Let's get chemical

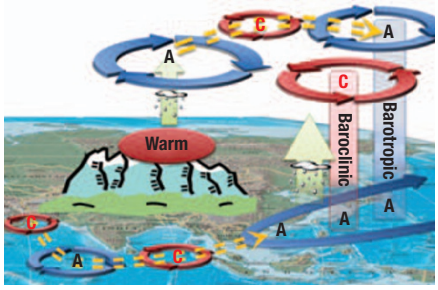
Earth Planet. Sci. Lett. **272,** 591–599 (2008)

Chemical weathering leads to soil formation, determines nutrient availability to organisms and influences the drawdown of atmospheric carbon dioxide. A new modelling study suggests that contrary to a previous hypothesis, fast uplift and physical erosion may not necessarily lead to faster chemical weathering.

Ken Ferrier and James Kirchner from the University of California, Berkeley used a numerical simulation to determine how varying rates of physical erosion affected the rate of chemical weathering. Their model incorporated estimates of chemical weathering rates from concentrations of immobile elements as well as cosmogenic radionuclides. They found that chemical weathering should be greatest at intermediate rates of physical erosion and concluded that increased physical weathering in rapidly eroding areas may actually reduce chemical weathering rates.

By incorporating the changing pace of physical erosion, this study provides a way to model chemical weathering rates under more realistic conditions.

Heat and rain



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Geophys. Res. Lett.
doi:10.1029/2008GL034330 (2008)

Temperatures on the Tibetan Plateau have risen by 1.8 °C over the past 50 years, which may have had a notable effect on East Asian rainfall, finds a new study. Warming and precipitation increases are linked through atmospheric dynamics.

Bin Wang of the University of Hawaii and colleagues detected a coherent warming trend in surface air temperatures recorded between 1961 and 2007 at 90 stations on the Tibetan Plateau at elevations over 2,500 m. East Asian subtropical rainfall has increased significantly over the same period. In simulations with a numerical climate model, a similar pattern of precipitation changes emerged in response to warming on the Tibetan Plateau. In the model, Tibetan Plateau warming sets in motion two distinct atmospheric wave trains, resulting in moisture transport to East Asia.

With projected future temperature rises on the Tibetan Plateau on the order of 4 °C over the next 100 years, subtropical East Asia is likely to become wetter yet.

Feeding denitrifyers

Deep-Sea Res. Pt I
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Denitrification — the process by which marine bacteria reduce nitrate and nitrite to N_2 gas — is affected by the supply of organic carbon to the oxygen minimum zone, according to new research. Although denitrification occurs in many ocean regions, the controls on the distribution of the process have been unclear.

Bess Ward of Princeton University and colleagues used shipboard incubation experiments to assess the response of denitrifying bacteria to the addition of different nutrients. The team collected waters from the most N_2-productive oxygen minimum zones: the eastern tropical North and South Pacific Ocean and the Arabian Sea. No site responded to the addition of copper — a key ingredient in nitrogen reducing enzymes. However, the addition of organic carbon rapidly increased the denitrification rate at the Pacific sites.

The team concluded that carbon is the limiting nutrient for denitrifying bacteria in the low oxygen waters of the eastern tropical Pacific Ocean.

Ancient tropical chill

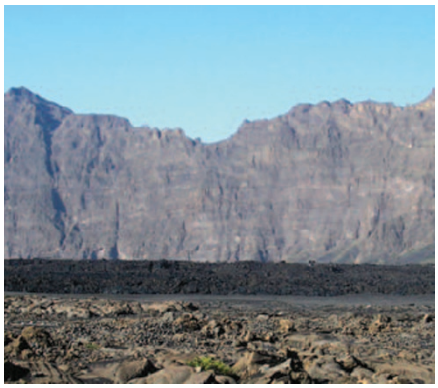
Geology **36,** 659–662 (2008)

Glaciers could have existed at relatively low elevations in the tropics during the late Palaeozoic era some 300 million years ago, suggests a new study. During this period, the Earth underwent a major episode of climate cooling, but previous studies had documented continental glaciation only from higher latitudes.

Gerilyn Soreghan from the University of Oklahoma and colleagues searched the Unaweep Canyon in Colorado for evidence of past glaciation. Previous work has shown that the canyon was located at tropical latitudes during the late Palaeozoic era. The researchers found poorly sorted sediments with deformation features indicative of rafting and transport by ice, confirming a glacial origin of the canyon. Evidence from additional late Palaeozoic tropical localities led the team to suggest that tropical glacial activity was widespread, at least episodically.

The lower atmospheric carbon dioxide and solar luminosity reported for the Palaeozoic era cannot fully explain the presence of low-elevation glaciers in the tropics, hinting at a yet-unknown cause.

A big collapse



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Geochem. Geophys. Geosys. **9,** Q07015 (2008)

Many of the larger Cape Verde islands off the coast of Africa experienced massive landslide events, according to a recent study. Oceanic islands of volcanic origin are inherently unstable and susceptible to flank collapse, which triggers the landslides.

Douglas Masson from the University of Southampton, UK and colleagues mapped the bathymetry of the western Cape Verde Islands in detail and determined the geomorphic characteristics of their submerged flanks. The data reveal scars and debris deposits, suggesting that the islands experienced landslides in the past. The only previously identified instance of flank collapse in this group occurred on the island of Fogo. This is also the most recent event, tentatively dated at 80,000 years ago.

These past events are suspected to have caused large tsunamis. Such a tsunami from a future flank collapse could threaten populations on neighbouring islands and the west coast of Africa.