

The icy moons of the gas giants as possible habitats

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The study of the habitable conditions in our solar system tends to extend the limits of the region where we thought life might appear and subsist towards the external parts, within the realms of the giant planets systems. Several of the icy moons around gas giants show promising conditions for the development and/or maintenance of life [e.g. Coustenis & Encrenaz, *Cambridge Univ. Press, 2013*]. Jupiter's Europa, Callisto and Ganymede as well as Saturn's Titan and Enceladus, seem to have some of the requirements for habitability, like organic-rich atmospheres and underground liquid water oceans for which we find evidence in the data acquired by the Galileo and the Cassini-Huygens missions. These oceans, hidden under icy crusts, may even be (in the case of Europa and Enceladus) in direct contact with a silicate mantle floor and kept warm through time by tidally generated heat, similar to the Earth. Furthermore, the strong gravitational pull operated by the giant planets may produce enough energy to sufficiently heat the cores of orbiting icy moons. Similarly, waterworlds can exist as exoplanets around other stars. In the solar system, such potential habitats can be investigated with designated space missions, like ESA's JUPITER ICy moon Explorer (JUICE) to Jupiter's system (launch in 2022) and others.



Biography:

Athena Coustenis is an Astrophysicist, Director of Research of the French National Science Research Center in LESIA/Paris Observatory. She specializes in Planetology and space research.