## Eruptions on the side

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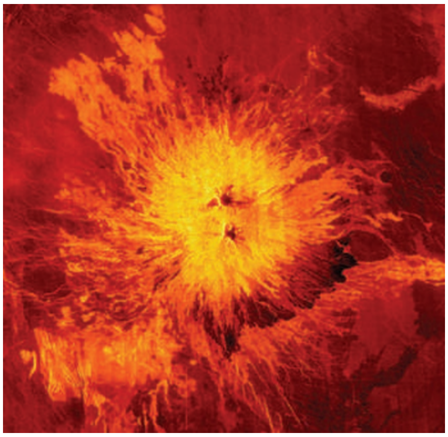

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Late-stage activity at the Sapas Mons volcano on Venus seems to be localized around the flanks of the volcano, rather than the summit. Simulations suggest that flank eruptions may result from variations in stress in the stiff outer shell of Venus.

Gerald Galgana at the Lunar and Planetary Institute, Houston, and colleagues assessed the dynamics of magma chambers located at different depths in the lithosphere of Venus using numerical models. The mass of the giant volcano caused magma chambers located at shallow depths to be compressed, a process that promotes lateral movement of magma. The authors suggest that magma migrating towards the surface in the vicinity of the volcano would therefore be forced to flow laterally, resulting in eruptions concentrated on the flanks of the volcano.

This mechanism could also help to explain flank eruptions observed on unusually large volcanoes on Earth, such as those in the Galapagos.

## Late slab break-off

*Earth Planet. Sci. Lett.*
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Any break-off of the subducted ocean crust beneath the Zagros Mountains that run between Iran and Iraq occurred less than 10 million years ago, according to numerical modelling. The mountains formed during the collision of the Eurasian and Arabian plates.

When two continents approach each other, the dense oceanic crust between them is subducted. Eventually, the oceanic crust is completely consumed, the continents collide and form a mountain range. The subducted oceanic crust later tears off from the continent and sinks into the mantle. Jeroen van Hunen and Mark Allen at the University of Durham, UK, use three-dimensional numerical simulations to demonstrate that the strength of the oceanic crust, rather than its density, controls the timing of slab break-off.

The researchers conclude that the old, strong oceanic crust subducted beneath the Zagros Mountains started to break no earlier than 20–25 million years after the continents had begun to collide, indicating that slab break-off was a relatively recent event. This timing is consistent with dates for collision and flare-up of magmatism, possibly related to the slab break-off.

## Arctic ice rebound

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Over the past decade, Arctic sea ice retreated substantially during the summer months, and there are fears that the ice loss could be irreversible. However, model simulations suggest that sea ice can recover following a large-scale melt during a single summer.

Steffen Tietsche of the Max-Planck-Institute for Meteorology in Hamburg, Germany and colleagues used an atmosphere–ocean circulation model to explore the potential for sea ice recovery in the Arctic following the complete loss of summer sea ice. In their simulations, the ocean remains ice-free for several months following complete summer melt. But ice starts to re-emerge rapidly in the late autumn, and recovers to pre-melt conditions within two years.

The loss of sea ice allows heat to build up in the surface ocean during the summer. An analysis of the model's heat budget suggests this heat is rapidly returned to the atmosphere the following autumn because of the lack of an insulating ice cover.

## Dynamic snowball

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At least two periods of global glaciation have been identified between 850 and 635 million years ago. Rocks from South Australia suggest that prolonged periods of sea-ice-free conditions interrupted the first Snowball Earth glaciation.

Daniel Paul Le Heron of Royal Holloway University of London and colleagues took a detailed look at the rock units of the Flinders Ranges of South Australia that were deposited during the Snowball Earth glaciations. The team found the usual assortment of rock types associated with the presence of glaciers and sea ice. But interspersed among the near-glacial rocks were sedimentary rocks that exhibited a texture known as hummocky cross-stratification. This texture is associated with the movement of sediment by currents in a storm. Storms can only affect the sediment bed if there is no sea ice in that location.

The occurrence of local sea-ice-free conditions is consistent with the emerging view that Snowball Earth glaciations were characterized by dynamic ice sheets and sea ice that underwent multiple periods of retreat and expansion.

## Electric desert dust

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Several hundred megatons of mineral dust are swept from the Sahara Desert into the atmosphere each year. Analyses of the airborne dust particles reveal that they are electrically charged, and as a result more susceptible to removal by precipitation.

Keri Nicoll of the University of Reading, UK, and colleagues used balloon-borne instruments to examine the electrical properties of Saharan dust lofted above the Cape Verde Islands off the west coast of Africa. They detected dust layers at around 1 and 4 km altitude. The atmosphere was charged in these layers — more so than in surrounding clean air — indicating that the dust was electrically charged. Back-trajectory measurements suggest that the dust was lifted from northwest Africa two days before the measurements. Any initial charge generated during ascension would have decayed within this period, suggesting that the dust is continually re-charged.

One effect of charging at the observed magnitude will be an increase in the assimilation of dust particles into water droplets, and thus the removal of the dust from the atmosphere through wet deposition.