HISTORY

Mexican silver surge

Geology http://doi.org/jsg (2012)

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The price of commodities such as wheat and hides soared in Europe between 1515 and 1650, as the continent went through a prolonged period of economic inflation. An isotopic analysis of coins from the time suggests that an influx of Mexican silver may have been to blame.

Anne-Marie Desaulty and Francis Albarede of the University of Lyon, France, examined the isotopic composition of lead, silver and copper in 15 English coins manufactured between 1317 and 1640 to determine the source of the ores used to make the coins. The isotopic composition of pre-Tudor coins, minted before the onset of inflation, matched that of silver ores in central Europe and England. In contrast, the isotopic signature of coins minted in the sixteenth and early seventeenth century — when inflation was in full swing — bore the hallmarks of both Mexican and European silver ores. However, silver from colonial Peru, also mined at the time, was present at only very low concentrations.

The findings suggest that while Mexican silver was shipped across the Atlantic Ocean to Europe, fuelling inflation during Tudor times, Peruvian silver flowed west, to China. *AA*

PLANETARY SCIENCE

Unatmospheric dwarf

Nature http://dx.doi.org/10.1038/nature11597 (2012)

The icy dwarf planet Makemake lies between dwarf planets Pluto and Eris. Measurements made when Makemake passed in front of a star suggest that, unlike Pluto, it lacks an appreciable atmosphere.

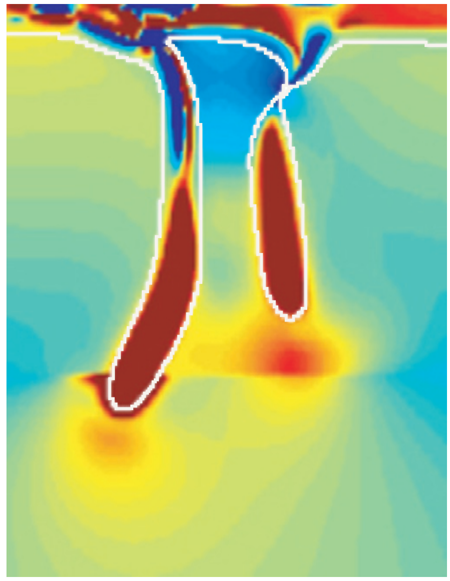
Jose Ortiz of the Instituto de Astrofísica de Andalucía, Spain, and a multinational group of colleagues recorded the passage of Makemake between a faint star and the Earth using seven telescopes from five sites. Timing the disappearance and reappearance of the star's light, they estimated the geometry of Makemake: slightly elliptical, with axes of about 1,430 and 1,500 kilometres. The researchers ruled out the existence of a global atmosphere such as that found on Pluto, which had previously been expected based on the size and surface reflectance of Makemake.

However, localized patches of atmosphere, possibly consisting of nitrogen or methane, are consistent with the data. The effects of such patches could help to explain earlier observations that require the presence of two different types of terrain on the dwarf planet's surface. *AN*

GEODYNAMICS

Stalled slab

Lithosphere http://doi.org/jsj (2012)



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A fragment of an ancient subducted slab is thought to have been left dangling in the upper mantle beneath Idaho, western USA, for over 40 million years. Numerical modelling demonstrates that slab buoyancy combined with high mantle viscosity helped stall the slab's descent into the mantle.

Erin Burkett and Michael Gurnis at the California Institute of Technology, USA, investigated the conditions that could allow a cold, dense slab fragment to persist in the upper mantle for so long, without detaching from the surface tectonic plate and sinking into the warm mantle. In their numerical simulations, they find that a short slab fragment will stall for longer than a long fragment because it is, comparatively, stronger and more buoyant. A high viscosity contrast between the upper and lower mantle also helps to slow the slab's sinking velocity.

Together, these factors can delay slab detachment and sinking for about 28 million years, but it is difficult to explain the presence of dangling slabs for much longer. It is therefore possible that the piece of lithosphere observed beneath Idaho is a delaminated part of the surface plate, rather than a dangling slab left over from subduction. *AW*

CRETACEOUS OCEANS

Nutrient-driven anoxia

Paleoceanography http://doi.org/jsk (2012)

About 93.5 million years ago, the world's oceans became depleted in oxygen. According to numerical simulations, a rise in the availability of nutrients in the surface oceans could have driven much of the oxygen loss at this time.

Fanny Monteiro of the University of Bristol, UK, and colleagues compared geochemical data recording seafloor oxygenation across this interval, known as Ocean Anoxic Event 2, to biogeochemical simulations from an Earth system model. The climate is known to have warmed around the time of the anoxic event, but the modelling showed that oceanic temperature changes alone were not sufficient to reproduce the observed spread of anoxia. Instead, high levels of marine productivity in the surface ocean could have driven the bulk of the oxygen depletion — the decay of these organisms at depth consumes oxygen. This productivity would have been fuelled by the delivery of nutrients by enhanced continental weathering under greenhouse climate conditions and the recycling of phosphorus in increasingly anoxic sediments.

The simulations also imply that at least 50% of the global ocean volume was anoxic at the height of the event, with anoxic conditions even reaching the sunlit surface waters in parts of the east Pacific Ocean. *AN*

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