Extraterrestrial oceans – beneath the surface

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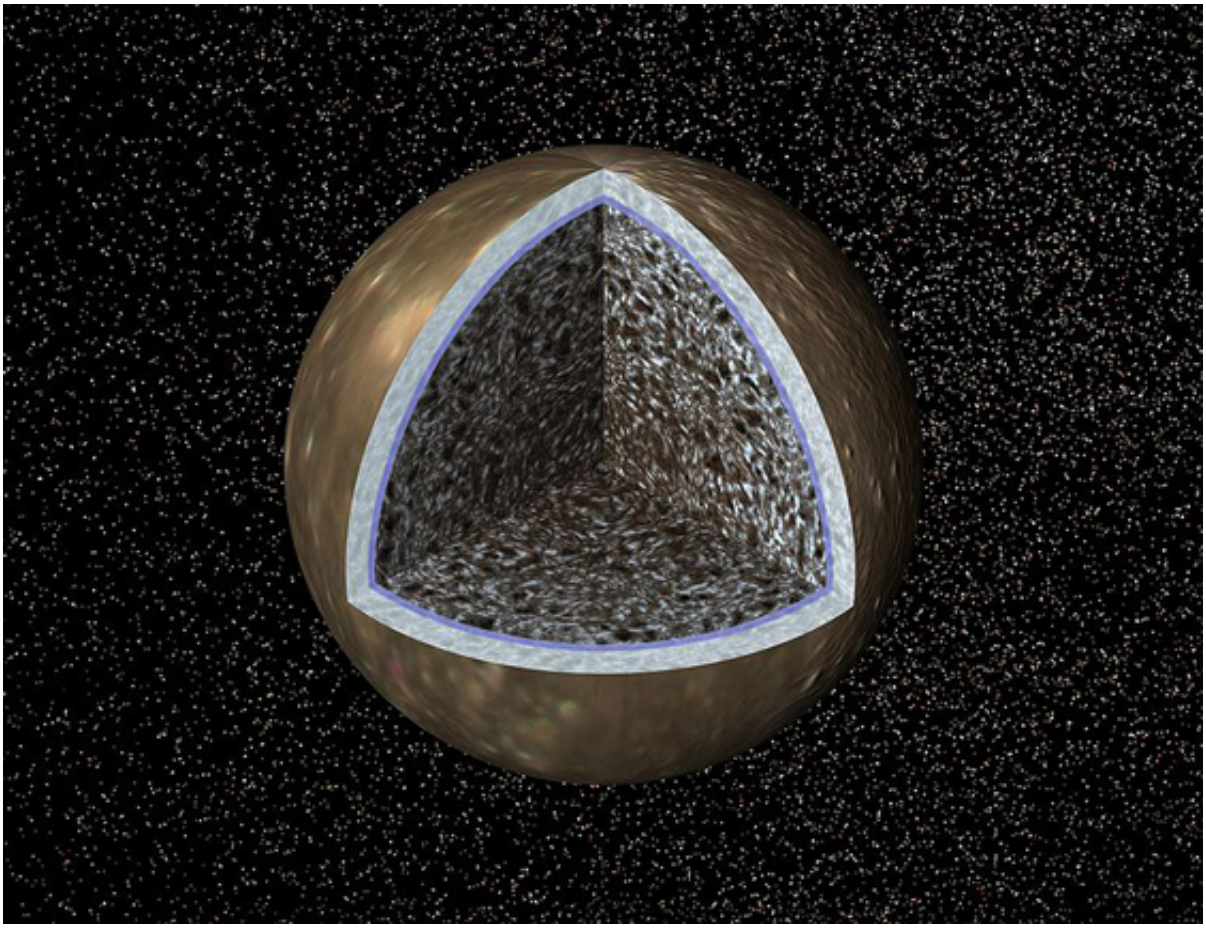

Icy objects in our solar system have large oceans under their surfaces and here life could evolve and flourish. So says a new thesis by Jesper Lindkvist, PhD student at the Swedish Institute of Space Physics and Umeå University. The thesis will be defended on Tuesday 31 May at the

Swedish Institute of Space Physics in Kiruna, Sweden.

There has long been speculation as to whether Jupiter's large, icy moon Callisto has an ocean beneath its surface. Observations of Callisto's near-space environment by instruments on board the spacecraft Galileo, which is orbiting Jupiter, lead us to believe that there is such a sub-surface ocean. Computer simulations of the space plasma interactions support this belief.

"If you find an ocean beneath the surface of one moon, perhaps the same is true of other icy objects in space", says Jesper Lindkvist.

Outflow of water vapour has been detected from the surface of the dwarf planet Ceres, which is in the asteroid belt between Mars and Jupiter. This could indicate a reservoir of water, also related to a large sea beneath the surface. The spacecraft Dawn is at Ceres right now, trying to answer this question.

"If someone was planning to build a future space base on one of these Solar System objects, for example to seek after signs of life, I would suggest they take an extra long ice bore and their fishing equipment", jokes Jesper Lindkvist.

The outflow of water vapour from moons and dwarf planets is similar to that we see from comets. The icy comet 67P/Churyumov-Gerasimenko which rounded the sun in the summer of 2015 has been followed closely by the European spacecraft Rosetta. Measurements of the space environment round it show that the water flowing out from the comet's nucleus forms a prominent atmosphere which interacts with the constant flow of ionised particles from the sun, the so-called solar wind.

"Understanding their origin and how icy bodies evolve is one more piece of the puzzle we need to lay in order to explain the origin of our Solar

System and its eventual fate", says Jesper Lindkvist.

More information: Plasma Interactions with Icy Bodies in the Solar System: umu.diva-portal.org/smash/record.jsf?pid=diva2%3A925397&dswid=-2255

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