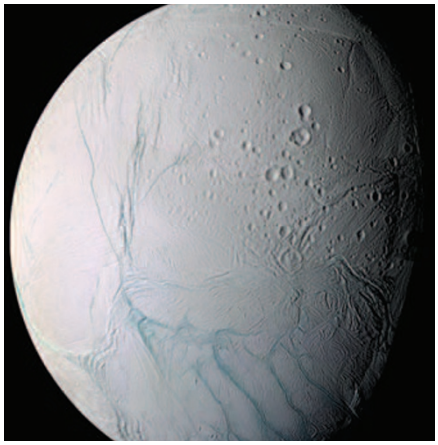
Enceladus' mobile lid



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Saturn's icy moon Enceladus has a geologically active south polar terrain, characterized by eruptions of vapour and dust, and long linear fractures. These features may be indicative of lateral movement of the moon's outermost layer in a manner loosely analogous to the movement of tectonic plates on Earth, suggests a new study.

Amy Barr of the Southwest Research Institute, Colorado conducted numerical simulations to determine the mode of heat generation and transport within Enceladus, and how this is related to the icy lid that caps the moon's outer shell. The results suggest that the measured heat flow from the south polar terrain is explained well by lateral movement of a layer that is relatively thin and weak, rather than the previously invoked thick immobile lid.

The simulations predict specific geological consequences of a mobile lid, which can be tested using data obtained by the Cassini spacecraft.

Cruising for currents

J. Geophys. Res. **113,** C06001 (2008)
The Royal Caribbean *Explorer of the Seas* has sailed through the Florida Straits almost weekly since its maiden voyage, carrying vacationing passengers and collecting oceanographic data on each cruise. A new study using these data suggests that flow rates in the Florida Current, which are linked to Gulf Stream transport, have varied seasonally and interannually over the past five years.

Lisa Beal at the University of Miami, Florida and colleagues compiled current velocity data collected by the cruise ship between 2001 and 2006. They found a clear seasonal signal, with higher transport between May and July, and a transport minimum during January. They also found an overall decrease in transport between 2002 and 2005, and recovery from 2006. The longer-term changes may be linked to changes in the North Atlantic Oscillation.

The team found the strongest variability close to the shelf break and other local topographic features, which suggests that the greatest short-term variability in transport results from changing meander modes.

Shaken and stirred

Earth Planet. Sci. Lett.
doi:10.1016/j.epsl.2008.04.052 (2008)
In 2007, a swarm of earthquakes in Tanzania was followed by an explosive eruption of ash from the nearby Oldoinyo Lengai volcano. A recent study suggests that seismic waves from the quakes triggered the eruption by stirring and shaking the magma chamber beneath the volcano.

Gidon Baer of the Geological Survey of Israel and his colleagues combined satellite-derived Radar data with detailed field mapping and modelling to resolve the distribution and timing of deformation in the area. They found that the earthquake swarm was the result of changes in regional stress caused by increased pressure in the magma chamber beneath the volcano. The earthquakes, in turn, may have triggered the eruption, either by increasing pressure on the chamber or by promoting the rising and growth of bubbles within the magma.

Although earthquakes and volcanic eruptions generally occur together, it is not usually possible to decipher the exact relationship between the two phenomena.

The silver lining

AXEL ROUWN

Proc. Natl Acad. Sci. USA **105,** 7370–7375 (2008)
The increase in cloud reflectivity caused by atmospheric aerosols is up to three times greater than previously estimated, according to a new study. Aerosols are known to affect the development and characteristics of clouds, and therefore the amount of incoming solar radiation reaching the Earth's surface, but their cumulative effect on radiative forcing is poorly constrained.

Gregory Roberts, of the Scripps Institution of Oceanography, and colleagues used unmanned aerial vehicles to measure cloud microphysics, aerosol distributions and solar radiative fluxes for individual clouds. The team used these measurements to calculate the aerosol's influence on each cloud's albedo. They found that aerosol-induced increases in the number of water droplets within clouds led to a greater increase in albedo than previously thought.

The authors suggest that direct measurements of aerosol–cloud interactions could help to constrain the cooling influence of aerosols on the Earth's surface, which is currently one of the most uncertain parameters in climate forecasting models.

Icebergs' southward voyage

Geology **36,** 447–450 (2008)
Icebergs from past glacial periods reached much further south in the Atlantic Ocean than previously thought, according to a recent study.

Jenna Hill from the Coastal Carolina University, South Carolina and her colleagues used bathymetric data collected off the coast of the eastern USA, between 33° and 32° N, to create detailed seafloor maps. They found several grooves, furrows and pits on the sea floor, which commonly indicate the presence and motion of icebergs. The size of these features and the characteristics of piles of sediments along them rule out other causes, such as trawling and submarine drainage. The directions of the features are consistent and indicate transport to the southwest.

The team suggests that a current of cold meltwater originating in the northernmost Atlantic Ocean transported icebergs southward along the eastern coast of North America, probably aided by eastward deflection of the warm Gulf Stream.