



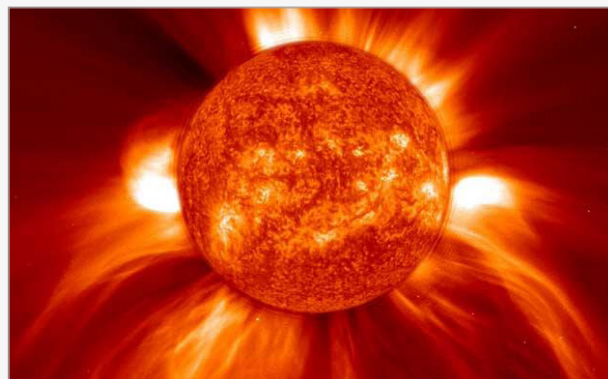
## Annales Geophysicae

### The 'step feature' of suprathermal ion distributions: a discriminator between acceleration processes?

With this study, we draw attention to the so-called 'step feature' of the velocity distributions of suprathermal particles in the solar wind. We also offer a criterion that allows one to distinguish between those scenarios that employ velocity diffusion, i.e. second-order Fermi processes, which are prime candidates in the present debate.

#### Reference

Fahr, H. J. and Fichtner, H.: [The 'step feature' of suprathermal ion distributions: a discriminator between acceleration processes?](#), *Ann. Geophys.*, 30, 1315-1319, 2012



A coronal mass ejection from the sun. These violent solar plasma eruptions disrupt the solar wind. Credit: ESA/NASA

## Atmospheric Chemistry and Physics

### No statistically significant effect of a short-term decrease in the nucleation rate on atmospheric aerosols

We use a global aerosol microphysics model to determine whether a ten-day reduction of 15% in the nucleation rate could generate a statistically significant response in aerosol concentrations and optical properties.

#### Reference

Dunne, E. M. et al.: [No statistically significant effect of a short-term decrease in the nucleation rate on atmospheric aerosols](#), *Atmos. Chem. Phys.*, 12, 11573-11587, 2012

### Sea-spray geoengineering in the HadGEM2-ES earth-system model: radiative impact and climate response

The radiative impact and climate effects of geoengineering using sea-spray aerosols have been investigated in the HadGEM2-ES Earth system model using a fully prognostic treatment of the sea-spray aerosols and also including their direct radiative effect.

#### Reference

Jones, A. and Haywood, J. M.: [Sea-spray geoengineering in the HadGEM2-ES earth-system model: radiative impact and climate response](#), *Atmos. Chem. Phys.*, 12, 10887-10898, 2012

### Future air quality in Europe: a multi-model assessment of projected exposure to ozone

In order to explore future air quality in Europe at the 2030 horizon, two emission scenarios developed in the framework of the Global Energy Assessment including varying assumptions on climate and energy access policies are investigated with an ensemble of six regional and global atmospheric chemistry transport models.

#### Reference

Colette, A. et al.: [Future air quality in Europe: a multi-model assessment of projected exposure to ozone](#), *Atmos. Chem. Phys.*, 12, 10613-10630, 2012

### Multi-generation gas-phase oxidation, equilibrium partitioning, and the formation and evolution of secondary organic aerosol

A new model of secondary organic aerosol formation is developed that explicitly takes into account multi-generational oxidation as well as fragmentation of gas-phase compounds, and assumes equilibrium gas-particle partitioning.

#### Reference

Cappa, C. D. and Wilson, K. R.: [Multi-generation gas-phase oxidation, equilibrium partitioning, and the formation and evolution of secondary organic aerosol](#), *Atmos. Chem. Phys.*, 12, 9505-9528, 2012

### Particle backscatter and relative humidity measured across cirrus clouds and comparison with microphysical cirrus modelling

Advanced measurement and modelling techniques are employed to estimate the partitioning of atmospheric water between the gas phase and the condensed phase in and around cirrus clouds, and thus to identify in-cloud and out-of-cloud supersaturations with respect to ice.

