

Ice Giants Exploration: Dual and Twin Spacecraft Approaches

Romolo Politi (1), Diego Turrini (1), Davide Grassi (1), Roberto Peron (1), Valeria Cottini (2), Nicolas Gorius (3)
(1) Institute for Space Astrophysics and Planetology INAF-IAPS, Italy, (2) University of Maryland, College Park, College Park, Maryland, United States (3) NASA Goddard Space Flight Center, Greenbelt, Maryland, United States
(romolo.politi@iaps.inaf.it)

Abstract

With the progression of the robotic exploration of the Solar System and the continuous advance in exoplanetary studies, filling the gap represented by the limited knowledge we possess of Uranus and Neptune is becoming more and more critical. Not only these ice giant planets represent the archetype for studying one of the most abundant classes of exoplanets, but their characteristics and those of their satellite systems have been shaped by the earliest and most violent phases of the life of the Solar System. Understanding them is therefore an essential step in understanding our place in the galactic context. Because of their similarities and differences, both ice giants are compelling targets and much can be learned by their comparative study. With this rationale in mind in 2013 we submitted to the European Space Agency the ODINUS white paper (<http://odinus.iaps.inaf.it>), where we described the scientific case of exploring both planets and their satellites in the framework of a single European L-class mission. To achieve this ambitious goal, we proposed the first mission scenario based on the use of two identical spacecraft to two different planets. Both the scientific case and the original twin orbiter scenario were assessed as feasible by ESA and were further refined and consolidated by the ODINUS team during the following interactions the scientific community. The recent joint NASA-ESA study for future missions to the ice giants (<https://www.lpi.usra.edu/icegiants/>) allowed for confirming the feasibility of the dual/twin spacecraft approach to the two ice giant planets and for considering more ambitious mission profiles, involving larger payloads and the possibility of including atmospheric probes, in the framework of scenarios of international cooperation.