

The logo features two stylized wireframe globes on the left, followed by the word "the" in a small, black, sans-serif font, and the word "eggs" in a large, bold, 3D-style font where the "e" and "g" are black and the "s" is white.

# the eggs

## E.G.U. NEWSLETTER

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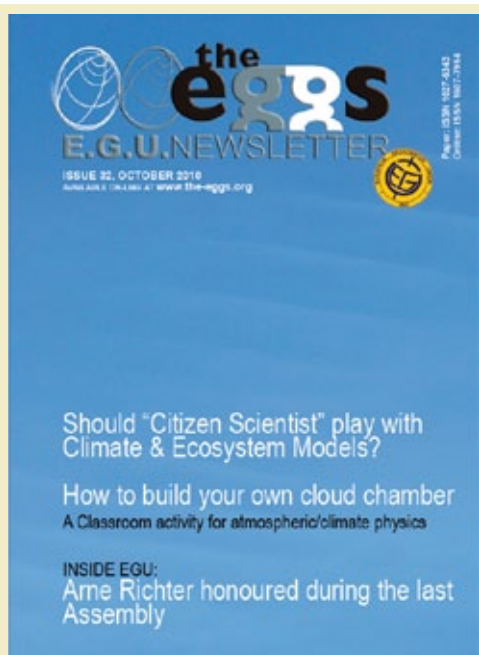
## Should “Citizen Scientist” play with Climate & Ecosystem Models?

## How to build your own cloud chamber

A Classroom activity for atmospheric/climate physics

INSIDE EGU:

## Arne Richter honoured during the last Assembly



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Cover photo: Cirrus clouds with almost equally spaced features, due to a gravity wave train.  
Wind direction is vertical to the cloud lines. Image: Kostas Kourtidis.

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# Next Alexander von Humboldt Conference will be on Ocean Acidification

to be held June 2011 in Penang, Malaysia

We kindly inform you that the First Circular announcing the 7th EGU Alexander von Humboldt Conference on "Ocean Acidification: Consequences for marine ecosystems and society", to be held June 20-24, 2011 in Penang/Malaysia can be downloaded from [http://meetings.copernicus.org/avh7/AVH7\\_First\\_Circular.pdf](http://meetings.copernicus.org/avh7/AVH7_First_Circular.pdf)

Further details related to the venue, milestones, registration fees, accommodation, and other items of interest will be given in the "Second Circular and Call for Abstracts" which will be sent out later this

year. If you wish to receive it or if you have specific requests please contact [fabian@wzw.tum.de](mailto:fabian@wzw.tum.de).

Please display this circular and/or make it available to other colleagues who might be interested.

September 1st, 2010

*On behalf of the organizers*

**Peter Fabian, European Geosciences Union (EGU)**

**Zulficar Yasin, University Sains Malaysia (USM)**

# AMT and OS included in Thomson's ISI Science Citation Index Expanded

this reflects the efforts of the editorial boards of the  
Atmospheric Measurement Techniques and Ocean Science journals

After assessing the quality, number and characteristics of papers published in Atmospheric Measurement Techniques (AMT) and Ocean Science (OS) since their launch, Thomson Reuters have announced that they will be including the journals in their ISI listings.

This is excellent news for the two EGU journals and reflects the tremendous efforts of the editorial board, the quality of papers submitted to it, and its positions in the scientific publications market. EGU looks forward to further strengthening the journals' profiles in the future.

For OS, an impact factor of 0.937 has been assigned.

# EGU Position Statement on the Status of Discussion Papers

Published in EGU Interactive Open Access Journals

4 July 2010.- This statement shall clarify the definition and standing of discussion papers published in the interactive open access journals of the European Geosciences Union (EGU). These journals pursue a two-stage process of publication and review, which is designed to foster and document scientific discussion and has proven to enhance the transparency, efficiency and self-regulation of scientific quality assurance.

In the first stage, manuscripts that pass a rapid pre-screening (access review) are immediately published as discussion papers in the journal's discussion forum. They are then subject to interactive public discussion for a period of multiple weeks, during which the comments of designated referees, additional comments by other interested members of the scientific community, and the authors' replies are also published alongside the discussion paper. In the second stage, manuscript revision and peer review are completed in the same way as in traditional journals (with further rounds of review and revision where required) and, if accepted, final papers are published in the main journal. To provide a lasting record of scientific discussion and quality assurance, and to secure the authors' publication precedence, every discussion paper and interactive comment remains permanently archived and individually citable.

The interactive open access approach of EGU has been practiced successfully since 2001, and the meaning and usefulness of discussion papers and interactive commenting are well established and appreciated in large parts of the geoscientific community. The following points shall clarify the status of discussion papers also for colleagues who may not be familiar with interactive open access publishing.

1. Discussion papers are proceedings-type publications, comparable to traditional conference proceedings, working papers, preprints/e-prints, etc. (see arXiv.org, Nature Precedings, etc.). Like other proceedings-type publications, discussion papers are citable and permanently archived but are not peer-reviewed. Nevertheless, they undergo a pre-selection process prior to publication (access review by an editor, optionally supported by referees).

2. Depending on the review and revision process, the contents and formulation of final papers published in the main journal are likely to differ from those of the corresponding discussion papers. As stated on the first page and emphasized by watermarks on every page of a discussion paper, readers are asked to refer to the corresponding final paper if available. Nevertheless, the discussion paper and accompanying interactive comments remain permanently archived, accessible and citable. Thus, differences between a discussion paper and the corresponding final paper are fully traceable. Interested readers can eas-

ily recognize at which time the scientific contents and messages have become publicly available, because dates of submission, acceptance and publication are clearly stated on the first page of every discussion paper and corresponding final paper.

3. With regard to dual and prior publication policies, the EGU policy is consistent with the policies of other leading scientific publishers and journals. For example, Nature, PNAS, PLoS, Elsevier and most physics journals accept manuscripts that have been posted and archived on electronic preprint or e-print servers prior to submission for peer-reviewed publication (see references). As outlined above and on the web pages of the EGU interactive open access journals, discussion papers are defined as proceedings-type publications similar to electronic preprints and do not constitute peer-reviewed publications. After interactive public discussion, it appears thus not inappropriate to submit the same manuscript or an improved version for peer-reviewed final publication elsewhere. "Elsewhere" naturally includes but is not limited to the interactive journal operating the forum where the manuscript has been published for review and discussion. Following common practice of traditional scientific publishing, the authors of a manuscript not accepted for final publication in an interactive journal may choose to submit their manuscript to an alternative journal. Normally, it would appear more appropriate to re-submit a substantially revised and improved version rather than the same manuscript that has already been published as a discussion paper. In practice, however, it is up to the authors and to the editors of alternative publication venues to decide if it may be appropriate to publish the same manuscript on a different level (peer-reviewed final paper following proceedings-type discussion paper). For clarity, every final paper in an EGU interactive open access journal is linked to the preceding discussion paper, and the date of each stage of publication is specified.

## References

arXiv.org  
<http://arxiv.org>

Elsevier  
<http://www.elsevier.com/wps/find/authorshome.authors/preprints>

European Geosciences Union (EGU)  
<http://www.egu.eu/publications/general-terms.html>

Nature and Nature Precedings  
[http://www.nature.com/authors/editorial\\_policies/duplicate.html](http://www.nature.com/authors/editorial_policies/duplicate.html)  
<http://precedings.nature.com>  
[http://precedings.nature.com/site/help#what\\_is\\_nature\\_precedings](http://precedings.nature.com/site/help#what_is_nature_precedings)

Proceedings of the National Academy of Sciences (PNAS)  
*PNAS Policy on Prior Publication, Proc. Natl. Acad. Sci.*, 96, 4215, 1999  
<http://www.pnas.org/content/96/8/4215.full>

Public Library of Science (PLoS)  
<http://www.plosbiology.org/static/policies.action>  
<http://www.plosone.org/static/policies.action>

EGU

# Upcoming Election

## EGU Election Autumn 2010

The EGU Election Autumn 2010 for the Division Presidents as well as for the Treasurer will take place 01 November – 01 December 2010. You are kindly asked to propose a candidate to any vacancy by 20 August 2010. You are welcome and encouraged to self-nominate yourself. If the candidate is not you, please get the candidate's agreement that they are interesting in running. Please prepare the candidate's CV as well as a statement, both in PDF format.

More info on Division President vacancies and proposal submission at <http://www.egu.eu/elections.html>

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# Should “Citizen Scientist” play with Climate & Ecosystem Models?

An introduction to the Clear Climate Code Project

By Ivo Grigorov

A series of recent events has fuelled a hot debate over the transparency and credibility of climate research. While the debate between sceptics and believers may continue, the circumstances have provided good context for “citizen science” to spill over into climate research.

The concept is not a new one and already applied in astronomy & planetary science, archaeology and biodiversity studies. The idea is that volunteers participate in tasks where human perception and common sense are needed, without the time-consuming scientific training. So could the concept work in something as technical, multi-disciplinary and complex as Global Climate Change modelling?

Earlier this year, the Clear Climate Code Project (CCC; <http://clearclimatecode.org>) set up by the staff of the Cambridge-based Ravenbrook Limited software engineering consultancy (<http://www.ravenbrook.com>), published their own version of NASA's Goddard Institute for Space Studies GISTEMP Model.

CCC is a volunteer-based project founded on the premise that “The results of some climate-related software are used as the basis for important public policy decisions. If the software is not clearly correct, decision-making will be obscured by debates about it”. The goals of the small group of software engineers are to: 1) produce clear climate science software; 2) encourage the production of clear climate science software; 3) increase public confidence in climate science results, without judgement or arbitration of climate science.

## Why start with GISTEMP1?

GISTEMP is just one of the instrumentation record analyses openly available<sup>2</sup> but one has to start somewhere. The CCC team took the original version and re-wrote it in a single software, Python, in order to restructure the code for clarity for competent users who are not necessarily scientists, while attempting to independently reproduce Hansen's originally published results.

The results were not only reproduced<sup>3</sup> (Figure 1), but the Python version of the model is significantly lighter (40% of original code), clearer (with half the codelines carrying explanation and comments) and significantly faster. Moreover, Hansen's collaborator at NASA GISS, Dr Reto Ruedy, has openly praised the re-coding of the model by saying “I hope to switch

to your version of that program ...Ideally, we would like to replace our whole code”<sup>4</sup>.

## What next?

Clear Climate Code are currently working on an integrated graphic visualisation tools for GISTEMP. Beyond that, CCC are looking to repeat the demonstration with other global models focussed on Arctic Sea Ice Extent and past temperature reconstructions.

The goals of the computer engineers are also very complementary to those of Marine Ecosystem Evolution in a Changing Environment (MEECE)<sup>5</sup> Project. Funded by Framework Programme 7, the MEECE project, coordinated by Plymouth Marine Laboratory (UK), aims to 1) improve the knowledge base on marine ecosystems and their response to climate and anthropogenic pressure, as well as 2) develop innovative predictive management tools based on the current generation of marine ecosystem models.

A central step in that ambition is making the current generation of marine ecosystem models more transparent and usable by any competent user outside the original development team. Making source code accessible and readily usable is a skill in itself and a task that often does not make the list of priorities when there are pressing scientific questions to be answered.

The CCC demonstration shows that the benefits can be beyond simple transparency and public confidence in research. Accessible and readily usable model code can invite constructive contribution from outside the research domain, and poses the question whether the GISTEMP code clarification can spill over into other of Global Climate Change modelling fields, if “citizen scientist” are given the minimum of technical documentation and access to the source code?

**Clear Climate Code** (<http://clearclimatecode.org>) is set up by the staff of the Cambridge-based Ravenbrook Limited software engineering consultancy (<http://www.ravenbrook.com>). Contact: Nick Barnes, [nb@ravenbrook.com](mailto:nb@ravenbrook.com).

**MEECE Integrated Project** (<http://www.meece.eu>) is a research project funded by Framework Programme 7. Through its Model Library (<http://www.meece.eu/library.html>) the project aims to bring transparency to marine ecosystem models by providing access to the minimum technical information necessary for a competent non-expert to apply the models.