#### Reference

Brabec, M. et al.: [Particle backscatter and relative humidity measured across cirrus clouds and comparison with microphysical cirrus modelling](#), *Atmos. Chem. Phys.*, 12, 9135-9148, 2012

### Diurnal variations of organic molecular tracers and stable carbon isotopic composition in atmospheric aerosols over Mt. Tai in the North China Plain: an influence of biomass burning

This study demonstrates that crop-residue burning activities can significantly enhance the organic aerosol loading and alter the organic composition and stable carbon isotopic composition of aerosol particles in the troposphere over the North China Plain.

#### Reference

Fu, P. Q. et al.: [Diurnal variations of organic molecular tracers and stable carbon isotopic composition in atmospheric aerosols over Mt. Tai in the North China Plain: an influence of biomass burning](#), *Atmos. Chem. Phys.*, 12, 8359-8375, 2012

### Contrasting trends of mass and optical properties of aerosols over the Northern Hemisphere from 1992 to 2011

This study compares the long-term variation of mass and optical properties of atmospheric aerosols over the Northern Hemisphere, including China, the US, Canada and Europe. Contrasting trends of mass and optical properties were found from 1992 to 2011.

#### Reference

Wang, K. C. et al.: [Contrasting trends of mass and optical properties of aerosols over the Northern Hemisphere from 1992 to 2011](#), *Atmos. Chem. Phys.*, 12, 9387-9398, 2012

### Occurrence of lower cloud albedo in ship tracks

The concept of geoengineering by marine cloud brightening is based on seeding marine stratocumulus clouds with sub-micrometer sea-salt particles to enhance the cloud droplet number concentration and cloud albedo, thereby producing a climate cooling effect. The efficacy of this as a strategy for global cooling rests on the extent to which aerosol-perturbed marine clouds will respond with increased albedo. It is found that the sign (increase or decrease) and magnitude of the albedo response in ship tracks depends on the mesoscale cloud structure, the free tropospheric humidity, and cloud top height.

#### Reference

Chen, Y.-C. et al.: [Occurrence of lower cloud albedo in ship tracks](#), *Atmos. Chem. Phys.*, 12, 8223-8235, 2012

## Atmospheric Measurement Techniques

### The scientific basis for a satellite mission to retrieve CCN concentrations and their impacts on convective clouds

The cloud-mediated aerosol radiative forcing is widely recognised as the main source of uncertainty in our knowledge of the anthropogenic forcing on climate. Here, we present a new conceptual framework to help us overcome the challenges for improving our understanding, using relatively simple passive satellite measurements in the visible and infrared.

#### Reference

Rosenfeld, D. et al.: [The scientific basis for a satellite mission to retrieve CCN concentrations and their impacts on convective clouds](#), *Atmos. Meas. Tech.*, 5, 2039-2055, 2012

### First middle-atmospheric zonal wind profile measurements with a new ground-based microwave Doppler-spectro-radiometer

We report on the wind radiometer WIRA, a new ground-based microwave Doppler-spectro-radiometer specifically designed for the measurement of middle-atmospheric horizontal wind by observing ozone emission spectra at 142.17504GHz.

#### Reference

Rüfenacht, R., Kämpfer, N., and Murk, A.: [First middle-atmospheric zonal wind profile measurements with a new ground-based microwave Doppler-spectro-radiometer](#), *Atmos. Meas. Tech.*, 5, 2647-2659, 2012

## Combined wind measurements by two different lidar instruments in the Arctic middle atmosphere

The comparison of winds derived by RMR and sodium lidar is excellent for long integration times of 10h as well as shorter ones of 1h. Combination of data from both lidars allows identifying wavy structures between 30 and 110km altitude, whose amplitudes increase with height.

### Reference

Hildebrand, J. et al.: [Combined wind measurements by two different lidar instruments in the Arctic middle atmosphere](#), *Atmos. Meas. Tech.*, 5, 2433-2445, 2012

## Development of a new data-processing method for SKYNET sky radiometer observations

In this study, we propose a new data processing method to improve single scattering albedo retrievals for the SKYNET sky radiometer network, which is one of the growing number of networks of sun-sky photometers, such as NASA AERONET and others.

