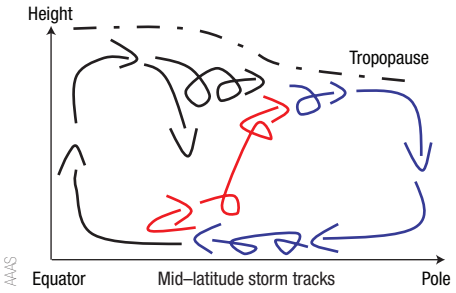
The second rising



AAAS

Science **321,** 1075–1078 (2008)
A common view of atmospheric circulation, based on the movement of dry air masses, holds that air parcels rise in the tropics, travel towards the poles at high altitudes, and return to the equator at low altitudes. A new study that takes into account the effects of water vapour concludes that half of the air reaching the poles begins its journey as warm, moist air parcels in the subtropics, which rise in the mid-latitudes.

Olivier Pauluis of New York University and colleagues examined the effect of water vapour on global atmospheric circulation patterns using over 35 years of meteorological data. They show that the amount of air transported to the poles doubles when atmospheric moisture is taken into account in their calculation of air parcel pathways, and suggest that global circulation patterns need to be revised to account for the additional pockets of subtropical moist air.

This second rising may be a key factor in determining the distribution of temperature, precipitation and winds in mid-latitudes.

Ductile subduction

J. Geophys. Res. **113,** B08411 (2008)
New modelling shows that the conversion of passive continental margins into active subduction zones may be driven by ductile deformation at the margin, rather than the previously invoked brittle deformation and faulting.

Liran Goren from the Weizmann Institute of Science, Israel, and colleagues used analytical formulations and analogue experiments to investigate the initiation of subduction at a passive margin. They found that differences in the densities of continental and oceanic material generated lateral pressure gradients, which in turn induced ductile deformation. The upper part of the continental lithosphere began to flow towards the ocean while the lower part of the oceanic lithosphere moved towards the continent, leading to the initiation of low-angle subduction.

The team concluded that once the oceanic lithosphere is emplaced below the continental margin, it may continue to sink under its own weight, thereby initiating long-lived subduction.

Mississippi yo-yo

Geology **36,** 675–678 (2008)
The Mississippi river delta underwent alternating phases of uplift and subsidence in response to the last glacial–interglacial cycle, suggests a new study. These changes dominated variability in the relative sea level of the region.

Michael Blum of the Louisiana State University and colleagues used published geologic data to reconstruct the history of incision and sedimentation in the lower Mississippi valley. Their numerical modelling, aimed at evaluating the response of the delta to these processes, suggests that the loading and unloading of sediments is sufficient to induce uplift and subsidence of the delta on the order of several metres. The signal of sea level change is therefore likely to vary with location along the Gulf of Mexico.

These findings question the assumption of delta stability used to reconstruct relative sea level change for this region.

Vesuvian ascent

Nature **455,** 216–219 (2008)
The shallow magma chamber of Vesuvius has migrated upwards by almost 4 kilometres since the catastrophic eruption of AD 79, according to a new study. The location of magma chambers — reservoirs in which magma is stored and processed before volcanic eruptions — can control the evolution of magma and the frequency of eruptions.

Bruno Scaillet from the Institut des Sciences de la Terre d'Orléans, France, and colleagues used laboratory experiments to examine the crystallization of lavas erupted during four different Vesuvian eruptions. They found that the mineral assemblages of older eruptions, including Pompeii, stabilized at pressures much higher than those associated with assemblages of younger eruptions. Because pressure is greater at depth, they concluded that the younger eruptions came from an increasingly shallow magma chamber.

The team suggests that the rates at which magma was supplied to the chamber may have varied before major explosive eruptions.

A mega-hunt

Proc. Natl Acad. Sci. USA **105,** 12150–12153 (2008)
The megafauna of Tasmania were driven to extinction by human hunting, according to a new study. Careful fossil dating suggests that humans and megafauna briefly coexisted on the island.

Chris Turney of the University of Wollongong, Australia, and colleagues used radiocarbon dating of bone collagen and optically stimulated luminescence dating of the surrounding sediments to estimate the ages of numerous Tasmanian fossil sites. The team found that, contrary to previous studies, six species of marsupials and a monotreme were still thriving when humans crossed over from Australia approximately 40,000 years ago. However, the humans and megafauna appear to have overlapped for just a few thousand years, which may explain the lack of fossil remains at early archaeological sites.

The team found no evidence of rapid climate or environmental change at the time of the extinction, suggesting that the arrival of human hunters was the dominant factor in the demise of the megafauna.


PETER SHOUTEN