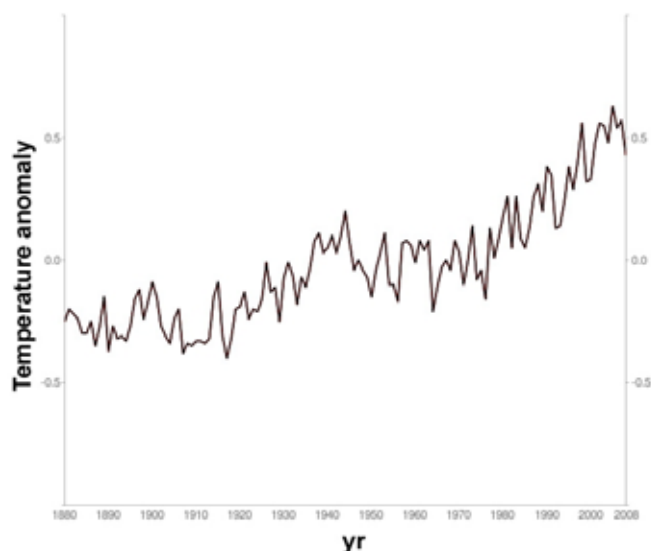


Figure 1. Global annual temperature anomaly. Without an offset, the CCC-version (red) replicates GISS original output (black) so well that it is barely visible. For full GISTEMP-CCC comparison, [visit http://clearclimatecode.org/category/status/](http://clearclimatecode.org/category/status/)

## References

1. Hansen, J.E., and S. Lebedeff, 1987: Global trends of measured surface air temperature. J. Geophys. Res., 92, 13345-13372
2. Code source: <http://data.giss.nasa.gov/gistemp/sources/>
3. <http://ccc-gistemp.googlecode.com/files/ccc-gistemp-0.2.0-comparison-2010-01-11.html>
4. Reto Ruedy-CCC communication on Google Groups - <http://groups.google.com/group/ccc-gistemp-discuss/msg/bd-ba6c032080f05b>
5. MEECE Integrated Project is funded by Framework Program 7, [www.meece.eu](http://www.meece.eu)

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# EDUCATION

# How to build your own cloud chamber

A Classroom activity for atmospheric/climate physics

Bringing particle physics to life in the classroom using a very simple type of particle detector, namely a continuously sensitive diffusion cloud chamber. This homemade version consists of an airtight fish tank full of air and alcohol vapour, cooled to a very low temperature, which can be used to detect charged particles, particularly cosmic ray muons, if they have enough energy.

Particle physics is often seen as something only for huge research institutes, out of reach of the general public. Francisco Barradas-Solas and Paloma Alameda-Meléndez demonstrate how – with the aid of a homemade particle detector – you can dispel this myth by bringing particle physics to life in the classroom.

The objective of elementary particle physics is to find the basic building blocks of which everything is made and to investigate the behaviour of these building blocks. Although it can be seen as a cornerstone of science, particle physics is often neglected or poorly understood in schools, partly because it is perceived as unrelated to the things with which we interact on a daily basis. However, particle physicists detect and measure electrons, photons or muons every day with the same confidence with which all of us ‘detect’ cows, tables or aeroplanes. Furthermore, particle detectors (e.g. PET scanners) are routinely used, for example, by medical physicists to detect tu-

mours and monitor the function of internal organs.

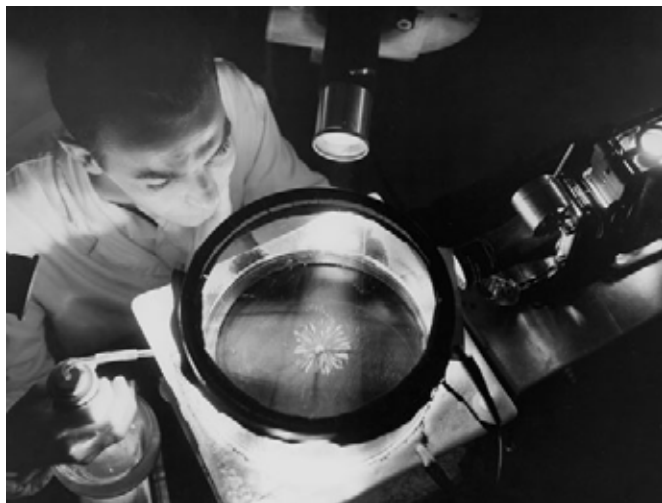
Here we demonstrate how to bring particle physics to life in the geophysics classroom, using possibly the simplest type of particle detector: a continuously sensitive diffusion cloud chamber. This homemade version consists simply of an airtight fish tank full of air and alcohol vapour, cooled to a very low temperature, which can be used to detect charged particles, particularly cosmic ray muons, if they have enough energy.

## Elementary particles

Elementary particles are the simplest elements from which everything is made. They are not just the building blocks of matter and radiation, but also give rise to the interactions between them (for more details of elementary particles, see Landua & Rau, 2008). These particles carry energy and momentum, and can thus be seen by detectors. Strictly speaking, you cannot directly see any particles – instead, their passage through detectors is inferred from the effects they cause, such as ionisation (for charged particles). That is precisely what we do when we observe the condensation trail left in the sky by an aeroplane that we cannot see – and what we can do with our homemade cloud chamber.

## The continuously sensitive diffusion cloud chamber

This cloud chamber is basically an airtight container filled with a mixed atmosphere of air and alcohol vapour. Liquid alcohol evaporates from a reservoir and diffuses through the air from the top to the bottom of the chamber. Cooling the base with dry ice (solid carbon dioxide, which is at a constant temperature of around  $-79^{\circ}\text{C}$  while it sublimates) results in a strong vertical temperature gradient, so that a zone with supersaturated alcohol vapour forms close to the bottom. This sensitive layer is unstable, with more very cold alcohol vapour than it can hold. The process of condensation of vapour into liquid can be triggered by the passage of a charged particle with enough energy to ionise atoms in its path. These ions are the condensation nuclei around which liquid droplets form to make a trail.



*Alpha rays from a polonium source emit in a flower-like pattern at the center of a continuous cloud chamber. The particles are made visible by means of alcohol vapour diffusing from an area at room temperature to an area at  $-78^{\circ}\text{C}$ . This photograph was taken in 1957. Public domain image; image source: Wikimedia Commons*



## Assembly and operation

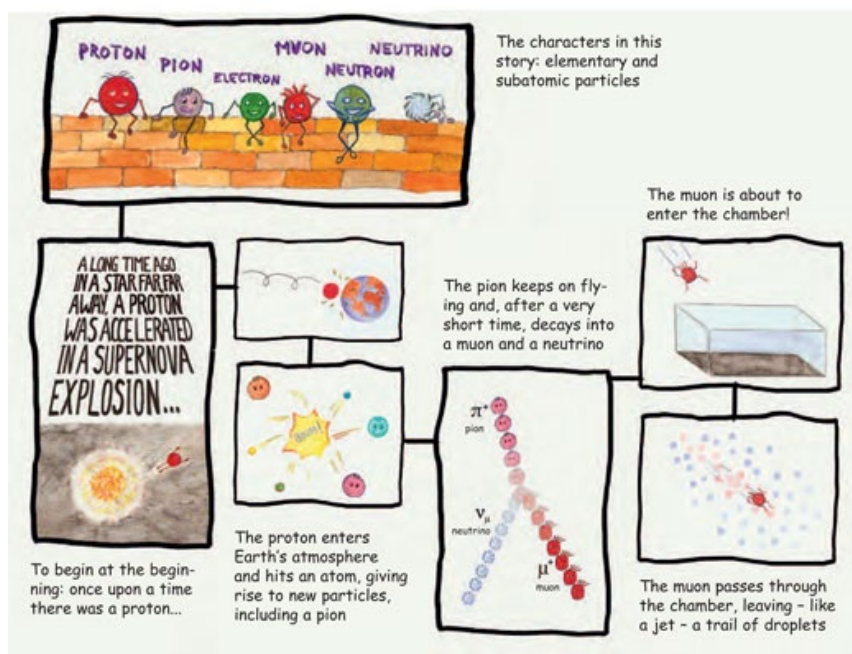
### Materials

- \* Straight-sided, clear plastic or glass container (e.g. a fish tank) with a base about 30 cm x 20 cm, and a height around 20 cm (other sizes can be used, but the effects may vary)
- \* Aluminium sheet (about 1 mm thick, same thickness as the base of the fish tank)
- \* Shallow tray somewhat larger than the base area of the fish tank
- \* Two lamps, one of them strong
- \* Strip of felt (about 3 cm wide and long enough to wrap around the inside of the fish tank, e.g. somewhat more than 1 m long)
- \* Glue (not alcohol-soluble)
- \* Black insulating tape or duct tape
- \* Isopropyl alcohol (isopropanol)
- \* Dry ice

### Method

1. Glue a strip of felt (the alcohol reservoir) around the insides at the bottom of the fish tank (the body of the cloud chamber). Some felt can be glued to the bottom of the tank, too.
2. Cut the aluminium sheet to fit (as closely as possible) the top the fish tank, and cover one side of the sheet with insulating tape, forming a black surface.
3. Soak the felt with isopropyl alcohol (but not so much that it drips down the sides of the chamber). Safety note: Do this in a well-ventilated room and remember that alcohol is flammable.
4. Turn the fish tank upside-down over the aluminium sheet. Make sure the black side of the sheet faces upwards (to make the particle tracks more visible).
5. Use insulating or duct tape to fasten the aluminium sheet to the rim of the fish tank, sealing the chamber so that it is airtight. This is the most critical step and must be carefully done, as the joint will become moist and very cold during operation.
6. Make a flat layer of dry ice in the tray and place the chamber on top of it, making sure that its base is horizontal. To ensure good thermal contact between the metal plate and the dry ice, avoid large chunks of dry ice: flat sheets or dust are best, but small grains will do. Safety note: Dry ice is around  $-79\text{ }^{\circ}\text{C}$  and should only be handled using thick gloves.
7. Keep the top of the chamber warm, for example by shining a lamp onto it. Avoid using the chamber in a cold environment, because this could prevent the correct temperature gradient from forming, meaning no tracks can be seen.
8. Leave the chamber undisturbed for about 10 min, until the temperature gradient is established. Shine a bright light through the chamber at a low angle, and look at the bottom of the chamber. At first you should see only an alcohol mist falling, but gradually, charged particle tracks should appear as thread-like condensation in the mist. Note: the tracks are more visible in a darkened room.

Although any charged particle with enough energy, for example from ambient radioactivity, can leave its trail in the chamber, the majority of the tracks will be made by secondary cosmic rays: particles created when other particles (mostly protons) coming from outer space hit the upper atmosphere. Secondary cosmic rays travel at close to the speed of light and are absorbed by the atmosphere or decay in flight, giving rise to new particles including muons, which can reach the surface of Earth and are easily detected. Muons are charged elementary particles very similar to electrons except for their mass (which is two hundred times larger).



*Taken from the cloud chamber comic strip; image courtesy of Paloma Alameda-Meléndez*

### What you can do with the chamber?

In order to make the chamber really useful, we cannot limit ourselves to showing it and describing how it works. To support the explanation, we have prepared a short, simply written comic strip w1 (see below), showing how the chamber works and illustrating the origin and composition of cosmic rays through the story of a cosmic proton and its descendants.

We use this chamber at school with our 12- to 16-year-old students as part of an effort to help them see particles as real physical objects. Watching the visible trails left by invisible particles and comparing them to trails left by jet engines (in which much of the same physics is involved) is the first step in a process that we continue by introducing real data and pictures from high-energy physics into otherwise standard exercises and questions w2, w3 (Cid, 2005; Cid & Ramón, 2009) and that we conclude with another, more complicated, detector for school use: a cosmic-ray scintillation detector which allows students to record and study data by themselves (Barradas-Solas, 2007).

