

Oceans in Planetary Satellites: An Historical Overview  
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Planetary astronomers have long recognized that frozen water or frost, as well as more exotic frozen volatiles, may be a major constituent of the surfaces of bodies in the cold reaches of the outer solar system. The idea of large amounts of water, possibly in liquid form, in the interiors of satellites of the giant planets first began to be seriously discussed about thirty years ago (e.g. Lewis, 1971). Since then, theoretical debates concerning the likelihood of these global subsurface oceans have continued. Data from the Voyager encounters with Jupiter, Saturn, Uranus and Neptune (1979-1989) showed the satellites of the outer solar system to be geologically diverse with some showing evidence of young, resurfaced surfaces consistent with the possibility of a subsurface liquid layer. Tidal heating as a significant energy source for these bodies was also spectacularly confirmed with the discovery of volcanoes on Io. Results from the Galileo mission (1995 – present) have provided significant support for the presence of a global liquid water layer in all three of the icy Galilean satellites, Europa, Ganymede, and Callisto. The current evidence from Galileo will be reviewed as well as prospects for future exploration.