

## CLIMATOLOGY

### Teak record for Burma

*Geophys. Res. Lett.* <http://dx.doi.org/10.1029/2011GL049927> (in the press)

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Researchers have used samples from 20 living teak trees in Burma to plug a hole in the Asian monsoon record.

There are few long-term instrument-based climate records in Asia, so researchers turn to natural records instead. This includes tree rings from species, such as teak, that have identifiable rings from the wet and dry seasons in the tropics. In 2010, a tree-ring atlas of droughts and monsoons in Asia over the last 1,000 years was published (E. Cook *et al.*, *Science* **328**, 486–489; 2010), but some countries were not represented in the regional study.

Now, Rosanne D'Arrigo of the Tree-Ring Laboratory at the Lamont-Doherty Earth Observatory in New York, and colleagues, have looked at teak samples from Burma's Maingtha Reserve Forest, revealing a climate record stretching from 1613 to 2009. Their results match well with those from neighbouring countries, D'Arrigo's team reports. They recommend stitching together more such records, although intense logging makes it hard to find long-lived trees. NJ

## EMISSIONS TRADE

### The effects of Kyoto

*J. Environ. Econ. Manage.* <http://dx.doi.org/10.1016/j.jeem.2011.10.005> (2011)

The Kyoto Protocol, which came into force in 2005, was the first multilateral attempt to cap carbon emissions. Its effects on national emissions are debatable, however, because it may encourage so-called carbon leakage, in which carbon-intensive production is relocated outside national borders.

Rahel Aichele and Gabriel Felbermayr of the University of Munich, Germany, compiled a set of annual data on the carbon footprint — the sum of domestic carbon emissions and net emissions embodied in trade — of 40 countries from 1995 to 2007.

Their model allowed them to isolate the impact of the protocol commitments on domestic emissions from the impact on the overall carbon footprint. The researchers also estimated the impact of the protocol on the carbon-import ratio — the amount of emissions embodied in imports relative to domestic emissions. An increase in the ratio indicates that carbon leakage has occurred.

They found that, on average, the Kyoto commitments have reduced domestic emissions by 7%, but the carbon-import ratio increased on average by about 14%. This implies a substantial relocation of carbon-intensive production; carbon leakage cancelled out the domestic savings, rendering carbon footprints unchanged. MC

## CARBON STORAGE

### When peat dries

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Peatlands lock away the large quantities of carbon that build up in these water-saturated environments owing to the presence of phenolic compounds, which inhibit microbial decomposition. Phenolic concentrations remain high in peatlands because anoxic conditions limit the activity of the enzyme responsible for their breakdown. However, droughts introduce oxygen into these systems, and the frequency of these events is increasing.

Nathalie Fenner and Chris Freeman of the Wolfson Peatland Carbon Capture Laboratory at Bangor University in Wales, UK, used *in vitro* manipulations, mesocosm experiments and field observations to examine the impact of drought on peatland carbon.

They found that drought stimulates bacterial growth and activity of the enzyme phenol oxidase, reducing the concentration of phenolic compounds in peat. This further stimulates microbial growth, causing the breakdown of organic matter and the release of carbon dioxide. Furthermore, they show that re-wetting the peat accelerates carbon losses to the atmosphere, owing to drought-induced increases in nutrient and labile carbon levels, which raise pH and stimulate

anaerobic decomposition. These findings suggest that severe drought, and subsequent re-wetting, could destabilize peatland carbon stocks. AB

## ECOLOGY

### Moving trees

*Glob. Change Biol.* <http://dx.doi.org/10.1111/j.1365-2486.2011.02586.x> (2011)

Climate change is expected to lead to significant shrinkage and/or shifting of habitat for many species. As a result there is growing interest in proactive adaptation strategies, perhaps the most controversial of which is assisted colonization, in which species are moved to new suitable habitat that they could not have reached on their own.

Conservation biologist Helen Regan, at the University of California, Riverside, USA, and colleagues focused on Tecate cypress, a rare fire-dependant tree found in California. They tracked the impacts of climate change on the tree's habitat to investigate whether assisted colonization could help offset threats, such as habitat loss and altered fire regimes.

The results suggest that assisted colonization could be an effective risk-minimizing strategy, so long as there are suitable sites nearby and translocated trees are able to establish successfully. However, assisted colonization may be ineffective where other threats are ongoing, such as where humans have increased the rate or severity of fire outbreaks. AB

## OCEANOGRAPHY

### Atlantic current slowdown

*Geophys. Res. Lett.* <http://dx.doi.org/10.1029/2011GL049801> (in the press)

Researchers have long theorized that the ocean's thermohaline or meridional overturning circulation — an ocean 'conveyor belt' driven by temperature and salinity gradients, which includes the warm North Atlantic Gulf Stream — might slow down as a result of climate change. But this has proven difficult to measure.

Uwe Send of the Scripps Institution of Oceanography in California, and colleagues, looked at readings from three moored buoys that are part of the Meridional Overturning Variability Experiment (MOVE) array, anchored at either end of a single 1,000-km strip running eastwards from Guadalupe, north of Venezuela. Data from January 2000 to June 2009 showed a 20% decrease in deep-ocean southward flow across this line. This is the first direct observation of interannual and decadal variability in this current, the team reports.