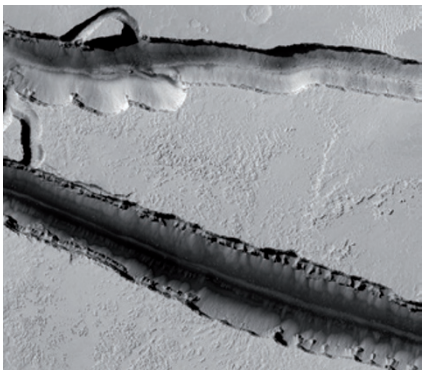
Shaky Mars

J. Geophys. Res. http://dx.doi.org/10.1029/2011JE003816 (in the press)



Mars is thought to be less geologically active than Earth, but recent faulting and young volcanism near Cerberus Fossae suggest this particular region could still be active. Spacecraft imagery of boulder populations along this fracture system suggests recent seismic activity.

Gerald Roberts of Birkbeck College, University of London, and colleagues measured boulder size and distribution around faults in Cerberus Fossae as observed in HiRISE imagery. The images show that boulder sizes decrease with increasing distance from the fault centre, in contrast to the random distribution that would be expected from processes associated with ground ice. Instead, the distribution closely compares to that of earthquake-triggered boulder avalanches on Earth. The researchers thus conclude that past marsquakes best explain their observations.

Not only are there boulders associated with faulting that occurred less than 2.5 million years ago, the trails produced by some rolling boulders have not been erased by aeolian activity. This suggests that local seismicity — and volcanism — may be ongoing. *TG*

Magma on ice

J. Volc. Geotherm. Res. http://dx.doi.org/10.1016/j.jvolgeores.2011.12.008 (2012)

Volcanic eruptions beneath glaciers should rapidly melt the overlying ice, allowing lava to spew out unconfined. However, field observations from the Askja Volcano, Iceland, suggest an alternative: ice can rapidly chill intruding magma, preventing extensive ice melting.

Alison Graettinger at the University of Pittsburgh and colleagues studied the character of ancient basaltic dykes — intrusions of magma into overlying ice and sediments — that are exposed on the flanks of the once ice-covered Askja Volcano. Many of the dykes have sharply defined, glassy margins, yet their interiors are composed of mixed sediment, ash and magmatic rocks. The researchers suggest that the edges of the dykes were quickly chilled, forming the glassy margins and limiting further melting of ice or mixing with the surrounding sediment. In contrast, ice and sediments within the intruded region rapidly melted and mixed with the magma to form the diverse interior of the dyke.

Detection of similar dykes could be used to identify previously glaciated areas on Earth and Mars. *AW*

Polygon preservation

Environ. Res. Lett. **7,** 015502 (2012)

Peatlands characterized by polygonal mounds are a common and often highly stable feature of the Arctic coast, despite significant environmental change elsewhere in the region. Measurements of surface albedo and heat flux suggest that local feedbacks contribute to the stability of these systems.

John Gamon of the University of Alberta and colleagues studied the surface properties of a polygonal peat plateau in Manitoba to determine the source of its stability. The troughs of standing water surrounding the polygonal mounds are typically dominated by sedges, whereas the mounds are dominated by dwarf shrubs and lichens. During the summer, the troughs have a lower albedo, and consequently gain more heat and thaw to a greater depth than the mounds. During winter, a deeper snowpack forms over the troughs, helping to retain some of the summer heat. As a result, the troughs exhibit substantially higher annual surface temperatures, on average, than the mounds.

The researchers suggest that the contrasting thermal regimes exhibited by the troughs and mounds reinforce these structural features, and thereby help to stabilize this patterned landscape. *AA*

Oil and air

Proc. Natl Acad. Sci. USA http://dx.doi.org/10.1073/pnas.1110052108 (2011)

The oil spill associated with the Deepwater Horizon blowout was the largest in US history. Atmospheric measurements suggest that the spill, and associated clean-up operations, led to the emission of significant quantities of air pollutants.

Ann Middlebrook of the NOAA Earth System Research Laboratory, Colorado, USA, and colleagues examined the composition and quantity of air pollutants generated by the blowout, using aircraft- and ship-based measurements taken two months after the spill. They detected a 4-km-wide plume of volatile organic compounds in the atmosphere, which they attribute to evaporation of the oil. The plume comprised a number of hazardous pollutants, including benzene and toluene. Secondary reactions in the atmosphere generated pollutants such as ozone and peroxyacetyl nitrate, a common constituent of photochemical smog.

The researchers also observed a 30-km-wide plume of organic particulate matter, generated by the evaporating hydrocarbons from the oil slick. Using a regional air-quality model, they show that winds carried these particulates to the Gulf Coast. *AA*

Dusty transition

Earth Planet. Sci. Lett. **317–318,** 8–19 (2012)

The intensification of Northern Hemisphere glaciation 2.7 million years ago marked the growth of northern continental ice sheets. It also spurred the delivery of dust to the North Atlantic Ocean, according to an analysis of marine sediments.

David Naafs of the Alfred Wegner Institute for Polar and Marine Research, Germany, and colleagues measured the accumulation of leaf waxes, a constituent of continental dust, in marine sediments from the middle of the North Atlantic. They found a marked increase in accumulation associated with the onset of glaciation, coincident with a rise in dust delivery across the planet. Numerical simulations give no indication that changes in the atmospheric circulation were responsible for the rise in dustiness. Instead, the team suggests glacier activity, which tends to grind rock and sediments into an easily blown flour, as the cause.

Dust accumulation in marine sediments varies with the obliquity of the Earth's orbit, suggesting that this orbital parameter drove Northern Hemisphere ice-sheet growth at the onset of glaciation. *AN*

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