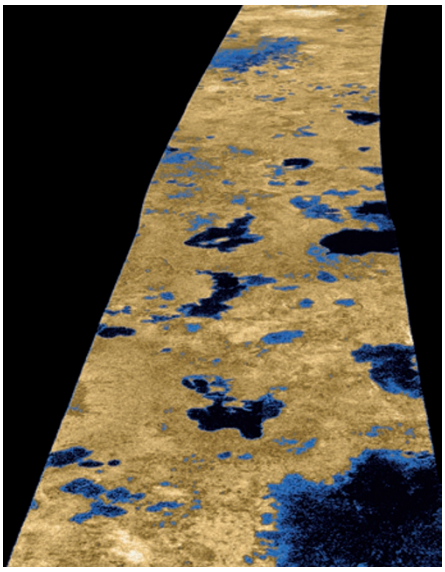
PLANETARY SCIENCE

Titan's evaporites

Icarus http://doi.org/ngw (2013)



The surface of Saturn's moon Titan is dotted with dry lake beds and lakes thought to be filled with liquid hydrocarbons. Geochemical modelling suggests that the surface of the dry lake beds could be enriched in butane and acetylene.

Daniel Cordier of the Institut UTINAM/OSU THETA, Besançon, France, and colleagues simulated the geochemical evolution of a hydrocarbon lake similar to those thought to occur on Titan. The modelled lake consisted of liquid ethane, methane and nitrogen, with a suite of organic compounds in solution. The simulated evaporation of the lake concentrated the dissolved species, particularly acetylene and butane. The relative abundance of each compound was temperature dependent, with butane favoured under warmer conditions. According to the simulations, surficial evaporites in dry lake beds should be predominantly composed of acetylene and butane.

However, the modelling did not account for the presence of sediments, which could affect the formation of solids from solutions. The researchers suggest that the amount of sediments in the lake could affect the composition of the evaporite deposits, leading to variations in the overall chemical composition according to the sediment dynamics within each lake. *AN*

PALAEOCLIMATE

Snowball synchroneity

Geology http://doi.org/ng2 (2013)

Between roughly 650 and 635 million years ago, much (if not all) of the Earth was covered by ice and snow. Dating of rock units that formed following the end of the glaciation suggests that the termination of this Marinoan Snowball Earth event was synchronous around the world.

Clive Calver of Mineral Resources Tasmania and colleagues measured the uranium and lead contents of volcanic zircons collected from the Cottons Breccia unit, part of the Marinoan-aged rock formation located on Kings Island, Tasmania. The unit formed at low latitudes, and consists of glacial and marine rocks that were deposited during and immediately after the Marinoan glaciation. The team identified volcanic ash within the younger layers, which gave a U-Pb age of about 636 million years.

This timing for the Marinoan meltdown is consistent with ages for the end of the Marinoan glaciation obtained from rocks located in Namibia and South China, indicating that the end of this Snowball Earth occurred synchronously around the globe, at least on a million-year timescale. *AN*

ATMOSPHERIC CLIMATE

Ozone-induced extremes

Geophys. Res. Lett. http://doi.org/ng3 (2013)

Southern Hemisphere storms and precipitation have shifted south in the past few decades as a result of ozone loss from the upper atmosphere. Model simulations suggest that Antarctic ozone loss has also led to an increase in the intensity and frequency of heavy rainfall events in some regions of the Southern Hemisphere.

Sarah Kang of the Ulsan National Institute of Science and Technology, Republic of Korea, and colleagues assessed the effect of stratospheric ozone depletion on summer rainfall patterns in the Southern Hemisphere between the 1970s and the present day in two global climate models. They find that ozone loss may have increased the frequency and intensity of heavy rainfall events at high and subtropical latitudes of the Southern Hemisphere. In contrast, ozone depletion seems to have reduced the frequency and intensity of such events at the mid-latitudes.

Although limitations in observational data preclude a robust test of the simulated rainfall trends, the model-derived shift in rainfall extremes is consistent with previously reported high-latitude and subtropical moistening and mid-latitude drying, also linked to ozone loss in the upper atmosphere. *AA*

VOLCANOLOGY

Glacial magma

J. Geophys. Res. http://doi.org/ngz (2013)

Over the past century, the warming climate has caused glaciers in Iceland to retreat. Numerical simulations show that the decreased volume of ice at the surface has lowered pressures in the underlying mantle, causing mantle melt and the generation of large volumes of magma.

Peter Schmidt at Uppsala University, Sweden, and colleagues used a numerical model to analyse how the crust and mantle in Iceland have responded to melting glaciers since 1890. As the glaciers decreased in volume, not only did the Earth's surface rebound but the pressure in the crust and underlying mantle decreased. The melting temperature of mantle rocks is sensitive to pressure: under lower pressures, mantle rocks melt at lower temperatures. Decompression of the mantle beneath Iceland therefore caused increased melting of the Icelandic mantle.

The researchers estimate that glacially induced melting has generated an extra 0.21 to 0.23 km^3 of magma each year beneath Iceland. The volume of magma predicted to eventually reach the surface in central Iceland would be sufficient to supply eruptions similar in size to the 2010 Eyjafjallajökull eruption once every seven years. *AW*

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