vicinity of large icy satellites of Jupiter and Saturn through repeated flybys. These observations highlight the interaction of planetary field and plasma with the exospheres, surfaces and interiors of these icy satellites. In addition, magnetic field observations made by Galileo in the vicinity of Europa, Ganymede and Callisto showed that strong magnetic induction fields emanate from these moons in response to the rotating magnetic field of Jupiter. Further analyses have shown that the magnetic induction fields are consistent with the presence of subsurface liquid oceans in these moons. Many independent lines of geological and geophysical evidences support this conclusion for Europa and Ganymede. Recent observations from the icy Saturnian moon Enceladus show that it interacts strongly with Saturn's plasma and acts as a significant source of plasma in the magnetosphere of Saturn.
In this talk, I will discuss the present status and future plans for the explorations of the large icy satellites of the solar system using magnetic fields. I will present recent spacecraft observations and modeling results from these moons. Finally, I will discuss the problem with and a possible solution towards using magnetic induction to explore the interior of Titan and other icy moons of Saturn.