Why not use the Science in School online discussion forum to exchange ideas about how to use the cloud chamber at school? See: [www.scienceinschool.org/forum/cloudchamber](http://www.scienceinschool.org/forum/cloudchamber).

## Acknowledgements

The authors would like to thank Dr Eleanor Hayes, Editor-in-Chief of Science in School, for her assistance in giving the final form to this article.

## References

Barradas-Solas F (2007) Giving new life to old equipment. *Physics Education* 42: 9-11. doi: 10.1088/0031-9120/42/1/F03. To access this article, which is freely available online, visit the website of the Institute of Technical Education, Madrid, Spain (<http://palmera.pntic.mec.es>) or use the direct link: <http://tinyurl.com/y8ssyc5>.

Cid R (2005) Contextualized magnetism in secondary school: learning from the LHC (CERN). *Physics Education* 40: 332-338. doi: 10.1088/0031-9120/40/4/002.

Cid X, Ramón C (2009) Taking energy to the physics classroom from the Large Hadron Collider at CERN. *Physics Education* 44: 78-83. doi: 10.1088/0031-9120/44/1/011.

Landua R, Rau M (2008) The LHC: a step closer to the Big Bang. *Science in School* 10: 26-33. [www.scienceinschool.org/2008/issue10/lhcwhy](http://www.scienceinschool.org/2008/issue10/lhcwhy).

## Web references

w1 – The comic strip (in English and Spanish) and full assembly instructions (in Spanish) are available from our website: [http://palmera.pntic.mec.es/~fbarrada/cc\\_supp\\_mat.html](http://palmera.pntic.mec.es/~fbarrada/cc_supp_mat.html).

w2 – See, for instance, the introductory information about the LHC and simple physical calculations which take place in all particle accelerators (Physics at LHC) on the 'Taking a closer look at LHC': <http://www.lhc-closer.es>.

w3 – The CERN website for high-school teachers (<http://teachers.web.cern.ch>) also includes a gallery of bubble chamber pictures which fits nicely into our project. See the direct link: <http://tinyurl.com/yfbv8ls>.

## Resources

For brief, simple overviews of particle physics aimed at the general public, see:

Close FE (2004) *Particle Physics: A Very Short Introduction*. Oxford, UK: Oxford University Press. ISBN: 9780192804341.

The Lawrence Berkeley National Laboratory's online interactive tour, 'The Particle Adventure: the Fundamentals of Matter and Force': [www.particleadventure.org](http://www.particleadventure.org).

The virtual visitor centre of the SLAC National Accelerator Laboratory (particularly the sections on theory, detectors and cosmic rays): [www.slac.stanford.edu/vvc](http://www.slac.stanford.edu/vvc).

The CERN website: <http://public.web.cern.ch/public/en/Research/Detector-en.html>.

For a discussion of how some of the big questions in particle physics will be addressed by CERN's Large Hadron Collider, see:

Landua R (2008) The LHC: a look inside. *Science in School* 10: 34-47. [www.scienceinschool.org/2008/issue10/lhchow](http://www.scienceinschool.org/2008/issue10/lhchow).

For more detailed, yet accessible, introductions aimed at people with a scientific education and not afraid of a little mathematics, we recommend:

Barnett RM et al. (2000) *The Charm of Strange Quarks: Mysteries and Revolutions of Particle Physics*. New York, NY, USA: AIP Press. ISBN: 0387988971.

Treiman SB (1999) *The Odd Quantum*. Princeton, NJ, USA: Princeton University Press. ISBN: 0691009260. Treiman's book is one of the best to begin tackling the subtleties of quantum mechanics in particle physics (which we have avoided in this article), including virtual and unstable particles, and the field / particle relationship.

To learn more about cosmic rays, see NASA's Cosmicopia: <http://helios.gsfc.nasa.gov/cosmic.html>.

We and many others have learned about building cloud chambers from Andy Foland's cloud chamber page: [www.lns.cornell.edu/~adf4/cloud.html](http://www.lns.cornell.edu/~adf4/cloud.html).

The American Museum of Natural History's website includes an illustrated version of the main stages of the assembly of the cloud chamber: [www.amnh.org/education/resources/rfi/web/einsteinguide/activities/cloud.html](http://www.amnh.org/education/resources/rfi/web/einsteinguide/activities/cloud.html).

It is not easy to explain in detail the processes of supersaturation and track formation or to justify the choice of active liquid (isopropanol, in our case), as they depend in a complicated way on – for example – ionisation energies, vapour pressures, diffusion rates and various engineering aspects of the chamber. If you want to pursue this further, see the supplementary bibliography on our cloud chamber website: [http://palmera.pntic.mec.es/~fbarrada/cc\\_supp\\_mat.html](http://palmera.pntic.mec.es/~fbarrada/cc_supp_mat.html).

For a Science in School article describing how to measure radioactivity from radon in the home, see:

Budinich M, Vascotto M (2010) The 'Radon school survey': measuring radioactivity at home. *Science in School* 14: 54-57. [www.scienceinschool.org/2010/issue14/radon](http://www.scienceinschool.org/2010/issue14/radon).

If you enjoyed this and other teaching activities in this issue of Science in School, you might like to browse our collection of previously published teaching activities. See: [www.scienceinschool.org/teaching](http://www.scienceinschool.org/teaching).

**Francisco Barradas-Solas and Paloma Alameda-Meléndez**

*This article first appeared in Issue 14 of Science in School, the European journal for science teachers ([www.scienceinschool.org](http://www.scienceinschool.org)) and is reproduced with permission.*

# INSIDE EGU

## Arne Richter honoured during the last Assembly

Arne Richter, former Executive Secretary and a legendary figure for EGU, was honoured in a special Symposium during the last Assembly. Further, from 2011 onward the EGU Council renamed the former Outstanding Young Scientist Award to Arne Richter Award for Outstanding Young Scientists, recognising his commitment to helping younger geoscientists

The Arne Richter Award for Outstanding Young Scientists recognizes scientific achievements in any field of the Geosciences, made by a young scientist. From 2011 onward the EGU Council renamed the former Outstanding Young Scientist Award in honour of Arne Richter, the former Executive Secretary of the EGU, for his never-ending efforts to promote young scientists.

### Special Symposium in Honour of Arne Richter

After 20 years of service for the EGU and EGS, Arne Richter has resigned as Executive Secretary. A familiar face to many who attended the General Assemblies, Arne was one of the founding fathers and the engine that kept the organisation running over the years.

Arne has served the EGU – and before joining the EUG, the EGS – as Executive Secretary for over two decades. The indispensable Arne Richter can finally look forward to his retirement. To say that Arne has played a prominent role in the establishment and growth of the EGU is a massive understatement. During his career, the EGU grew from a small top-down organisation, to the second largest learned society in Earth and planetary sciences.

Arne is a man with great compassion and social commitment who has experienced many magic moments during his time at the EGU. For instance, unique open access meetings, helping Russian colleagues by managing a foundation company, and supporting young children and scholars to understand natural sciences.

It is truly a pity to see Arne leave, after all, the EGU has greatly enjoyed his warm presence, priceless efforts and unconditional dedication.

Arne Richter was honoured in a special symposium during the 2010 Wien Assembly, convened by EGU President Tuija Pulkkinen and EGU former President Gerald Ganssen. Most of his many friends and collaborators during his EGU years have attended. He was awarded with the Unions' Diamond Service Award. Arne Richter is the first recipient of this award.



*Tuija Pulkkinen hands over the the Diamond Service Award to Arne Richter, on Wednesday, 5 May 2010.*

### Brief CV of Arne Richter

Dr. Arne K. Richter was a student in physics and mathematics at the University of Hamburg until 1970 attaining a Diploma in Physics from the University of Hamburg, 1970. From 1970–1971 he was a Research Physicist and Scientific Staff member at the Institute for Pure and Applied Nuclear Physics, University of Kiel, Dr. rer. nat., University of Kiel, 1975, Scientific Staff member of the Max-Planck-Institute for Aeronomy since 1975, Managing Director of the Copernicus Gesellschaft e. V. since 1988, Secretary General and Executive Secretary of the European Geophysical Society 1988–2003, Executive Secretary of the European Geosciences Union since 2002, Managing Director of Lindau Instruments GmbH 1988–89, European Director of the American Geophysical Union since 1989, President of the Eurokosmos-Group 1991–99, and Director of the STAR Foundation 2000–2005 and of the Copernicus Foundation since 2000.

His main areas of research include statistical mechanics, kinetic and macroscopic theories of gases and plasmas, analysis and interpretation of plasma, magnetic field and low energetic particle data from the interplanetary medium and near planets and comets. Co-investigator of almost 20 space experiments, more than 150 scientific publications, reports and theoretical-experimental proposals and almost 200 papers presented as contributed/invited talks at several national and international meetings/colloquia. He provided guidance of students in mathematics and physics, supervision of students working on their diploma and PhD thesis, lecturing at the Technical University of Clausthal-Zellerfeld in meteorology, atmospheric chemistry and dynamics of the lower and upper atmosphere. His other activities include Member of several space mission study teams, of the International Scientific and Technical Steering Committee of the VEGA Project, and of the International Scientific Council of the PHOBOS and MARS 94 Projects. Finally, he has been Executive Editor of "Physics and Chemistry of the Earth" and of "Advances in Geosciences".

He served as Science Secretary of Section III (External Geophysics) and as Chairman of the Programme Committee of the annual General Assemblies of the European Geophysical Society since 1987. Organization of numerous national and international Workshops and Symposia. Elected member of the

Directorial Board of the Institute for Pure and Applied Nuclear Physics, University of Kiel and of the Max-Planck-Institute for Aeronomy. Member of the Works Council (Betriebsrat) and of the Committee on Further Education as well as Chairman of the Computer Committee of the Max-Planck-Institute for Aeronomy, and Coordinator of Scientific Cooperation between the Max-Planck-Institute for Aeronomy and the Central Research Institute for Physics (Budapest) and the Space Research Institute (Moscow).

Dr. Richter is recipient of the Prize of scholarship from the Carl-Christiansen-Gedaechtnis-Stiftung, 1967, of the Atlas-Award of the European Geophysical Society, 2000, a Gagarin Medalist of the Cosmonautical Federation of the USSR, 1986, and an awarded member of the International Who's Who of Intellectuals, 1994, the Marquis Who's Who in the World, 1998, the Historical Society Who's Who of Professionals, 2001, the Marquis Who's Who in Science and Engineering, 2002/2003, and the Madison Who's Who of Executives and Professionals, 2005. His PhD thesis was entitled Wave-trains in the solar wind. III Alfvén waves in the azimuthally-dependent interplanetary medium, *Astrophys Space Sci* 36, 383, 1975.

*Based on the International Who's Who of Intellectuals, Eleventh Edition, Cambridge, UK, p. 412, 1995/96.*





## EARTH FROM SPACE

large smoke plumes from burning peat fields and forest fires in the area east of Moscow



*Smoke over Moscow, credits: ESA*

30 July 2010.- Central Russia and the Moscow region are experiencing their hottest July in history, with record temperatures reaching over 35°C posing a high fire risk.

Several large smoke plumes originating from burning peat fields and forest fires are visible in this Envisat image covering the area east of Moscow.

The city itself is seen in the bottom left corner of the image. The smoke plumes are stretching over several hundred kilometres and, combined with the normal air pollution in the city, can cause pollution levels ten times the normal levels for the capital.

Envisat's Medium Resolution Imaging Spectrometer acquired this image on 29 July 2010 at a resolution of 300 m.

**ESA**

## COPAL Questionnaire on aircraft measurements

FMI collecting information on instrumentation that might be useful to COMMunity heavy-PAYload Long endurance Instrumented Aircraft for Tropospheric Research in Environmental and Geo-Sciences

COPAL (COMMunity heavy-PAYload Long endurance Instrumented Aircraft for Tropospheric Research in Environmental and Geo-Sciences) is an EU infrastructure preparatory project that aims in to acquire and equip a large and long-endurance aircraft for atmospheric and geophysical research, as for instance a Lockheed C-130.

