

research highlights

ATMOSPHERIC SCIENCE

Shifting westerly winds

Science <http://doi.org/kfp> (2013)

In recent decades, the westerly winds of the Southern Hemisphere have shifted polewards. This change is strongest in the austral summer and affects weather and climate. Modelling studies have found the shift to be caused by either increasing concentrations of greenhouse gases, or decreasing stratospheric ozone, with ozone predicted to have a greater impact

Sukyoung Lee and Steven Feldstein, of Pennsylvania State University, USA, used observational data to separate the two forcings and quantify their contribution to the shifting jetstream. They use a reanalysis data product — daily ERA-Interim data — and applied a cluster analysis. Greenhouse-gas warming was represented by an 11-day cluster, and ozone depletion by a 7-day cluster. The trends in the occurrence frequency indicate that ozone forcing had a greater effect on the jetstream — by almost 50% — supporting the model results previously reported. **BW**

INTERNATIONAL TRADE

Global freight emissions

World Econ. <http://doi.org/kfq> (2013)

Carbon dioxide emissions from international freight and passenger transport only amounted to about 5% of global energy-related emissions in 2001. However, this fraction is likely to rise due to growing international trade, and the increasing use of more carbon-intensive air transport to move goods across borders.

Frank Vöhringer of the Ecole Polytechnique de Lausanne, Switzerland,

and colleagues analysed changing patterns of carbon emissions from international transport worldwide by looking at different trade and climate policy scenarios. They found that if international cooperation leads to trade liberalization, with no climate policy enforced, about half of the increase in world emissions is due to international transport. If international cooperation includes trade and climate policies (carbon taxes), trade-related emission sources become less important, but emissions from international transport increase regardless of the carbon tax coverage. In particular, if a carbon tax is imposed only on rich countries — excluding air and water transport from the tax base — emissions from international transport increase by 11.6%. Assessments of trade and climate policies should therefore consider international transport emissions. **MC**

ATMOSPHERIC SCIENCE

Black carbon punch

J. Geophys. Res. <http://dx.doi.org/10.1002/jgrd.50171> (2013)

Black carbon aerosols — tiny soot particles suspended in the atmosphere — are a by-product of the incomplete combustion of fossil and biomass fuels, and are mainly emitted by the transport, industrial and residential sectors. These aerosols play an important and complex role in the climate system, where they absorb solar radiation, influence clouds and alter snow and ice thaw processes.

Tami Bond at the University of Illinois, at Urbana-Champaign, US, and a multidisciplinary team of 30 co-workers assessed the influence of black carbon on radiative forcing — the balance of radiant

energy received and lost by the Earth — in the most comprehensive study so far. Their results indicate that black carbon has around twice the direct warming effect conventionally expected, giving it the dubious privilege of being the second most important warming agent after CO₂.

The ways in which black carbon and co-emitted pollutants influence the climate are complicated, making it difficult to predict the success of blanket policies that cut black carbon emissions. Nevertheless, decreases in some categories of emissions, such as those from diesel engines and domestic wood and coal fires, are expected to reduce short-term warming and have important health co-benefits. **AB**

CRYOSCIENCE

Lakes of Greenland

The Cryosphere **7**, 201–204 (2013)



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The Greenland Ice Sheet has been exposed to substantial warming over the last 20 years. This has led to an increase in the altitude of the equilibrium line — the elevation at which snow and ice removal is equal to accumulation. Meltwater lakes are therefore expected to be found at higher elevations, but the lack of undulations in the surface of the ice sheet may prevent lake formation further inland.

Ian Howat, of the School of Earth Sciences and Byrd Polar Research Center, Ohio State University, USA, and co-workers examined forty years of satellite images to map the annual distribution of lakes between 1972–2012, for the months of July and August. They found that the presence of lakes closely follows the equilibrium line for most of the ice sheet, indicating there maybe no physical limitation to lake expansion. **BW**

Written by Alastair Brown, Monica Contestabile and Bronwyn Wake.

BUSINESS

Corporate political action

Energy Policy <http://doi.org/kfm> (2013)

Companies are able to exercise power to influence climate change policies. An understanding of the factors that drive business support for, or opposition to, climate policy is therefore critical for the design of instruments that facilitate sustainable institutional change.

Steven Sarasini of the Chalmers University of Technology, Sweden, interviewed thirty-three representatives of electricity producers, industrial associations and lobby organizations from different locations in Sweden. Respondents were asked about the strengths and weaknesses of the European emissions trading and the Swedish electricity certificate schemes, and how and why they participated in the development of these schemes. He found that companies use political influence to protect their financial interests and, when the risk of losses is severe, they exert their power to disrupt regulatory institutions. However, respondents' appraisals of policy instruments were based on a set of shared criteria — cost efficiency, effectiveness and equity — that remain critical even when they face financial risks. Climate policies must therefore match those criteria to avoid political opposition from business. **MC**