



## Atmospheric Chemistry and Physics (ACP)

### Heterogeneous formation of polar stratospheric clouds – part 2: nucleation of ice on synoptic scales

This paper provides compelling evidence for the importance of heterogeneous nucleation, likely on solid particles of meteoritic origin, and of small-scale temperature fluctuations, for the formation of ice particles in the Arctic stratosphere.

#### Reference

Engel, I. et al.: [Heterogeneous formation of polar stratospheric clouds – Part 2: Nucleation of ice on synoptic scales](#), *Atmos. Chem. Phys.*, 13, 10769–10785, 2013

### Filamentary structure in chemical tracer distributions near the subtropical jet following a wave breaking event

This paper presents a set of observations and analyses of trace gas cross sections at mid-latitudes in the upper troposphere/lower stratosphere.

#### Reference

Ungermaun, J. et al.: [Filamentary structure in chemical tracer distributions near the subtropical jet following a wave breaking event](#), *Atmos. Chem. Phys.*, 13, 10517–10534, 2013

### Cloud-resolving simulations of mercury scavenging and deposition in thunderstorms

This study examines dynamical and microphysical features of convective clouds that affect mercury wet scavenging and concentrations in rainfall.

#### Reference

Nair, U. S. et al.: [Cloud-resolving simulations of mercury scavenging and deposition in thunderstorms](#), *Atmos. Chem. Phys.*, 13, 10143–10157, 2013

### Naphthalene SOA: redox activity and naphthoquinone gas–particle partitioning

In this study, the authors examined chamber secondary organic aerosol (SOA) from low-NO<sub>x</sub> photooxidation of naphthalene by hydroxyl radical with respect to its redox cycling behaviour using the dithiothreitol assay.

#### Reference

McWhinney, R. D., Zhou, S., and Abbatt, J. P. D.: [Naphthalene SOA: redox activity and naphthoquinone gas–particle partitioning](#), *Atmos. Chem. Phys.*, 13, 9731–9744, 2013

### Black carbon in the Arctic: the underestimated role of gas flaring and residential combustion emissions

Chemistry transport models and climate chemistry models struggle to reproduce the Arctic Haze phenomenon, and this has recently prompted changes in aerosol removal schemes to remedy the modelling problems. In this paper, the authors show that shortcomings in current emission data sets are at least as important.

#### Reference

Stohl, A. et al.: [Black carbon in the Arctic: the underestimated role of gas flaring and residential combustion emissions](#), *Atmos. Chem. Phys.*, 13, 8833–8855, 2013

### The magnitude and causes of uncertainty in global model simulations of cloud condensation nuclei

In this article the authors perform a variance-based analysis of a global 3D aerosol microphysics model to quantify the magnitude and leading causes of parametric uncertainty in model-estimated present-day concentrations of cloud condensation nuclei.

#### Reference

Lee, L. A. et al.: [The magnitude and causes of uncertainty in global model simulations of cloud condensation nuclei](#), *Atmos. Chem. Phys.*, 13, 8879–8914, 2013

### Global CO<sub>2</sub> fluxes estimated from GOSAT retrievals of total column CO<sub>2</sub>

This paper presents one of the first estimates of the global distribution of CO<sub>2</sub> surface fluxes using total column CO<sub>2</sub> measurements retrieved by the SRON-KIT (Netherlands Institute for Space Research and Karlsruhe Institute for Technology) RemoTeC algorithm from the Greenhouse gases Observing SATellite (GOSAT).

#### Reference

Basu, S. et al.: [Global CO<sub>2</sub> fluxes estimated from GOSAT retrievals of total column CO<sub>2</sub>](#), *Atmos. Chem. Phys.*, 13, 8695–8717, 2013

## Gravitational separation in the stratosphere – a new indicator of atmospheric circulation

The O<sub>2</sub>/N<sub>2</sub> ratio observed in the middle stratosphere, corrected for gravitational separation, showed the same mean air age as estimated from the CO<sub>2</sub> mole fraction. Therefore, gravitational separation can be used as a new indicator of changes in atmospheric circulation in the stratosphere, the authors concluded in this study.