National management of research aircrafts in Europe has resulted in a diverse fleet of dozens of small to large size aircraft. However, all these aircrafts are limited to a practical endurance of five hours, hence preventing long range experiments over the oceans, polar regions and remote continental areas. The objective of the COPAL project is to fill in this gap.

### Objectives

The Finnish Meteorological Institute is collecting information about research laboratories, SMEs and available scientific instrumentation that might be useful to COPAL. The aim of the project is to provide the best possible airborne research platform for the European atmospheric and geophysical research community. Therefore we ask you to dedicate the time (10-30 minutes) required to fill in either or both the surveys described below. If you need additional information, please, don't hesitate to contact Dr. Jussi Paatero, Finnish Meteorological Institute ([jussi.paatero@fmi.fi](mailto:jussi.paatero@fmi.fi)).

Please, fill in the survey No. 1 on airborne instruments that are already operational. The link to the survey is <http://www.webropol.com/P.aspx?id=456745&cid=13976763>.

Please, fill in the survey No.2 on SMEs, universities and research laboratories that might be interested in participating in COPAL by e.g. instrument development, data analysis or other know-how useful to COPAL. The link to the survey is <http://www.webropol.com/P.aspx?id=456922&cid=12378453>.

Thank you for your interest towards the subject!

**Finnish Meteorological Institute  
Helsinki, Finland**

## Jim Dooge, one of the Pioneers of Hydrology passed away

Jim Dooge was a former Irish minister of foreign affairs, but to us he is known as one of the most famous European Hydrologists

It is with deep regret that we have learned that Prof. James (Jim) Dooge passed away on Friday, 20 August 2010. Jim Dooge was a former Irish minister of foreign affairs, but to us he is known as one of the most famous European Hydrologists of the previous century. He was one of Hydrology's pioneers, and a father of linear theory in hydrology. He defined catchments as "complex systems with some degree of organisation" (Dooge, 1986), and always tried to find the laws behind the simple behaviour that these systems sometimes demonstrate (Dooge, 1997). His last paper was "Bringing it all together" (Dooge, 2005), which was the first paper to be published in the new open-access HESS.

Jim's interest in hydrology was stimulated by his background in engineering, which he took to the highest

scientific level. With time, his interest expanded to cover meteorology and climate. He considerably influenced the climate change debate. It was Jim who invited the International Conference on Water and the Environment to be held in Dublin in 1992 as a precursor to the Rio Earth Summit. He chaired the meeting where the "Dublin Principles" were formulated. These Dublin principles formed the foundation for the Global Water Partnership and have been influential in shaping water management policy over the last 20 years.

Jim Dooge was also an active participant in EGU activities. He published his "Linear Theory of Hydrological Systems" (Dooge, 2003) with EGU, was always present at EGU meetings and was a strong supporter of the HESS journal. He received the first Dalton medal of

EGU in 1998 and gave his last speech "Bringing it all together" during the EGU general assembly of 2004, which he himself called his 'swan song'.

Jim will be remembered by us with gratitude and the deepest admiration.

Dooge J.C.I. (1986), "Looking for hydrologic laws", Water Resources Research, 22(9), 46S–58S.

Dooge, J.C.I. (1997), "Searching for Simplicity in Hydrology", Surveys in Geophysics 18: 511–534, 1997.

Dooge, J.C.I. (2003), "Linear Theory of Hydrological Systems", EGU Reprint Series, 1, 2003.

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**EGU**



## SMOS mission observes Amazon freshwater plume

the Soil Moisture and Ocean Salinity mission has been delivering observations since mid-July

3 September 2010.- The Soil Moisture and Ocean Salinity (SMOS) ESA mission has been delivering observations of 'brightness temperature' since mid-July. As a measure of radiation emitted from Earth's surface, this information can be used to derive global maps of soil moisture every three days and maps of ocean salinity at least every 30 days.

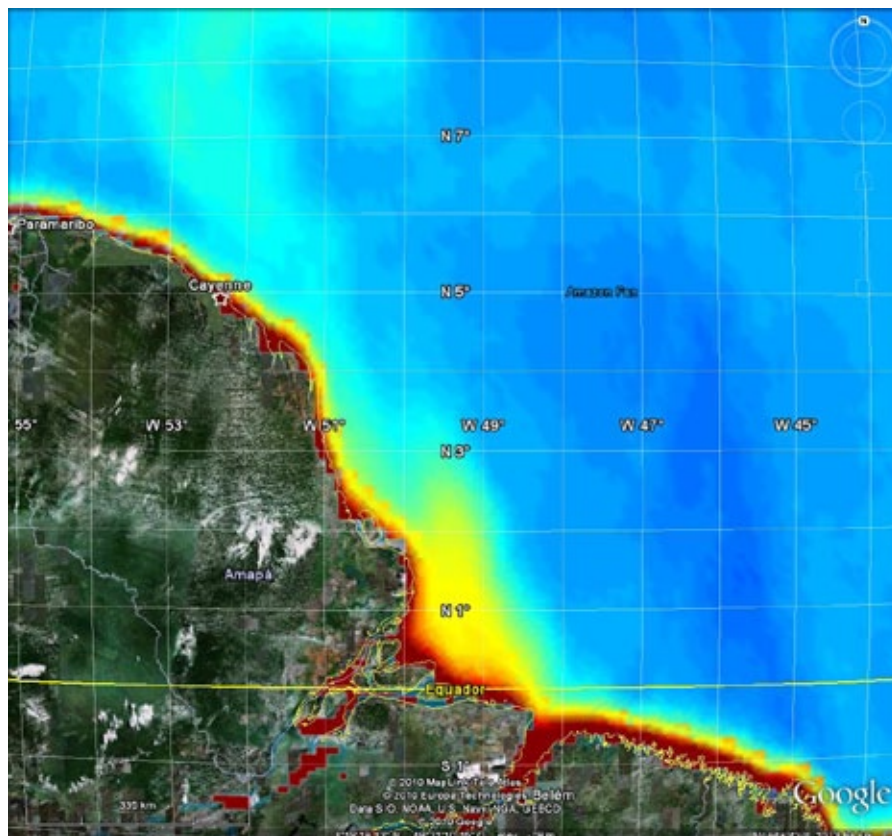
Soil moisture and ocean salinity data products will be released later this month, but preliminary data are very encouraging.

Talking about observations that relate to ocean salinity, Nicolas Reul from Ifremer said, "One of the dramatic steps forward achieved with SMOS is that we now have the ability to track the movement of low-salinity surface waters, particularly those resulting from large 'plumes' such as the Amazon.

"Observations between mid-July and mid-August clearly show how the North Brazilian Current transports fresh water from the Amazon River as the current flows across the mouth of the river. These observations confirm the excellence of the data we are already getting from SMOS".

Discharge from the Amazon River, the Amazon plume, amounts to around 15% of the global input of fresh water into the ocean. The migration of the plume, however, varies seasonally. During the first half of the year the river water generally disperses over a broad area to the northwest, towards the Caribbean Sea, but in the second half of the year the plume flows around the North Brazil Current and is carried back eastwards.

The migration of the Amazon plume results in significant differences in the salinity of the surface ocean water.



*The image, derived from SMOS data in July 2010, shows the plume of fresh Amazon River water as it enters the Atlantic Ocean. Credits: I. Corbella, UPC / Google Earth.*

"Over the last weeks we have been able to track how the Amazon freshwater plume curves back on itself at this time of year as large North Brazilian Current eddies form northwest of the river mouth", said Dr Reul.

"At the same time, the Orinoco plume has also been clearly visible as a tongue of fresh water entering the Tropical Atlantic along the windward side of the Caribbean islands".

"These observations are a good example of how well SMOS is performing and they show us that the mission can provide data on temporal sea-surface variability at scales of less than a week".

More on SMOS at <http://www.esa.int/SPECIALS/smos/index.html>

ESA

## Ways to chart our maritime past

there is little attention to cultural monuments at the sea-shore and under water

19 August 2010.- By combining meteorology and archaeology, scientists may discover old sea routes and mooring sites, and boost our knowledge of ancient maritime culture.

"Archaeology has a long-standing tradition in protecting areas on land. But unfortunately, there is little attention to cultural monuments at the sea-shore and under water", says meteorologist Marianne Nitter at the University of Stavanger's Museum of Archaeology.

"These may include mooring and landing sites, jetties, boat-houses, standing stones and house remains – objects which can inform us about pre-historic maritime culture and our ancestors' mobility and travelling routes", she adds.

Together with her colleague, geologist Lotte Selsing, and marine archaeologist Endre Elvestad at Stavanger Maritime Museum, Nitter has studied the protection of maritime cultural monuments.

These objects are very vulnerable, as they are exposed to rising sea levels, increasing maritime traffic and extreme weather, she explains. Tall waves and more frequent storm surges can obliterate them altogether.

"The process of recording underwater and near-shore cultural artefacts was initiated relatively late in Norway,

so we simply don't know how many of them there are. And we cannot protect monuments that are neither located nor registered", Nitter says.

### Introducing climate-space

To help locating these artefacts, Nitter has introduced the concept of 'climate-space'.

Inspired by the term 'landscape room', this concept enables archaeologist to convey and incorporate abstract meteorological phenomena into the field of archaeology.

A climate-space is an area with homogenous temperature, precipitation, wind direction and wind force, Nitter explains. Valleys, groves, mountains, lakes, fiords and slopes are all examples of local climate-spaces.

The area is defined by topography and vegetation, which limits the occurrence of various weather phenomena. Furthermore, a climate-space is defined by calculating the weather phenomena's time scale, the climate parameter to which you relate it to – such as temperature, rainfall or wind – and the topographic lines of the landscape. These three parameters are mutually dependent.

"The climate-space may change rapidly, and in step with changing param-

eters. Wind direction may change within minutes, and vegetation over a few seasons", says Nitter.

### Go with the wind

Iron Age vessels could be landed in very shallow waters, which are now only accessible by dingy boats. As ships got bigger and deeper draught, a number of landing sites of the Viking and early Middle Ages were abandoned during the 14th and 15th centuries.

The climate-space concept is particularly helpful in finding the oldest seafaring routes and landing places. By using this method, scientists can estimate wind and wave conditions inside a fiord. They may also assess the wind fetch and thereby determine the height of the waves. By calculating wind and waves, scientists are able to chart landing sites which are no longer in use.

"By applying fetch and climate-space calculation to a particular landing site, you will see that the location of the harbour is adapted to the prevailing wind directions and most favourable wave conditions", says Nitter.

After locating the best prehistoric landing places, we are likely to find cultural monuments, she asserts.

**University of Stavanger**

## How toxic, blue-green algae out-compete other organisms

through cylindrospermopsin secretion

12 August 2010.- How toxic, blue-green algae out-compete other organisms through a form of selfish "enslavement" -- and by so doing proliferate dangerously in freshwater bodies -- has been described by a researcher at the Hebrew University of Jerusalem.

In general, the increasing occurrence of toxic cyanobacterial (blue-green algae) blooms in freshwater bodies is a matter of concern due to their detrimental impact on drinking water quality and, in extreme cases, causing death to humans, livestock and wild animals.

A toxic blue-green alga known as *Aphanizomenon ovalisporum* was first detected in Lake Kinneret (Sea of Galilee) in 1994, and its presence has been noted each summer thereafter. The conditions promoting these toxic blooms and other toxin formations in freshwater bodies were not known.

However, now in a paper published online on Aug. 12 in *Current Biology*, Bar-Yosef et al. has suggested a novel mechanism to explain the ability of *Aphanizomenon* to form massive toxic blooms by overcoming competition from other microorganisms in the water.

*Aphanizomenon* is known to produce the toxin cylindrospermopsin (CYN). Secretion of the CYN, Bar-Yosef found, induces phosphate-limitation responses in other microorganisms in the ecosystem, even in the presence of ample phosphate in the water. The phosphate mineral is an essential nutrient for growth in many organisms.