### Reference

Hashimoto, M. et al.: [Development of a new data-processing method for SKYNET sky radiometer observations](#), *Atmos. Meas. Tech.*, 5, 2723-2737, 2012

# Biogeosciences

## Ocean acidification limits temperature-induced poleward expansion of coral habitats around Japan

Using results from four coupled global carbon cycle-climate models combined with in situ observations, we estimate the effects of future global warming and ocean acidification on potential habitats for tropical/subtropical and temperate coral communities in the seas around Japan.

### Reference

Yara, Y. et al.: [Ocean acidification limits temperature-induced poleward expansion of coral habitats around Japan](#), *Biogeosciences*, 9, 4955-4968, 2012



Coral community on Australia's Great Barrier Reef. Many of the world's corals are affected by ocean acidification. Credit: Ove Hoegh-Guldberg/NRDC

## Activity and abundance of denitrifying bacteria in the subsurface biosphere of diffuse hydrothermal vents of the Juan de Fuca Ridge

Based on our rate measurements, and on published data on hydrothermal fluid fluxes and residence times, we estimated that up to  $\sim 10\text{Tg N yr}^{-1}$  could globally be removed in the subsurface biosphere

of hydrothermal vents systems, thus, representing a small fraction of the total marine N loss ( $\sim 275$  to  $> 400\text{Tg N yr}^{-1}$ ).

### Reference

Bourbonnais, A. et al.: [Activity and abundance of denitrifying bacteria in the subsurface biosphere of diffuse hydrothermal vents of the Juan de Fuca Ridge](#), *Biogeosciences*, 9, 4661-4678, 2012

## Bioerosion by microbial euendoliths in benthic foraminifera from heavy metal-polluted coastal environments of Portovesme (south-western Sardinia, Italy)

We found that carbonate dissolution induced by euendoliths is selective, depending on the Mg content and morpho-structural types of foraminiferal taxa. This study provides evidences for a connection between heavy metal dispersion, decrease in pH of the sea-water and bioerosional processes on foraminifera.

### Reference

Cherchi, A. et al.: [Bioerosion by microbial euendoliths in benthic foraminifera from heavy metal-polluted coastal environments of Portovesme \(south-western Sardinia, Italy\)](#), *Biogeosciences*, 9, 4607-4620, 2012

## High-resolution inter-polar difference of atmospheric methane around the Last Glacial Maximum

We present new high-resolution methane records from the North Greenland Ice Core Project and the European Project for Ice Coring in Antarctica Dronning Maud Land ice cores covering Termination

1, the Last Glacial Maximum, and parts of the last glacial back to 32000 years before present.

#### Reference

Baumgartner, M. et al.: [High-resolution interpolator difference of atmospheric methane around the Last Glacial Maximum](#), *Biogeosciences*, 9, 3961-3977, 2012

### Marine bacteria in deep Arctic and Antarctic ice cores: a proxy for evolution in oceans over 300 million generations

Ice cores offer the opportunity to study evolution of marine microbes over ~ 300 million generations by analysing their genomes vs. depth in glacial ice over the last 700,000yr as frozen proxies for changes in their genomes in oceans.

#### Reference

Price, P. B. and Bay, R. C.: [Marine bacteria in deep Arctic and Antarctic ice cores: a proxy for evolution in oceans over 300 million generations](#), *Biogeosciences*, 9, 3799-3815, 2012

### The carbon budget of terrestrial ecosystems in East Asia over the last two decades

We estimate the current terrestrial carbon balance of East Asia and its driving mechanisms during 1990–2009 using three different approaches: inventories combined with satellite greenness measurements, terrestrial ecosystem carbon cycle models and atmospheric inversion models.

#### Reference

Piao, S. L. et al.: [The carbon budget of terrestrial ecosystems in East Asia over the last two decades](#), *Biogeosciences*, 9, 3571-3586, 2012

### Tree height integrated into pantropical forest biomass estimates

Aboveground tropical tree biomass and carbon storage estimates commonly ignore tree height (H). We estimate the effect of incorporating H on tropics-wide forest biomass estimates in 327 plots across four continents using 42,656H and diameter measurements and harvested trees from 20 sites to answer various questions.