### Reference

Ishidoya, S. et al.: [Gravitational separation in the stratosphere – a new indicator of atmospheric circulation](#), *Atmos. Chem. Phys.*, 13, 8787–8796, 2013

## Quantitative evaluation of emission controls on primary and secondary organic aerosol sources during Beijing 2008 Olympics

To assess the primary and secondary sources of fine organic aerosols after the aggressive implementation of air pollution controls during the 2008 Beijing Olympic Games, researchers measured 12-h PM<sub>2.5</sub> values at an urban site at Peking University and an upwind rural site at Yufa. The results are reported in this paper.

### Reference

Guo, S. et al.: [Quantitative evaluation of emission controls on primary and secondary organic aerosol sources during Beijing 2008 Olympics](#), *Atmos. Chem. Phys.*, 13, 8303–8314, 2013

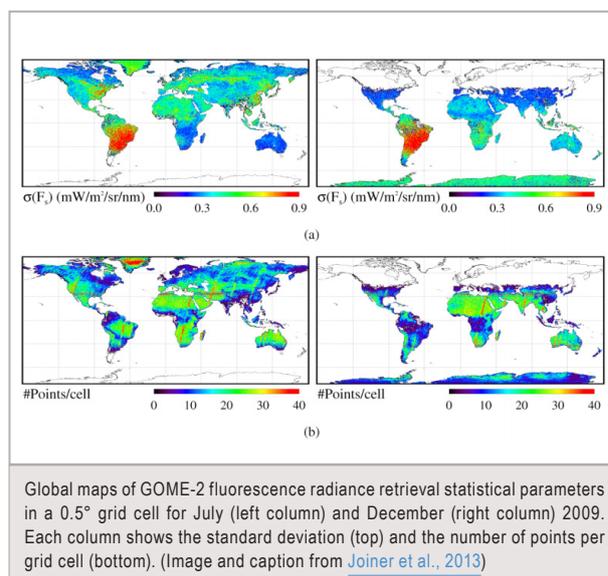
# Atmospheric Measurement Techniques (AMT)

## Global monitoring of terrestrial chlorophyll fluorescence from moderate-spectral-resolution near-infrared satellite measurements: methodology, simulations, and application to GOME-2

In this paper, the authors describe a new methodology to retrieve global far-red fluorescence information. They use hyperspectral data with a simplified radiative transfer model to disentangle the spectral signatures of three basic components: atmospheric absorption, surface reflectance and fluorescence radiance.

### Reference

Joiner, J. et al.: [Global monitoring of terrestrial chlorophyll fluorescence from moderate-spectral-resolution near-infrared satellite measurements: methodology, simulations, and application to GOME-2](#), *Atmos. Meas. Tech.*, 6, 2803–2823, 2013



# Biogeosciences (BG)

## A novel salinity proxy based on Na incorporation into foraminiferal calcite

This study investigates the impact of salinity on foraminiferal Na/Ca values by laser ablation ICP-MS (inductively coupled plasma mass spectrometry) analyses of specimens of the benthic foraminifer *Ammonia tepida* cultured at a range of salinities (30.0–38.6).

### Reference

Wit, J. C. et al.: [A novel salinity proxy based on Na incorporation into foraminiferal calcite](#), *Biogeosciences*, 10, 6375–6387, 2013

## Carbonate mineral saturation states in the East China Sea: present conditions and future scenarios

To assess the impact of rising atmospheric CO<sub>2</sub> and eutrophication on the carbonate chemistry of East China Sea shelf waters, the authors calculated the saturation states for two important biologically relevant carbonate minerals throughout the water column.

