

Saturn Express: A Microwave Sounder Plus Probe

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To follow the stunning success of Cassini-Huygens, we propose a new mission to Saturn that will return the same fundamental information about this giant planet that we are already obtaining about Jupiter. This will put us in a powerful position to refine models for the solar nebula and the origin and evolution of giant planets. The Galileo Probe has given us the abundances and isotope ratios of krypton and xenon plus 5 of the 6 most abundant elements composing Jupiter. The Juno Mission presently under development will provide the missing abundance of oxygen. The Galileo data already show a surprising enrichment of heavy elements, whose interpretation engenders new constraints on giant planet formation that may also change current models of the solar nebula. Lacking comparable knowledge of Saturn's composition, we cannot tell whether Jupiter is an anomaly or the norm. Resolution of this issue obviously impacts our perspective on the formation of the newly discovered giant planets around other stars. We can obtain the necessary information at relatively low cost by a multinational mission combining an atmospheric probe using Galileo and Cassini-Huygens inheritance with the microwave sounding capability developed for Juno. One potential pairing would have ESA build the probe with a NASA heat shield, while NASA builds the carrier; with communications, star tracker, microwave antennas, etc., supplied by some combination of ASI and the space programs of other countries. We will illustrate possible results of the mission.