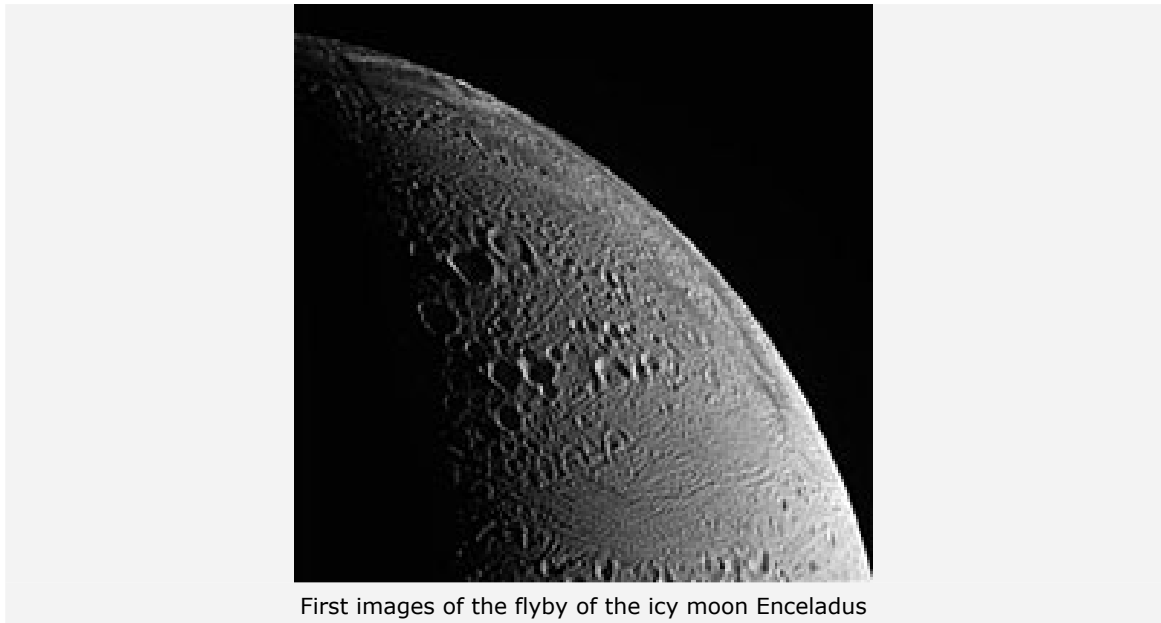

News Archive Space 2008

Close flyby of Saturn's enigmatic moon Enceladus

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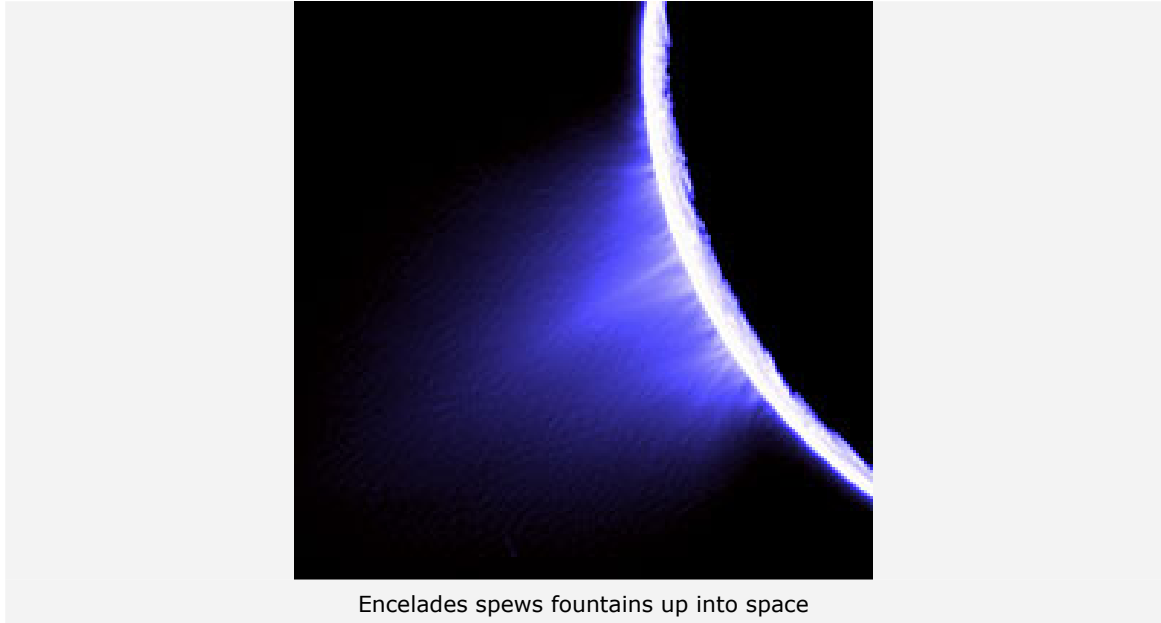