### Reference

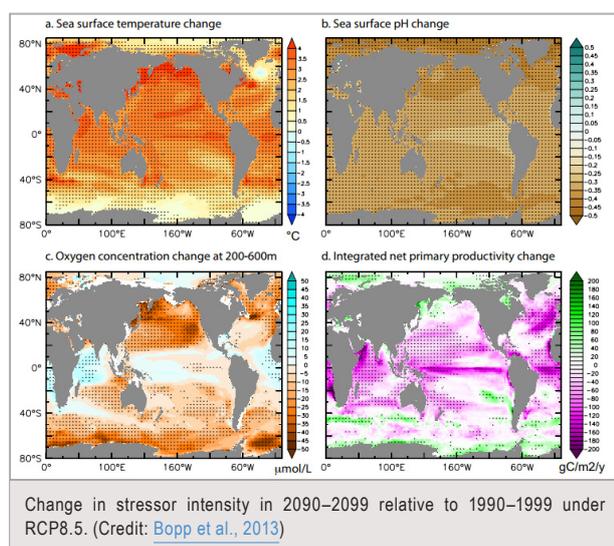
Chou, W.-C. et al.: [Carbonate mineral saturation states in the East China Sea: present conditions and future scenarios](#), *Biogeosciences*, 10, 6453–6467, 2013

## Multiple stressors of ocean ecosystems in the 21<sup>st</sup> century: projections with CMIP5 models

Ocean ecosystems are increasingly stressed by human-induced changes of their physical, chemical and biological environment. In this paper, the authors use the most recent simulations performed in the framework of the Coupled Model Intercomparison Project (CMIP) 5 to assess how stressors such as warming, acidification, deoxygenation and changes in primary productivity by marine phytoplankton may evolve over the course of the 21<sup>st</sup> century.

### Reference

Bopp, L. et al.: [Multiple stressors of ocean ecosystems in the 21<sup>st</sup> century: projections with CMIP5 models](#), *Biogeosciences*, 10, 6225–6245, 2013



## Nitrous oxide (N<sub>2</sub>O) production in axenic *Chlorella vulgaris* microalgae cultures: evidence, putative pathways, and potential environmental impacts

Using antibiotic assays and genomic analysis, this study demonstrates nitrous oxide (N<sub>2</sub>O) is generated from axenic *Chlorella vulgaris* cultures. In batch assays, this production is magnified under conditions favouring intracellular nitrite accumulation, but repressed when nitrate reductase activity is inhibited.

### Reference

Guieysse, B. et al.: [Nitrous oxide \(N<sub>2</sub>O\) production in axenic \*Chlorella vulgaris\* microalgae cultures: evidence, putative pathways, and potential environmental impacts](#), *Biogeosciences*, 10, 6737–6746, 2013

## Remote sensing of LAI, chlorophyll and leaf nitrogen pools of crop- and grasslands in five European landscapes

Leaf nitrogen and leaf surface area influence the exchange of gases between terrestrial ecosystems and the atmosphere, and play a significant role in the global cycles of carbon, nitrogen and water. This study used field-based and satellite remote-sensing-based methods to assess leaf nitrogen pools in five diverse European agricultural landscapes located in Denmark, Scotland, Poland, the Netherlands and Italy.

### Reference

Boegh, E. et al.: [Remote sensing of LAI, chlorophyll and leaf nitrogen pools of crop- and grasslands in five European landscapes](#), *Biogeosciences*, 10, 6279–6307, 2013

# Climate of the Past (CP)

## Peak glacial <sup>14</sup>C ventilation ages suggest major draw-down of carbon into the abyssal ocean

Here the authors present a new, though still fragmentary, ocean-wide  $\Delta^{14}\text{C}$  data set showing that during the Last Glacial Maximum and Heinrich Stadial 1 the maximum <sup>14</sup>C age difference between ocean deep waters and the atmosphere exceeded the modern values by up to 1500 <sup>14</sup>C yr, in the extreme reaching 5100 <sup>14</sup>C yr.

### Reference

Sarnthein, M., Schneider, B. and Grootes, P. M.: [Peak glacial <sup>14</sup>C ventilation ages suggest major draw-down of carbon into the abyssal ocean](#), *Clim. Past*, 9, 2595–2614, 2013

## North–south palaeohydrological contrasts in the central Mediterranean during the Holocene: tentative synthesis and working hypotheses

Using a multi-proxy approach and a strategy combining lacustrine and marine records along a north–south transect, data collected in the central Mediterranean as part of a collaborative project have led to reconstruction of high-resolution and well-dated palaeohydrological records and assessment of their spatial and temporal coherency.