#### Reference

Feldpausch, T. R. et al.: [Tree height integrated into pantropical forest biomass estimates](#), *Biogeosciences*, 9, 3381-3403, 2012

### A synthesis of carbon in international trade

In a globalised world, the transfer of carbon between regions, either physically or embodied in production, represents a substantial fraction of global carbon emissions. The resulting emission transfers are important for balancing regional carbon budgets and for understanding the drivers of emissions.

#### Reference

Peters, G. P., Davis, S. J., and Andrew, R.: [A synthesis of carbon in international trade](#), *Biogeosciences*, 9, 3247-3276, 2012

## Earth System Dynamics

### Urbanisation suitability maps: a dynamic spatial decision support system for sustainable land use

Recent developments in land consumption assessment identify the need to implement integrated evaluation approaches, with particular attention to the development of multidimensional tools for guiding and managing sustainable land use. Land use policy decisions are implemented mostly through spatial planning and its related zoning. We propose a novel methodological approach to identify a decision-making process for land use allocation.

#### Reference

Cerreta, M. and De Toro, P.: [Urbanisation suitability maps: a dynamic spatial decision support system for sustainable land use](#), *Earth Syst. Dynam.*, 3, 157-171, 2012



Urbanisation of the Valencia garden (Horta de València). The loss of soils by urbanisation is a worldwide threat. Credit: Artemi Cerdà




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### Effects of land cover change on temperature and rainfall extremes in multi-model ensemble simulations

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The impact of historical land use induced land cover change on regional-scale climate extremes is examined using four climate models within the Land Use and Climate, Identification of robust impacts project.

#### Reference

Pitman, A. J. et al.: [Effects of land cover change on temperature and rainfall extremes in multi-model ensemble simulations](#), *Earth Syst. Dynam.*, 3, 213-231, 2012

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### Technology and human purpose: the problem of solids transport on the Earth's surface

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Invoking purpose as a mechanism in solids advection is an example of the need to import anthropic principles and concepts into the language and methodology of modern Earth system dynamics.

#### Reference

Haff, P. K.: [Technology and human purpose: the problem of solids transport on the Earth's surface](#), *Earth Syst. Dynam.*, 3, 149-156, 2012

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## Hydrology and Earth System Sciences

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### Should we apply bias correction to global and regional climate model data?

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With this article, we advocate communicating the entire uncertainty range associated with climate change predictions openly and hope to stimulate a lively discussion on bias correction among the atmospheric and hydrological community and end users of climate change impact studies.

#### Reference

Ehret, U. et al.: [HESS Opinions: should we apply bias correction to global and regional climate model data?](#), *Hydrol. Earth Syst. Sci.*, 16, 3391-3404, 2012

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### Incorporating student-centred approaches into catchment hydrology teaching: a review and synthesis

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As hydrologists confront the future of water resources on a globalised, resource-scarce and human-impacted planet, the educational preparation of future generations of water scientists becomes increasingly important.

#### Reference

Thompson, S. E. et al.: [Incorporating student-centred approaches into catchment hydrology teaching: a review and synthesis](#), *Hydrol. Earth Syst. Sci.*, 16, 3263-3278, 2012

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### It takes a community to raise a hydrologist: the Modular Curriculum for Hydrologic Advancement (MOCHA)

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In this paper we combine literature review, community survey, discussion and assessment to provide a holistic baseline for the future of hydrology education. The ultimate objective of our educational initiative is to enable educators to train a new generation of 'renaissance hydrologists,' who can master the holistic nature of our field and of the problems we encounter.

#### Reference

Wagener, T. et al.: [It takes a community to raise a hydrologist: the Modular Curriculum for Hydrologic Advancement \(MOCHA\)](#), *Hydrol. Earth Syst. Sci.*, 16, 3405-3418, 2012

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### Water resources trends in Middle East and North Africa towards 2050

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Changes in water resources availability can be expected as consequences of climate change, population growth, economic development and environmental considerations. A two-stage modelling approach is used to explore the impact of these changes in the Middle East and North Africa region.