First images of the flyby of the icy moon Enceladus

During a flyby on 12 March 2008, the Cassini space probe passed by Saturn's moon Enceladus at an altitude of only 50 kilometres. The icy moon, with its diameter of only 500 kilometres, has become a focal point for research because of its enigmatic fountains and the existence of liquid water beneath its icy crust. The DLR Institute of Planetary Research (DLR-Institut für Planetenforschung) of the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) will use the data obtained during this flyby to construct maps.

"I am thrilled! The data looks absolutely fantastic," says Prof. Dr Ralf Jaumann of the DLR Institute of Planetary Research after a first review of the data which the Cassini space probe has returned to Earth on Thursday (13 March 2008). During this third flyby, which lasted only 100 seconds, the cameras of the Saturn probe have recorded images of hitherto completely uncharted areas of the icy moon's northern hemisphere. This data had been eagerly anticipated by Jaumann: "In order to understand the moon and the processes which take place inside it, it is important that we gradually get to know its entire surface.

During earlier flybys of Enceladus, which orbits the gas giant Saturn at a distance of almost 240 000 kilometres, researchers discovered icy volcanoes in the moon's south polar region, spewing mighty fountains of water vapour, small ice particles and dust up into space. It appears that the northern side of the moon is less active. Jaumann added "The north has areas with very newly formed ice as well, but you mostly find older ice surfaces there, with meteorite impact craters. In the moon's south polar region, icy geysers are continuously spurting ice particles into the atmosphere, which then gradually settle back down onto the moon's surface, covering the impact craters. Moreover, the ice sheets in the south polar region are more mobile, resembling the flow of glaciers on earth. This causes the impact craters to gradually disappear.