The result is that *Aphanizomenon* is able to attain a relative advantage in phosphate-absorption capability, thus gaining dominance in the competition for nutrients.



## Herschel infrared space observatory

discovered that ultraviolet starlight is key ingredient for making water in space

2 September 2010.- When astronomers discovered an unexpected cloud of water vapour around the old star IRC+10216 in 2001, they immediately began searching for the source. Stars like IRC+10216 are known as carbon stars and are thought not to make much water. Initially they suspected the star's heat must be evaporating comets or even dwarf planets to produce the water.

Now, Herschel's PACS and SPIRE instruments have revealed that the secret ingredient is ultraviolet light, because the water is too hot to have come from the destruction of icy celestial bodies.

The sensitivity of Herschel's instruments has revealed that the water around IRC+10216 varies in temperature from about  $-200^{\circ}\text{C}$  to  $800^{\circ}\text{C}$ , which indicates that it is being formed much closer to the star than comets can stably exist.

IRC+10216 is a red giant star, hundreds of times the Sun's size, although only a few times its mass.

It is 500 light years away and while it is barely detectable at visible wavelengths, even in the largest telescopes, it is the brightest star in the sky at some infrared wavelengths. This is because it is surrounded by a huge envelope of dust that absorbs almost all its visible radiation and re-emits it as infrared light. It is in the envelope that the water vapour has been found. But how did the water get there?

The Herschel water detection made the astronomers realise that ultraviolet light from surrounding stars can reach deep into the envelope between the clumps and break up molecules such as carbon monoxide and silicon monoxide, releasing oxygen atoms. The oxygen

atoms then attach themselves to hydrogen molecules, forming water.

### Herschel on YouTube

- Looking inside Herschel ([http://www.youtube.com/watch?v=j9\\_VBK8Jq4](http://www.youtube.com/watch?v=j9_VBK8Jq4) &feature=Playlist&p=CD471914889C152B &index=1)

- Herschel mission objectives ([http://www.youtube.com/watch?v=YyEpV1\\_CH4w](http://www.youtube.com/watch?v=YyEpV1_CH4w) &feature=Playlist&p=CD471914889C152B &index=5)

### In depth

- This story in depth (<http://sci.esa.int/science-e/www/object/index.cfm?fobjectid=47649>)

ESA

## GOCE giving new insights into Earth's gravity

29 June 2010.- The first global gravity model based on GOCE satellite data has been presented at ESA's Living Planet Symposium. ESA launched GOCE in March 2009 to map Earth's gravity with unprecedented accuracy and resolution.

The model, based on only two months of data, from November and December 2009, shows the excellent capability of the satellite to map variations in Earth's gravity.

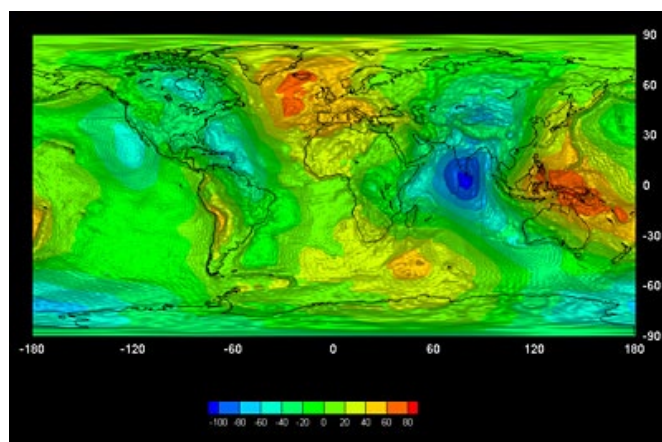
"GOCE is delivering where it promised: in the fine spatial scales", GOCE Mission Manager Rune Floberghagen said.

"We have already been able to identify significant improvements in the high-resolution 'geoid', and the gravity model will improve as more data become available".

Chairman of the GOCE Mission Advisory Group and Head of the Institute for Astronomical and Physical Geodesy at the Technische Universität München, Prof. Reiner Rummel, said: "The computed global gravity field looks very promising. We can already see that important new information will be obtained for large areas of South America, Africa, Himalaya, South-East Asia and Antarctica".

"Over continents, and in particular in regions poorly mapped with terrestrial or airborne techniques, we can already conclude that GOCE is changing our understanding of the gravity field", Dr Floberghagen added.

Since mid-September 2009, GOCE has been in its gravity-mapping orbit at a mere 254.9 km mean altitude – the lowest orbit sustained over a long period by any Earth observation satellite.



GOCE first global gravity model, Credits: ESA

The residual air at this low altitude causes the orbit of a standard satellite to decay very rapidly. GOCE, however, continuously nullifies the drag in real time by firing an ion thruster using xenon gas.

ESA

## Fish adapted to anoxic environment

the fish suspends its breathing when oxygen is low thus coping in with poisonous levels of H<sub>2</sub>S in the continental shelf off Namibia



*This goby also thrives among jelly. Photo: Kim E. Andreassen/UiB*

16 July 2010.- A unique fish species has adapted to a hostile environment poisonous to most other organisms. The findings are published in Science.

The unique fish is called the Benguela-goby, or bearded goby, and is found only on the anoxic continental shelf outside Namibia and South-Africa. Since the collapse of the sardine fisheries, this goby has become the new predominant prey species for larger fish, birds and mammals in the region.

Scientists from Norway, South Africa and Namibia have discovered how this little survivor copes in an environment that kills other fish. The findings alter the way we now consider the structure and functioning of marine food-webs. Previously the belief was that fish could not survive in an environment of sulphide rich mud or between stinging jellyfish. But the bearded goby has become tolerant to these extreme environments:

- During the day the goby stays on the anoxic seabed. Here it seems to "hold its breath", whilst at the same time eating the mud and associated small

organisms. Later, under cover of darkness, the goby swims up to the more oxygen rich surface waters in order to restore its oxygen debt and to digest its food, says senior scientist Anne Christine Utne-Palm from the University of Bergen. Utne-Palm is the first author of the report printed in this week's issue of the journal Science.

While holding its breath it feasts on the sulphidic mud. It also thrives among jelly:

- When gobies swim up to shallower waters at night, they associate with jellyfish. This is a night-time shelter from predators. Our studies in aquaria showed that goby predators avoid jellyfish, but that gobies are largely indifferent to them staying close and even swimming inbetween their stinging tentacles, says professor Anne Gro Veia Salvanes, co-author of the report to Science.

The results presented in Science are from interdisciplinary research conducted during several research cruises in the Benguela ecosystem off Namibia

using the RV Dr. Fridtjof Nansen and the RV G.O. Sars.

### Facts sheet

- This little goby-fish (*Sufflogobius bibarbatus*) reaches a maximum length of 13 cm and is only found in the Benguela ecosystem, one of the world's most productive fisheries areas.

- After overfishing of the sardines in the late 60s and early 1970s there was a shift in the food web of the Benguela ecosystem, and the gobies and jellyfish increased in abundance. Penguins, seals, sea birds and larger commercial fish that had previously fed almost exclusively on sardines switched to eating gobies for the most part.

- In the Benguela ecosystem off Namibia, an extreme environment is generated by natural processes; excess phytoplankton, and those not eaten by zooplankton accumulate on the bottom and over time build up to a thick rotting mud layer. This means that:

--Approximately 9.000 km<sup>2</sup> of the continental shelf lacks oxygen.

--Of this 7.000 km<sup>2</sup> are covered in a mud that is rich in hydrogen sulphide (H<sub>2</sub>S) and sulphur bacteria.

--Methane gas and hydrogen sulphide build up in the sediment, causing frequent gas eruptions stripping the entire water-column for oxygen, leading to massive mortality of fish and shellfish in the area.

--The physiological adaptation is that the goby suspends its breathing when oxygen is low. Experiments show that goby hearts recovers after anoxia, while hearts of its predator (hake) do not recover. Its ability to hold its breath helps the goby coping in with poisonous levels of H<sub>2</sub>S.

--Experiments in aquaria found that the goby preferred H<sub>2</sub>S-sediments over

alternative sediment such as sand. The H<sub>2</sub>S-sediments kill goby predators. The goby capitalises on its advantage to shelter there from predatory fish and at the same time it feeds on the nutritious mud.

--Whilst on the inhospitable seabed, however, the goby builds up an oxygen debt and so it has to move up into the water column to both refresh the blood and to digest its food. It does this at night, when predatory fish see less well.

--Up in the water at night the gobies appear to feed on jellyfish, whilst on the seabed they consume the mud and prey available there. Stable-isotope ratios in the tissue of gobies and their potential prey reveal that gobies consume considerable quantities of jellyfish, as well as the sulphide rich mud.

## Reference

Trophic Structure and Community Stability in an Overfished Ecosystem, Anne C. Utne-Palm, Anne G. V. Salvanes, Bronwen Currie, Stein Kaartvedt, Göran E. Nilsson, Victoria A. Braithwaite, Jonathan A. W. Stecyk, Matthias Hundt, Megan van der Bank, Bradley Flynn, Guro K. Sandvik, Thor A. Klevjer, Andrew K. Sweetman, Volker Brüchert, Karin Pittman, Kathleen R. Peard, Ida G. Lunde, Rønnaug A. U. Strandabø, Mark J. Gibbons, *Science*, 16 July 2010, Vol. 329. no. 5989, pp. 333 - 336. DOI: 10.1126/science.1190708

**University of Bergen**



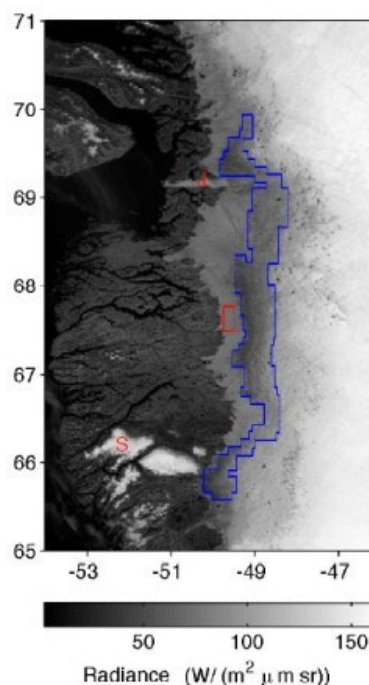
## An explanation for the dark region in the western melt zone of the Greenland ice sheet

The dark region appears every year during the summer season and can always be found at the same location

The western part of the Greenland ice sheet contains a region that is darker than the surrounding ice. This feature has been analysed with the help of MODIS images. The dark region appears every year during the summer season and can always be found at the same location, which makes meltwater unlikely as the only source for the low albedos. Spectral information indicates that the ice in this region contains more debris than the ice closer to the margin. ASTER images reveal a wavy pattern in the darker ice. Based on these findings we conclude that ice, containing dust from older periods, is presently outcropping near the margin, leading to albedos lower than observed for the remaining ablation area. Therefore it can be concluded that the accumulation of meltwater is a result rather than a cause of the darkening.

The full paper is available free of charge at <http://www.the-cryosphere.net/4/261/2010/tc-4-261-2010.html>

**Wientjes, I. G. M. and Oerlemans, J.: An explanation for the dark region in the western melt zone of the Greenland ice sheet, *The Cryosphere*, 4, 261-268, doi:10.5194/tc-4-261-2010, 2010.**



MODIS image from 9 August 2007, band 2 (841–876 nm), with the appearance of the dark region indicated with a blue contour. S is Sukkertoppen Iskappe and J is Jakobshavn Isbrae. The red contour indicates the reference area as described in Sect. 4. (Latitudes and longitudes along the axes), (Figure 1 of the paper).

## The Eons of Chaos and Hades

a proposition for the early earth

Eon	Era	Period	Age (Ga)
Hadean	Neohadean	Promethean	~3.9
		Acastan	4.0
	Mesohadean	Procrustean	4.1
		Canadian	4.2
	Palaeohadean	Jacobian	4.3
		Hephaestean	4.4
Chaotian	Neochaotian	Titanomachean	~4.5
		Hyperitian	
	Eochaotian	Ereborean	
		Nephelean	

The authors propose the Chaotian Eon to demarcate geologic time from the origin of the Solar System to the Moon-forming impact on Earth. This separates the solar system wide processes of planet formation from the subsequent divergent evolution of the inner planets. They further propose the division of the Hadean Eon into eras and periods (see figure) and naming the proto-Earth Tellus.