#### Reference

Droogers, P. et al.: [Water resources trends in Middle East and North Africa towards 2050](#), *Hydrol. Earth Syst. Sci.*, 16, 3101-3114, 2012

# Natural Hazards and Earth System Sciences

## Potential of semi-structural and non-structural adaptation strategies to reduce future flood risk: case study for the Meuse

Our research suggests that annual flood risk may increase by up to 185% by 2030 compared with 2000, as a result of combined land-use and climate changes. The independent contributions of climate change and land-use change to the simulated increase are 108% and 37%, respectively.

### Reference

Poussin, J. K. et al.: [Potential of semi-structural and non-structural adaptation strategies to reduce future flood risk: case study for the Meuse](#), *Nat. Hazards Earth Syst. Sci.*, 12, 3455-3471, 2012

## Assessment of remotely sensed drought features in vulnerable agriculture

In this paper, the remotely sensed Reconnaissance Drought Index (RDI) is employed for the quantification of drought. RDI enables the assessment of hydro-meteorological drought, since it uses hydro-meteorological parameters, such as precipitation and potential evapotranspiration.

### Reference

Dalezios, N. R., Blanta, A., and Spyropoulos, N. V.: [Assessment of remotely sensed drought features in vulnerable agriculture](#), *Nat. Hazards Earth Syst. Sci.*, 12, 3139-3150, 2012

## Rainfall intensity–duration thresholds for bedload transport initiation in small Alpine watersheds

In this study, the characteristics of rainfall events leading to bedload transport were investigated in five small Alpine catchments located in different geographical and morphological regions of Switzerland, Italy and France.

### Reference

Badoux, A. et al.: [Rainfall intensity–duration thresholds for bedload transport initiation in small Alpine watersheds](#), *Nat. Hazards Earth Syst. Sci.*, 12, 3091-3108, 2012

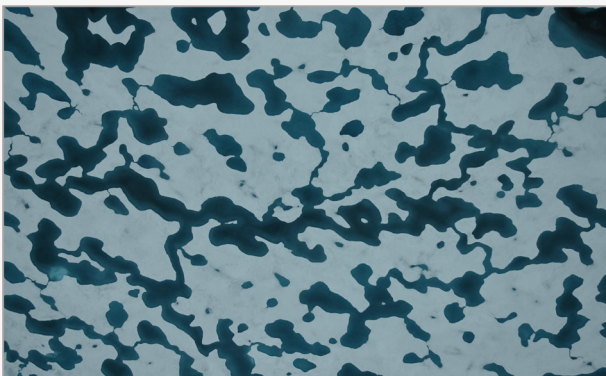
## Improving the active involvement of stakeholders and the public in flood risk management – tools of an involvement strategy and case study results from Austria, Germany and Italy

This paper presents basic elements and the application of two innovative approaches as a part of an ‘involvement strategy’ that aims at the active involvement of all interested parties (stakeholders) for assessing, reviewing and updating flood risk management plans, as formulated in the EU Flood Risk Management Directive 2007/60/EC.

### Reference

Fleischhauer, M. et al.: [Improving the active involvement of stakeholders and the public in flood risk management – tools of an involvement strategy and case study results from Austria, Germany and Italy](#), *Nat. Hazards Earth Syst. Sci.*, 12, 2785-2798, 2012

## The Cryosphere



Complex geometry of well developed Arctic melt ponds. Aerial photo taken on 14 August 2005 on the Healy–Oden Trans Arctic Expedition (HOTRAX). Credit: Hohenegger et al. (2012)

## Transition in the fractal geometry of Arctic melt ponds

By analysing data from hundreds of thousands of melt ponds, we find an unexpected separation of scales, where pond fractal dimension  $D$  transitions from 1 to 2 around a critical length scale of  $100\text{m}^2$  in area. The results impact sea ice albedo, the transmitted radiation fields under melting sea ice, the heat balance of sea ice and the upper ocean, and biological productivity such as under ice phytoplankton blooms.

### Reference

Hohenegger, C. et al.: [Transition in the fractal geometry of Arctic melt ponds](#), *The Cryosphere*, 6, 1157-1162, 2012