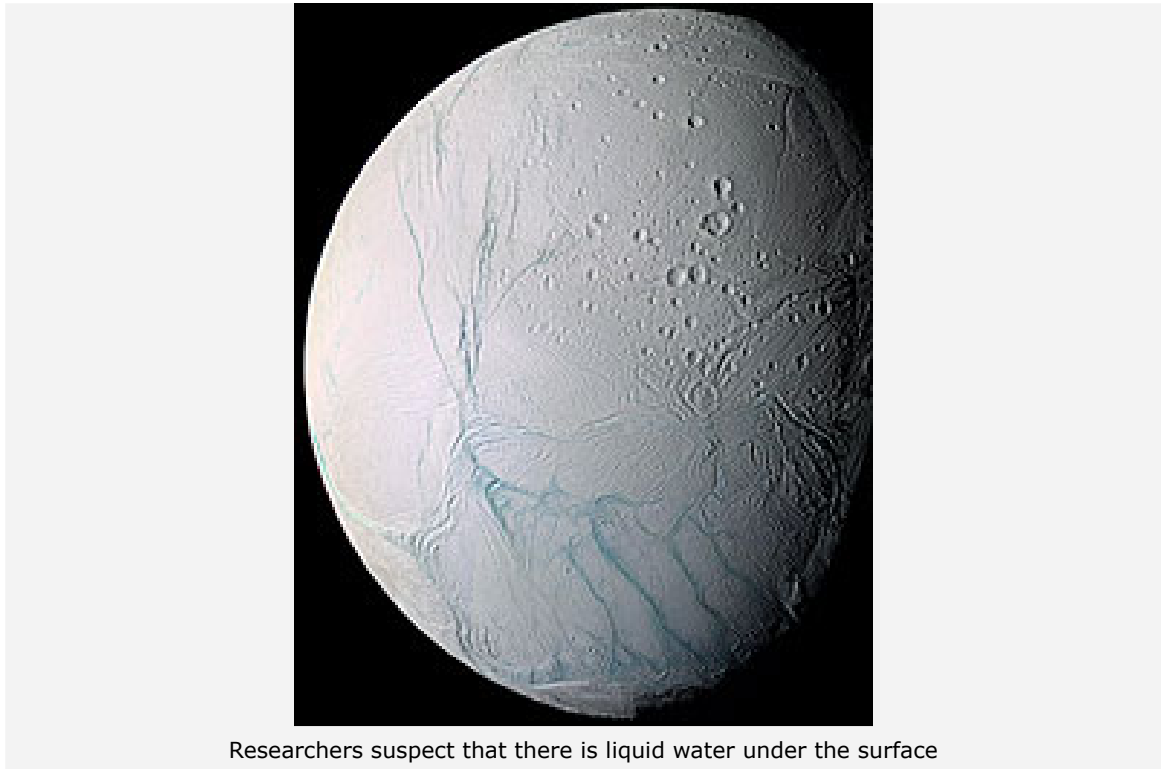


Encelades spews fountains up into space

Enceladus still holds many mysteries

Researchers do not yet know why the thermal centre of the icy moon is located in the south. "It is clear that in the past there was also cryovolcanic activity in the moon's northern hemisphere. It is possible that the thermal centre has very slowly moved southwards. It could also be the case, however, that the thermal centre is shrinking and that in the moon's geological past icy geysers occurred across its entire surface, while today they are mainly confined to the south polar region," according to DLR scientist Jaumann's description of the researchers' propositions.

It is also unclear where the moon gets its energy from. In any case, the moon, which is almost 1.5 billion kilometres from the sun, heats up to such an extent that water exists in liquid form and as vapour. While its surface temperature is at around minus 200 degrees Celsius, temperatures above zero degrees Celsius must obtain in some places in its interior. Researchers rule out that, four billion years after the formation of our Solar System, the small moon would still have a hot, fluid rocky core like that of Earth. "We suspect that the large gravitational force exerted by the giant planet Saturn thoroughly 'kneads' the icy moon," says Jaumann. Just like the sun and the moon contribute to setting the water masses of the earth's oceans in motion through their gravitational pull, Saturn with its enormous mass causes the water inside the moon, which is relatively close to it, to move. This motion causes friction, the so-called tidal friction, which in turn causes the moon to heat up. However, Jaumann admits that the current models for the possible internal activity of the icy moon show that the energy generated by tidal friction is not sufficient to heat up the moon to such an extent.



Researchers suspect that there is liquid water under the surface

Icy moon is a candidate in the search for life in the Universe

The icy moon already made the headlines in 2005, when researchers discovered its icy geysers, thereby providing evidence for the occurrence of cryovolcanic (ice volcanic) activity in the Saturn system. A necessary condition for these processes is the availability of liquid water, which until that time was not expected to exist in the outer reaches of our solar system. Jaumann: "We consider liquid water to be a basic requirement for life. This means we now have discovered a potential biological niche far out in our Solar System. The question if there could be other life within our Solar System should therefore be raised again." If there really is life beneath Enceladus' icy surface is a different question altogether, however, and one that Jaumann suspects researchers will not be able to answer soon.

Dust analysing device developed by the Max Planck Institute does not generate data

The dust particles which Enceladus spews up into space are investigated using the dust analysing device CDA (Cosmic Dust Analyser) onboard the Cassini space probe, developed by the Max Planck Institute (MPI) for Nuclear Physics (Max-Planck-Institut für Kernphysik) in Heidelberg. Dr Ralf Srama, the Principle Investigator (PI) for this device, had hoped that this flyby would allow him to proof that the particles which orbit the icy moon and which even feed Saturn's outer ring, the so-called E Ring, originate from two separate sources. However, the flyby ended in disappointment for Srama, since the data sent back by Cassini showed that his device had not been functioning during the flyby. "The data transfer between our instrument and the onboard computer apparently did not work correctly," says Srama. The problem appears to be the new software which the scientists had installed in order to improve the quality of their measurements. "We are able to trace the error to a specific command which was executed successfully during simulations on Earth and even in space, but which did not work out during yesterday's flyby. The researchers expect that they can solve the problem soon, and they put their hopes in the next Cassini flyby of the icy moon Enceladus, which is expected to take place on 11 August 2008. Srama added "Cassini will then get within 20 kilometres of the moon, and we are looking forward to the measurements we hope to obtain."

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