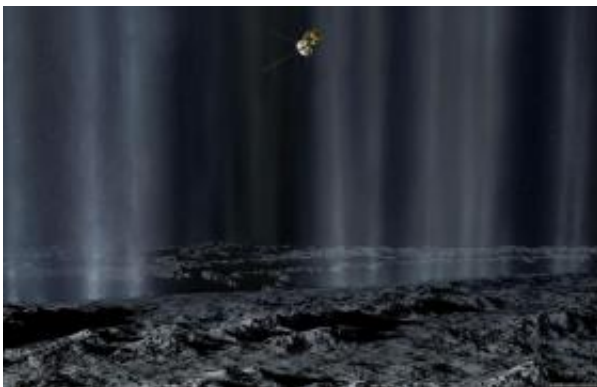


Enceladus leaves plasma bubbles in its wake

April 15 2010, by Anita Heward



Artist's impression of the Cassini spacecraft making a close pass by Saturn's inner moon Enceladus to study plumes from geysers that erupt from giant fissures in the moon's southern polar region. Copyright 2008 Karl Kofoed/NASA

(PhysOrg.com) -- Observations of how Saturn's moon Enceladus interacts with its environment show it leaves a complex pattern of ripples and bubbles in its wake. Sheila Kanani will be presenting the results at the RAS National Astronomy Meeting in Glasgow.

Enceladus sits deep within Saturn's [magnetosphere](#), which is filled with electrically charged particles ([plasma](#)) originating from both the planet and its moons. The [Cassini spacecraft](#) has made nine flybys of the mysterious sixth-largest moon since 2005. The closest of these have taken the spacecraft's suite of instruments just 25 km from [Enceladus's](#) surface, which scientists believe conceals a saline ocean. Heated vents at

the south pole of the moon release a plume of material, consisting mainly of icy grains and [water vapour](#), into space.

Measurements from the Cassini Plasma Spectrometer (CAPS) and the Magnetospheric IMaging Instrument (MIMI) show that both the moon and its plume are continuously soaking up the plasma, which rushes past at around 30 kilometres per second, leaving a cavity downstream. In addition, the most [energetic particles](#) which zoom up and down Saturn's magnetic field lines are swept up, leaving a much larger void in the high energy plasma. Material from Enceladus, both dust and gas, is also being charged and forming new plasma.

Now, Ms Kanani and a team at UCL's Mullard Space Science Laboratory, have discovered mysterious spiky features in the CAPS data that present a complex picture of readjustment downstream from Enceladus.

“Eventually the plasma closes the gap downstream from Enceladus but our observations show that this isn't happening in a smooth, orderly fashion. We are seeing spiky features in the plasma that last between a few tens of seconds and a minute or two. We think that these might represent bubbles of low energy particles formed as the plasma fills the gap from different directions,” said Ms Kanani.

Since Cassini arrived at Saturn, it has been building up a picture of the vital and unexpected role that Enceladus plays in Saturn's magnetosphere.

“Enceladus is the source of most of the plasma in Saturn's magnetosphere, with ionised water and oxygen originating from the vents forming a big torus of plasma that surrounds Saturn. We may see these spiky features in the wake of Saturn's other moons as they interact with the plasma but, to date, we have only studied Enceladus in

sufficient detail,” said Ms Kanani.

Provided by Royal Astronomical Society

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