The full paper is available free of charge at <http://www.solid-earth.net/1/1/2010/se-1-1-2010.html>

**Goldblatt, C., Zahnle, K. J., Sleep, N. H., and Nisbet, E. G.: The Eons of Chaos and Hades, *Solid Earth*, 1, 1-3, doi:10.5194/se-1-1-2010, 2010.**

*Proposed time scale for the Solar System formation and the early Earth (Figure 1 of the paper).*



## Sensitivity of oxygen dynamics in the water column of the Baltic Sea to external forcing

Natural physical factors are found the major factors controlling the oxygen dynamics in the Baltic Sea, while the influence of limiting nutrients is less pronounced.

A 1-D biogeochemical/physical model of marine systems has been applied to study the oxygen cycle in four stations of different sub-basins of the Baltic Sea, namely, in the Gotland Deep, Bornholm, Arkona and Fladen. The model consists of the biogeochemical model of Neumann et al. (2002) coupled with the 1-D General Ocean Turbulence Model (GOTM). The model has been forced with meteorological data from the ECMWF reanalysis project for the period 1998–2003, producing a six year hindcast which is validated with datasets from the Baltic Environmental Database (BED) for the same period. The vertical profiles of temperature and salinity are relaxed towards both profiles provided by 3-D simulations of General Estuarine Transport Model (GETM) and observed profiles from BED.

Modifications in the parameterisation of the air-sea oxygen fluxes have led to a significant improvement of the model results in the surface and intermediate water layers. The largest mismatch with observations is found in simulating the oxygen dynamics in the Baltic Sea bottom waters. The model results demonstrate the good capability of the model to predict the time-evolution of the physical and biogeochemical variables at all different stations.

Comparative analysis of the modelled oxygen concentrations with respect to observation data is performed to distinguish the relative importance of several factors on the seasonal, interannual and long-term variations of oxygen.

It is found that natural physical factors, like the magnitude of the vertical turbulent mixing, wind speed and the variation of temperature and salinity fields are the major factors controlling the oxygen dynamics in the Baltic Sea. The influence of limiting nutrients is less pronounced, at least under the nutrient flux parameterisation assumed in the model.

The full paper is available free of charge at <http://www.ocean-sci.net/6/461/2010/os-6-461-2010.html>

**Miladinova, S. and Stips, A.: Sensitivity of oxygen dynamics in the water column of the Baltic Sea to external forcing, *Ocean Sci.*, 6, 461-474, doi:10.5194/os-6-461-2010, 2010.**

## Stochastic resonance: from climate to biology

a review of some basic aspects of the mechanism

In this paper, the author reviews some basic aspects of the mechanism of stochastic resonance, first introduced as a possible mechanism to explain long term climatic variation. Since then, there have been many applications of stochastic resonance in physical and biological systems. The author shows that in complex system, stochastic resonance can substantially change as a function of the “system complexity” and also briefly mentions how to apply stochastic resonance for the case of Brownian motors.

The full paper is available free of charge at <http://www.nonlin-processes-geophys.net/17/431/2010/npg-17-431-2010.html>

**Benzi, R.: Stochastic resonance: from climate to biology, *Nonlin. Processes Geophys.*, 17, 431-441, doi:10.5194/npg-17-431-2010, 2010.**

## The social psychology of seismic hazard adjustment

re-evaluating the international literature

The majority of people at risk from earthquakes do little or nothing to reduce their vulnerability. Over the past 40 years social scientists have tried to predict and explain levels of seismic hazard adjustment using models from behavioural sciences such as psychology.

The present paper is the first to synthesise the major findings from the international literature on psychological correlates and causes of seismic adjustment at the level of the individual and the household. It starts by reviewing research on seismic risk perception. Next, it looks at norms and normative beliefs, focusing particularly on issues of earthquake protection responsibility and trust between risk stakeholders. It then considers research on attitudes towards seismic adjustment

attributes, specifically beliefs about efficacy, control and fate.

It concludes that an updated model of seismic adjustment must give the issues of norms, trust, power and identity a more prominent role. These have been only sparsely represented in the social psychological literature to date.

The full paper is available free of charge at <http://www.nat-hazards-earth-syst-sci.net/10/1663/2010/nhess-10-1663-2010.html>

**Solberg, C., Rossetto, T., and Joffe, H.: The social psychology of seismic hazard adjustment: re-evaluating the international literature, *Nat. Hazards Earth Syst. Sci.*, 10, 1663-1677, doi:10.5194/nhess-10-1663-2010, 2010.**

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## Statistical issues about solar–climate relations

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tests for significant correlation between observed temperature variability and geomagnetic field variability might be hindered by a low number of degrees of freedom

The relationship between solar activity and temperature variation is a frequently discussed issue in climatology. This relationship is usually hypothesized on the basis of statistical analyses of temperature time series and time series related to solar activity. Recent studies (Le Mouél et al., 2008, 2009; Courtillot et al., 2010) focus on the variabilities of temperature and solar activity records to identify their relationships.

In this paper, the authors discuss the meaning of such analyses and propose a general framework to test the statistical significance for these variability-based analyses. This approach is illustrated using European temperature data sets and geomagnetic field variations. The authors show that tests

for significant correlation between observed temperature variability and geomagnetic field variability are hindered by a low number of degrees of freedom introduced by excessively smoothing the variability-based statistics.

The full paper is available free of charge at <http://www.clim-past.net/6/565/2010/cp-6-565-2010.html>

**Yiou, P., Bard, E., Dandin, P., Legras, B., Naveau, P., Rust, H. W., Terray, L., and Vrac, M.: Statistical issues about solar–climate relations, *Clim. Past*, 6, 565–573, doi:10.5194/cp-6-565-2010, 2010.**

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## Climate change and the demise of Minoan civilization

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a series of unusually strong and long-lasting El Nino events starting at about 1450 BC and lasting for several centuries might have been an important factor for the demise of the Minoans

Climate change has been implicated in the success and downfall of several ancient civilizations.

Here the authors present a synthesis of historical, climatic, and geological evidence that supports the hypothesis that climate change may have been responsible for the slow demise of Minoan civilization. Using proxy ENSO and precipitation reconstruction data in the period 1650–1980 they present empirical and quantitative evidence that El Nino causes drier conditions in the area of Crete. This result is supported by modern data analysis as well as by model simulations.

Though not very strong, the ENSO-Mediterranean drying signal appears to be robust, and its overall effect was accentuated by a series of unusually strong and long-lasting El Nino events during the time of the Minoan decline. Indeed, a change in the dynamics of the El Nino/Southern Oscillation (ENSO)

system occurred around 3000 BC, which culminated in a series of strong and frequent El Nino events starting at about 1450 BC and lasting for several centuries.

This stressful climatic trend, associated with the gradual demise of the Minoans, is argued to be an important force acting in the downfall of this classic and long-lived civilization.

The full paper is available free of charge at <http://www.clim-past.net/6/525/2010/cp-6-525-2010.html>

**Tsonis, A. A., Swanson, K. L., Sugihara, G., and Tsonis, P. A.: Climate change and the demise of Minoan civilization, *Clim. Past*, 6, 525–530, doi:10.5194/cp-6-525-2010, 2010.**



## Ideas for the earth science classroom

The activities require few resources and are designed to encourage students aged 8-18 to investigate how Earth works

Are you looking for ideas to spice up your earth science class? Why not try out one of the rich collection of activities developed by Chris King, Elizabeth Devon and Peter Kennett from Earth Learning Idea.

To coincide with the UN International Year of Planet Earth (2007-2009), three earth science teachers from the UK compiled a website with a really big, varied and still expanding collection of teaching activities: Earth Learning Idea.

The simple activities require few resources (but can be readily adapted for use with standard school lab equipment) and are designed to encourage students aged 8-18 to investigate how Earth works (the recommended age range is given in each activity).

There is an online discussion around every idea in order to develop a global support network, and each activity is accompanied by 'back-up' notes for teachers. The activities are also being translated into Spanish, Norwegian, Italian, Chinese and Tamil.

You can help the team (and yourself), if you are a teacher trainer or school teacher in science, geography or earth science, by subscribing free of charge on the project website to receive two new earth learning ideas each month during 2010.

You can then discuss the idea with other interested people across the globe on the associated blog. All activities are free to download at any time, but if you subscribe, you will be notified when a new activity is published.

The activities on the website are divided into nine different categories: 'Earth as a system', 'Earth energy', 'Earth in space', 'Earth materials', 'evolution of life', 'geological time', 'investigating the Earth', 'natural hazards' and 'resources and environments'. They include activities on volcanoes, tsunamis, dinosaurs, oil and gas, earthquakes, permeability of soil and many more. Most are practical activities, whereas others can be thought experiments, such as a paper-folding activity to help students visualise how Darwin developed his theory of how coral atolls formed. Many protocols include an extra section of additional follow-up experiments.

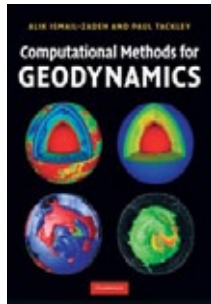
The website is located at

<http://geophysics.esci.keele.ac.uk/earthlearningidea/>

*Published in Science in School, issue 15, 2010*



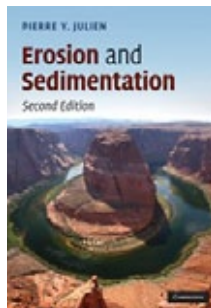
## Computational Methods for Geodynamics



Authors: Alik Ismail-Zadeh and Paul Tackley  
 Publisher: Cambridge University Press  
 ISBN: 9780521867672  
 YEAR : 2010  
 EDITION : 1st  
 PAGES : 313  
 PRICE : 48.00 €  
 Hardback

Computational Methods for Geodynamics describes all the numerical methods typically used to solve problems related to the dynamics of the Earth and other terrestrial planets, including lithospheric deformation, mantle convection and the geodynamo. The book starts with a discussion of the fundamental principles of mathematical and numerical modelling, which is then followed by chapters on finite difference, finite volume, finite element and spectral methods; methods for solving large systems of linear algebraic equations and ordinary differential equations; data assimilation methods in geodynamics; and the basic concepts of parallel computing. The final chapter presents a detailed discussion of specific geodynamic applications in order to highlight key differences between methods and demonstrate their respective limitations. Readers learn when and how to use a particular method in order to produce the most accurate results. This combination of textbook and reference handbook brings together material previously available only in specialist journals and mathematical reference volumes, and presents it in an accessible manner assuming only a basic familiarity with geodynamic theory and calculus. It is an essential text for advanced courses on numerical and computational modelling in geodynamics and geophysics, and an invaluable resource for researchers looking to master cutting-edge techniques. Links to online source codes for geodynamic modelling can be found at [www.cambridge.org/zadeh](http://www.cambridge.org/zadeh).

## Erosion and Sedimentation

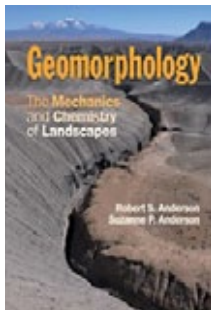


Authors: Pierre Y. Julien  
 Publisher: Cambridge University Press  
 ISBN: 9780521537377  
 YEAR : 2010  
 EDITION : 2nd  
 PAGES : 371  
 PRICE : 46.00 €  
 Paperback

The second edition of this acclaimed, accessible textbook brings the subject of sedimentation and erosion completely up-to-date, providing an excellent primer on both fundamental concepts of sediment-transport theory and methods for practical applications. The structure of the first edition is essentially unchanged, but all the chapters have been updated, with several chapters reworked and expanded significantly. Examples of the new additions include the concept of added mass, the Modified Einstein Procedure, sediment transport by size fractions, sediment transport of sediment mixtures, and new solutions to the Einstein Integrals. Many new examples and exercises have been added. Erosion and Sedimentation is an essential textbook on the topic for students in civil and environmental engineering and the geosciences, and also as a handbook for researchers and professionals in engineering, the geosciences and the water sciences.



