

Busnelli Alberto
Colombo Martina
Fusi Giovanni

Cassini Scientist for a Day

The mission Cassini-Huygens, started by NASA, ESA and the Italian space agency in 1997, remains securely after 16 years the most important and profitable scientific expedition ever to have studied Saturn and its moons. The orbiter, entitled to the Italian astronomer Giovanni Cassini, who discovered the divisions between the famous planet's rings, has already completed several flybys around Saturn and some of its satellites, such as Titan, Enceladus and many icy moons, revealing thanks to advanced optical, physical and hybrid instruments multiple unexpected facts about them.

Our suggestion about which target should be chosen as the main one in further Cassini orbiter's explorations falls on the first of three proposed, Iapetus.

Iapetus is one of the most mysterious moons of Saturn: first observed by Cassini in the XVII century, it is mainly made of ice and just for its 20% of heavy and rocky materials; shaped as a walnut, Iapetus is not spherical or ellipsoidal but squashed on its poles and divided at the equatorial level by a very tall ridge of uncertain origins: some hypothesis claim that the formation of the ridge was due to a previous faster rotation period of the satellite itself, others that it was the remains' backlog of the collapse of a ring of Saturn now disappeared.

This moon is heavily cratered on the whole of its surface, which isn't affected by the 'resurfacing' phenomenon as many other Saturn's satellites.

Probably the most interesting and challenging query about Iapetus is its double-chromatic aspect: Cassini himself had been able to recognize Iapetus' different coloring and correctly deduced it was tidally locked to Saturn although its big distance from it, which means that the planet always sees the same side of its moon. Iapetus can be subdivided into two hemispheres, one brighter with a high range of albedo (>0.5) and one darker with a low range (<0.05): the leading one, the brightest, is composed mainly of white ice while the trailing one, the darkest, still remains a mystery for researchers. Scientists elaborated some theories about the causes of this dichotomy: the most suitable state that the dark-reddish color of the trailing hemisphere is the result of the sublimation and the consequent displacement of the ice present in the leading one, which is in part composed of organic material. This explanation remains however undemonstrated.

In conclusion the big scientific interest risen by Iapetus at the horizon of the space exploration and the several unexplained phenomena that surround this mysterious moon should be taken as main reasons for which the Cassini orbiter should be sent to this target.

Moreover, because of its distance from Saturn and its strange inclined orbit it is possible to observe from Iapetus the planet's rings from a close and privileged position, which could allow the Cassini orbiter to study in an accurate way both the satellite and the rings, reaching two important targets of the Solar System exploration program.