### Reference

Magny, M. et al.: [North–south palaeohydrological contrasts in the central Mediterranean during the Holocene: tentative synthesis and working hypotheses](#), *Clim. Past*, 9, 2043–2071, 2013

## Earth System Dynamics (ESD)

### The impact of nitrogen and phosphorous limitation on the estimated terrestrial carbon balance and warming of land use change over the last 156 yr

The authors examine the impact of land use and land cover change over 1850–2005 using an Earth system model that incorporates nitrogen and phosphorous limitation on the terrestrial carbon cycle.

#### Reference

Zhang, Q. et al.: [The impact of nitrogen and phosphorous limitation on the estimated terrestrial carbon balance and warming of land use change over the last 156 yr](#), *Earth Syst. Dynam.*, 4, 333–345, 2013

### Climate response to imposed solar radiation reductions in high latitudes

Model simulations in which the authors reduced solar insolation over high latitudes not only cooled those regions, but also drew energy from lower latitudes, exerting a cooling influence over much of the hemisphere in which the reduction was imposed.

#### Reference

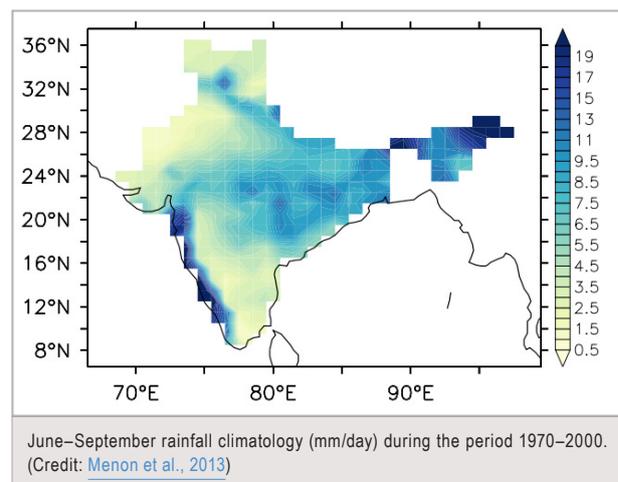
MacCracken, M. C. et al.: [Climate response to imposed solar radiation reductions in high latitudes](#), *Earth Syst. Dynam.*, 4, 301–315, 2013

### Consistent increase in Indian monsoon rainfall and its variability across CMIP5 models

In this study, the Indian summer monsoon rainfall is evaluated in 20 CMIP5 models for the period 1850 to 2100.

#### Reference

Menon, A. et al.: [Consistent increase in Indian monsoon rainfall and its variability across CMIP-5 models](#), *Earth Syst. Dynam.*, 4, 287–300, 2013



## Hydrology and Earth System Sciences (HESS)

### Inverse streamflow routing

Routing is a runoff-to-streamflow process, and the streamflow in rivers is the response to runoff integrated in both time and space. In this article, the authors develop a methodology to invert the routing process, i.e., to derive the spatially distributed runoff from streamflow (e.g., measured at gauge stations) by inverting an arbitrary linear routing model using fixed interval smoothing.

#### Reference

Pan, M. and Wood, E. F.: [Inverse streamflow routing](#), *Hydrol. Earth Syst. Sci.*, 17, 4577–4588, 2013

### A thermodynamic approach to link self-organisation, preferential flow and rainfall–runoff behaviour

This study investigates whether a thermodynamically optimal hillslope structure can, if present, serve as a first guess for uncalibrated predictions of rainfall–runoff.

#### Reference

Zehe, E. et al.: [A thermodynamic approach to link self-organisation, preferential flow and rainfall–runoff behaviour](#), *Hydrol. Earth Syst. Sci.*, 17, 4297–4322, 2013

## The Cryosphere (TC)

### Antarctic ice-mass balance 2003 to 2012

This paper presents regional-scale mass balances for 25 drainage basins of the Antarctic Ice Sheet from satellite observations of the Gravity and Climate Experiment (GRACE) for the period January 2003 to September 2012.

#### Reference

Sasgen, I. et al.: [Antarctic ice-mass balance 2003 to 2012: regional reanalysis of GRACE satellite gravimetry measurements with improved estimate of glacial-isostatic adjustment based on GPS uplift rates](#), *The Cryosphere*, 7, 1499–1512, 2013