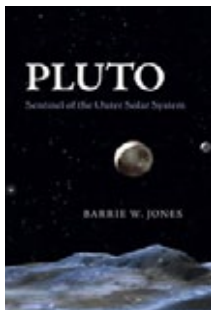
## Geomorphology: The Mechanics and Chemistry of Landscapes



Authors: Robert S. Anderson, Suzanne P. Anderson  
 Publisher: Cambridge University Press  
 ISBN: 9780521519786  
 YEAR : 2010  
 EDITION : 1st  
 PAGES : 637  
 PRICE : 58.00 €  
 Paperback

This textbook provides a modern, quantitative and process-oriented approach to equip students with the tools to understand geomorphology. Insight into the interpretation of landscapes is developed from basic principles and simple models, and by stepping through the equations that capture the essence of the mechanics and chemistry of landscapes. Boxed worked examples and real-world applications bring the subject to life for students, allowing them to apply the theory to their own experience. The book covers cutting edge topics, including the revolutionary cosmogenic nuclide dating methods and modeling, highlights links to other Earth sciences through up-to-date summaries of current research, and illustrates the importance of geomorphology in understanding environmental changes. Setting up problems as a conservation of mass, ice, soil, or heat, this book arms students with tools to fully explore processes, understand landscapes, and to participate in this rapidly evolving field.

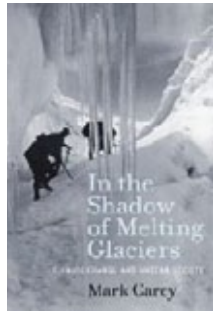
## Pluto: Sentinel of the Outer Solar System



Authors: Barrie W. Jones  
 Publisher: Cambridge University Press  
 ISBN: 9780521194365  
 YEAR : 2010  
 EDITION : 1st  
 PAGES : 231  
 PRICE : 29.00 €  
 Hardback

Orbiting at the edge of the outer Solar System, Pluto is an intriguing object in astronomy. Since the fascinating events surrounding its discovery, it has helped increase our understanding of the origin and evolution of the Solar System and has raised questions about the nature and benefits of scientific classification. This is a timely and exciting account of Pluto and its satellites. The author uses Pluto as a case study to discuss discovery in astronomy and how remote astronomical bodies are investigated. He also examines the role of classification in science by discussing Pluto's recent classification as a dwarf planet. Besides Pluto, the book also explores the rich assortment of bodies that constitute the Edgeworth-Kuiper Belt, of which Pluto is the innermost substantial member. Richly illustrated and up to date, this book is written for general readers, amateur astronomers and students alike. Boxed text provides more advanced information especially for readers who wish to delve deeper into the subject.

## In the Shadow of Melting Glaciers: Climate Change and Andean Society

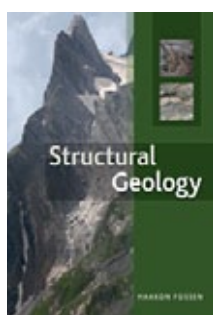


Authors: Mark Carey  
 Publisher: Oxford University Press  
 ISBN: 9780195396072  
 YEAR : 2010  
 EDITION : 1st  
 PAGES : 288  
 PRICE : 19.69 €  
 Paperback

Climate change is producing profound changes globally. Yet we still know little about how it affects real people in real places on a daily basis because most of our knowledge comes from scientific studies that try to estimate impacts and project future climate scenarios. This book is different, illustrating in vivid detail how people in the Andes have grappled with the effects of climate change and ensuing natural disasters for more than half a century. In Peru's Cordillera Blanca mountain range, global climate change has generated the world's most deadly glacial lake outburst floods and glacier avalanches, killing 25,000 people since 1941. As survivors grieved, they formed community organizations to learn about precarious glacial lakes while they sent priests to the mountains, hoping that God could calm the increasingly hostile landscape. Meanwhile, Peruvian engineers working with miniscule budgets invented innovative strategies to drain dozens of the most unstable lakes that continue forming in the twenty first century. But adaptation to global climate change was never simply

about engineering the Andes to eliminate environmental hazards. Local urban and rural populations, engineers, hydroelectric developers, irrigators, mountaineers, and policymakers all perceived and responded to glacier melting differently-based on their own view of an ideal Andean world. Disaster prevention projects involved debates about economic development, state authority, race relations, class divisions, cultural values, the evolution of science and technology, and shifting views of nature. Over time, the influx of new groups to manage the Andes helped transform glaciated mountains into commodities to consume. Locals lost power in the process and today comprise just one among many stakeholders in the high Andes-and perhaps the least powerful. Climate change transformed a region, triggering catastrophes while simultaneously jumpstarting modernization processes. This book's historical perspective illuminates these trends that would be ignored in any scientific projections about future climate scenarios.

## Structural Geology



Authors: Haakon Fossen  
 Publisher: Cambridge University Press  
 ISBN: 9780521516648  
 YEAR : 2010  
 EDITION : 1st  
 PAGES : 463  
 PRICE : 48.00 €  
 Hardback

Lavishly illustrated in color, this textbook takes an applied approach to introduce undergraduate students to the basic principles of structural geology. The book provides unique links to industry applications in the upper crust, including petroleum and groundwater geology, which highlight the importance of structural geology in exploration and exploitation of petroleum and water resources. Topics range from faults and fractures forming near the surface to shear zones and folds of the deep crust. Students are engaged through examples and parallels drawn from practical everyday situations, enabling them to connect theory with practice. Containing numerous end-of-chapter problems, e-learning modules, and with stunning field photos and illustrations, this book provides the ultimate learning experience for all students of structural geology.

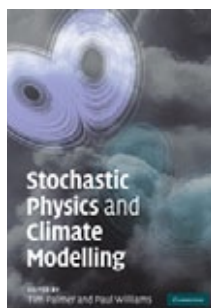
## Quantitative Seismic Interpretation



Authors: Per Avseth, Tapan Mukerji, Gary Mavko  
 Publisher: Cambridge University Press  
 ISBN: 9780521151351  
 YEAR : 2010  
 EDITION : 1st  
 PAGES : 359  
 PRICE : 58.00 €  
 Paperback

Seismic data analysis is one of the key technologies for characterizing reservoirs and monitoring subsurface pore fluids. While there have been great advances in 3D seismic data processing, the quantitative interpretation of the seismic data for rock properties still poses many challenges. Quantitative Seismic Interpretation demonstrates how rock physics can be applied to predict reservoir parameters, such as lithologies and pore fluids, from seismically derived attributes. It shows how the multidisciplinary combination of rock physics models with seismic data, sedimentological information, and stochastic techniques can lead to more powerful results than can be obtained from a single technique. The authors provide an integrated methodology and practical tools for quantitative interpretation, uncertainty assessment, and characterization of subsurface reservoirs using well-log and seismic data. They illustrate the advantages of these new methodologies, while providing advice about limitations of the methods and traditional pitfalls. This book is aimed at graduate students, academics, and industry professionals working in the areas of petroleum geoscience and exploration seismology. It will also interest environmental geophysicists seeking a quantitative subsurface characterization from shallow seismic data. The book includes case studies and problem sets.

## Stochastic Physics and Climate Modelling



Authors: Tim Palmer and Paul Williams  
 Publisher: Cambridge University Press  
 ISBN: 9780521761055  
 YEAR : 2010  
 EDITION : 1st  
 PAGES : 480  
 PRICE : 98.00 €  
 Hardback

This is the first book to promote the use of stochastic, or random, processes to understand, model and predict our climate system. One of the most important applications of this technique is in the representation of comprehensive climate models of processes which, although crucial, are too small or fast to be explicitly modelled. The book shows how stochastic methods can lead to improvements in climate simulation and prediction, compared with more conventional bulk-formula parameterization procedures. Beginning with expositions of the relevant mathematical theory, the book moves on to describe numerous practical applications. It covers the complete range of time scales of climate variability, from seasonal to decadal, centennial, and millennial. With contributions from leading experts in climate physics, this book is invaluable to anyone working on climate models, including graduate students and researchers in the atmospheric and oceanic sciences, numerical weather forecasting, climate prediction, climate modelling and climate change.

# The Paleontology of Gran Barranca



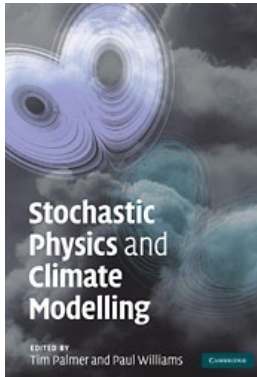
Authors: Richard H. Madden, Alfredo A. Carlini, Maria Guiomar Vucetich, Richard F. Kay  
 Publisher: Cambridge University Press  
 ISBN: 9780521872416  
 YEAR : 2010  
 EDITION : 1st  
 PAGES : 448  
 PRICE : 116.00 €  
 Hardback

Gran Barranca in Patagonia exposes the most complete sequence of middle Cenozoic paleofaunas in South America. It is the only continuous continental fossil record of the Southern Hemisphere between 42 and 18 million years ago, when climates at high latitudes transitioned from warm humid to cold dry conditions. This volume presents the geochronology of the fossil mammal sequence and a compilation of the latest studies of the stratigraphy, sedimentology, mammals, plants, invertebrates and trace fossils. It is also the first detailed treatment of the vertebrate faunal sequence at Gran Barranca, providing important new evidence about biotic diversity and evolution in the native species. A revised taxonomy allows a reevaluation of the origination and extinction of herbivorous mammals, marsupials, and xenarthrans, and the earliest occurrence of rodents and primates in southern latitudes. Academic researchers and advanced students in vertebrate paleontology, geochronology, sedimentology and paleoprimatology will value this wealth of new information.





## Stochastic Physics and Climate Modelling



Tim Palmer and Paul Williams  
Published by: Cambridge University Press  
ISBN: 9780521761055  
YEAR : 2010  
EDITION : 1st  
#PAGES : 480  
PRICE : 98.00 €

The readers of *Nonlinear Processes in Geophysics* are well aware that the solutions to nonlinear deterministic-like equations governing weather evolution are most probably chaotic in space and time: a small scale truncation can in a finite time generate large-scale errors.

The readers of *Nonlinear Processes in Geophysics* are well aware that the solutions to nonlinear deterministic-like equations governing weather evolution are most probably chaotic in space and time: a small scale truncation can in a finite time generate large-scale errors. This behaviour has been conjectured precisely, for the prototypical Navier-Stokes equations and is subject to a million-dollar Clay Mathematics Millennium prize. Without awaiting this mathematical conclusion, statistical theories of turbulence and corresponding stochastic models are already in constant use in a wide range of fluid mechanics applications.

The book “*Stochastic Physics and Climate Modelling*” edited by Palmer and Williams (2010) pushes forward these ideas in an original manner to the even more challenging and wider theme of climate change, which has an estimated worth of one trillion dollars (Stern, 2006), as recalled by the editors in their breathtaking preface. This book indeed promotes the use of stochastic, or random, processes to understand, model and predict our climate system, and in particular to resolve the presently considerable uncertainty in global and regional climate predictions.

This book corresponds to the careful updating and enlarging (seven new chapters have been added to the original eleven ones) of a thematic issue of the Royal Society introduced by Palmer and Williams (2008). This enables the book to cover a wide range of topics: low dimensional stochastic models and model reduction procedures; stochastic modelling of turbulence, diffusion and climate variability; stochastic differential equations driven by noise and their predictability; random dynamical systems and stochastic bifurcations; multiscale processes; stochastic parametrizations.

Some topics are rather mathematically oriented, others are treated at different levels including those with an emphasis on practical applications. This is particularly the case for stochastic parametrizations with the question of appropriate

backscatter schemes to model the small scale feedback on larger scales.

This book also benefits from the diversity of leading experts (mathematicians, physicists, oceanographers and meteorologists) who present different facets and approaches to the book's theme. Although it has the usual drawback that navigating within a multiple authored book is more difficult than within a single authored book. There are some natural overlaps on stochastic climate modelling with the book edited by Imkeller (2001), but the latter is more mathematically oriented and focused on random dynamical systems to a revisit of Hasselmann's program, whereas this book is focused on improving climate sub-grid modelling with the help of stochastic processes. There are much fewer overlaps with the books authored by Dobrovolski (2009) and Ditlevsen (PhD thesis, 2004), both of them being more focused on time-series analysis with the help of turbulence and scaling ideas. As would be expected due to my personal biases, I have some regrets about it. I feel that these ideas are not used enough in the present book to both characterize and model the climate variability over a wide range of scale, whereas the editors do acknowledge in their introduction the legacy of Richardson and Kolmogorov on the fundamental questions of fluctuations in nonlinear processes.

In conclusion, the book “*Stochastic Physics and Climate Modelling*” is a timely thought-provoking book on one of the most challenging and paradoxical scientific issues: stochastic physics may well be the key to substantial progress being made in climate change modelling and prediction, and to resolve the large uncertainties that exist. It is therefore a must for anyone having a keen interest in climate modelling, especially graduate students and researchers involved in climate studies.

This review is reproduced from *Nonlinear Processes in Geophysics*, 17, 421–422, 2010, [www.nonlin-processes-geophys.net/17/421/2010/](http://www.nonlin-processes-geophys.net/17/421/2010/)

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Stern, N.: The Economics of Climate Change: the Stern Review, Cambridge University Press, Cambridge UK, 2006.

***D. Schertzer Université Paris-Est, Ecole des Ponts  
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[www.imaggeo.net](http://www.imaggeo.net)



## HydroEco2011 - (Meeting)

02/05/2011 - 05/05/2011 - Vienna, Austria

Many ecological systems owe their existence to physical/chemical properties of groundwater and surface water, and can be damaged if water flow or water properties are changed by anthropogenic or natural processes.

To address the resulting issues, this conference brings together engineers and researchers from engineering and ecological disciplines. The disciplines include, but are not limited to, hydrology, ecology, environmental engineering, biology, chemistry, geochemistry, environmental biogeochemistry, and subsurface microbiology. The unifying theme is the interaction between groundwater and (or) /surface water and ecological systems. A typical example is the hyporheic zone in riparian areas, where the ecological system interacts with water and chemical flows between surface and groundwater.

The goals of the conference are:

- 1) to provide information that will help that interactions between groundwater, surface water and ecology are better understood, measured, simulated, and managed, and
- 2) to improve the technological basis for policy decisions (including WFD implementation) related to the reconstruction of ecologically valuable environments and the use of water resources in these environments.

### Organizer:

- (1) Universität für Bodenkultur Wien (BOKU), University of Natural Resources and Applied Life Sciences, Vienna,
- (2) International Association of Hydrological Sciences (IAHS),
- (3) Charles University, Prague, Czech Republic

<http://web.natur.cuni.cz/hydroeco2011/>

**Karel Kovar, Netherlands Environmental Assessment Agency, P.O. Box 303, 3720 AH BILTHOVEN, The Netherlands**

## Aquatic Sciences Meeting-Limnology and Oceanography in a Changing World - (Meeting)

13/02/2011 - 18/02/2011 - San Juan, Puerto Rico, USA

In February of 2011, ASLO will convene its biennial ASLO Aquatic Sciences Meeting in San Juan, Puerto Rico. Scientists from around the world will converge on the beautiful island of Puerto Rico to discuss emerging science on Limnology and Oceanography in a Changing World. The goal of this conference is to bring together an international group of freshwater and marine scientists to meet the challenge of global change, exploring diversity and connections across the range of aquatic systems impacted by humans. The ASLO Aquatic Sciences Meeting is a widely recognized venue for scientific exchange across all aquatic disciplines.

To support and encourage participation, ASLO has made a commitment to help subsidize the cost of on-site childcare at this meeting.

### Call for Papers

ASLO invites the submission of abstracts for oral and poster presentations. In order to have your abstract considered for acceptance, you must submit before the abstract deadline of 11 October 2010. Abstract and registration fees are due at the time of submission and are payable in U.S. Dollars. You can complete your ASLO membership application with your registration and abstract submission. We hope you will join ASLO and take advantage of the discounted registration fee for members.

### Special Needs

If you have a disability or limitation that may require special consideration in order to fully participate, please contact the conference management office to discuss how we can accommodate your needs. Call 800-929-3756 (USA, Canada & Caribbean) or 254-399-9635 (All other countries) or contact via e-mail at [business@aslo.org](mailto:business@aslo.org).

### For More Information

For more information on the 2011 ASLO Aquatic Sciences Meeting Meeting, address all correspondence and questions regarding registration, conference logistics, and hotel accommodations to:

Helen Schneider Lemay  
ASLO Business Office  
5400 Bosque Boulevard, Suite 680  
Waco, Texas 76710-4446

### Organizer:

American Society of Limnology and Oceanography-ASLO (<http://www.aslo.org/>)

<http://www.aslo.org/meetings/sanjuan2011/>

## Conference on "Ocean Acidification: Consequences for marine ecosystems and society" - (Meeting)

20/06/2011 - 24/06/2011 - Penang, Malaysia

We kindly inform you that the First Circular announcing the 7th EGU Alexander von Humboldt Conference on "Ocean Acidification: Consequences for marine ecosystems and society", to be held June 20-24, 2011 in Penang/Malaysia can be downloaded from [http://meetings.copernicus.org/avh7/AVH7\\_First\\_Circular.pdf](http://meetings.copernicus.org/avh7/AVH7_First_Circular.pdf)

Further details related to the venue, milestones, registration fees, accommodation, and other items of interest will be given in the "Second Circular and Call for Abstracts" which will be sent out later this year. If you wish to receive it or if you have specific requests please contact [fabian@wzw.tum.de](mailto:fabian@wzw.tum.de).

Please display this circular and/or make it available to other colleagues who might be interested.

September 1st, 2010

### Organizer:

Peter Fabian, European Geosciences Union (EGU)  
Zulficar Yasin, University Sains Malaysia (USM)

[http://meetings.copernicus.org/avh7/AVH7\\_First\\_Circular.pdf](http://meetings.copernicus.org/avh7/AVH7_First_Circular.pdf)

## Soil Science in a Changing world - (Meeting)

18/09/2011 - 22/09/2011 - Wageningen, the Netherlands

With this we would like to draw your attention to the first edition of a new series of meetings on applied soil science to be held bi-annually in Wageningen, the Netherlands. The first edition will be called 'Soil Science in a Changing world' and will be held from 18-22 September 2011.

The website with all required information is located at: <http://www.wageningensoilmeeting.wur.nl>. The website will inform you on all the topics and formats we choose for this meeting. Soon there will be the possibility to register and submit abstracts as well.

The organisers hope to welcome the prime of innovative soil scientists to make steps forwards in making soil science matter for society.

### Important dates

Deadline for abstracts: 30 March 2011  
Replies to authors: 1 June 2011  
Deadline for extended abstracts: 1 August 2011

<http://www.wageningensoilmeeting.wur.nl/UK/>

## International Symposium on "Weather Radar and Hydrology" - (Meeting)

18/04/2011 - 21/04/2011 - Exeter, United Kingdom

The International Symposium on "Weather Radar and Hydrology" (WRaH) will be held in the United Kingdom in 2011 from 18 to 21 April at the University of Exeter. The Symposium will provide a forum for the exchange of experiences and ideas on the use of weather radar in hydrology.

The Call for Papers and further details of the Symposium are available at: [www.wrah2011.org](http://www.wrah2011.org).

The theme of the 2011 Symposium will place emphasis on user applications of weather radar for flood forecasting and water management. All sessions will aim to combine developments in weather radar with advances in its hydrological application. You are strongly encouraged to submit abstracts of papers for the Symposium with this focus in mind. We aim to promote a strong interchange between researchers, practitioners in the water industry and those making advances in weather radar technology.

This is the 8th in a series of International Symposia, begun in 1989 at the University of Salford (UK) under the title "Hydrological Applications of Weather Radar". Subsequent symposia

have been convened in Germany, Brazil, USA, Japan, Australia and France. This 8th International Symposium marks a return to the UK after 20 years of successful symposia across the world.

Papers will be peer-reviewed and published as part of the International Association of Hydrological Sciences (IAHS) "Red Book" Series of Proceedings and Reports. A selection of papers, in extended form, will be published in a Special Issue of the "Hydrological Sciences Journal" of IAHS.

Sponsors of the Symposium include the British Hydrological Society, the Royal Meteorological Society, IAHS and WMO. Industry supporters in the UK are the Environment Agency, Met Office, Scottish Environment Protection Agency, Department of Agriculture and Rural Development for Northern Ireland and the Natural Environment Research Council. National coordination of the Symposium is via the "Interagency Committee on the Hydrological Use of Weather Radar".

### Submission deadlines

Abstract submission - 4 October 2010  
Notification of acceptance of abstract - mid-November 2010  
Symposium Proceedings, 6 page paper - 28 February 2011  
Full papers for HSJ Special Issue (optional) - 31 March 2011

### Organizer:

University of Exeter

[www.wrah2011.org](http://www.wrah2011.org)

**Bob Moore, Chair, Science Committee, Centre for Ecology & Hydrology, Wallingford**  
**Anthony Illingworth, Vice-Chair, Scientific Committee, Department of Meteorology, University of Reading**

## Space Climate Symposium-4 - (Meeting)

16/01/2011 - 21/01/2011 - Goa, India

### First Announcement

Dear Colleagues and Friends! We have the great pleasure to invite you to Space Climate Symposium-4 which will be held in Neelams the Grand Hotel, Goa, India, on 16-21 January, 2011.

Space Climate is an interdisciplinary science that deals with the long-term change in the Sun, and its effects in the heliosphere and in the near-Earth environment, including the atmosphere and climate. A special focus during this Symposium will be to study the causes, consequences and implications of the unusual solar cycle 23 that, most likely, has ended the Modern Grand Maximum of solar activity. Other topics include, e.g., solar dynamo, irradiance variations, solar wind, geomagnetic field and activity, cosmic rays and cosmogenic isotopes, and solar effects on different layers of the atmosphere and on local and global climate.

Invited speakers include, e.g., Jürg Beer, Archana Bhat-tacharyya, Paul Charbonneau, Gufran Beig, Katya Georgieva,



Sarah Gibson, Natchimuthuk Gopalswamy, Madhulika Guha-thakurta, Joanna Haigh, Siraj Hasan, Monica Korte, P.K. Manoharan, Piet Martens, Hiroku Miyahara, Mark Miesch, Martin Mlynchak, Kalevi Mursula, Dibyendu Nandi, Vladimir Obridko, Dean Pesnell, Jean-Pierre Rozelot, Alexander Ruzmaikin, Annika Seppälä, Sami Solanki, Brian Tinsley, Ilya Usoskin, and Tom Woods.

Further details on abstract submission, registration, and accommodation will be available soon at the meeting websites <http://www.iiserkol.ac.in/~spaceclimate4/> and <http://solar.physics.montana.edu/~spaceclimate4/> and will be outlined in the second announcement. Partial financial assistance for needy students and scientists may be available contingent upon the availability of funding.

**Deadlines:** Registration, Abstract Submission and Accommodation: 31st October, 2010

<http://www.iiserkol.ac.in/~spaceclimate4/>

*Dibyendu Nandi (LOC chair)*  
*Kalevi Mursula (SOC chair)*

## Coherent Flow Structures in Geophysical Flows at Earth's Surface - (Meeting)

03/08/2011 - 05/08/2011 - Burnaby, British Columbia

### SCOPE AND OBJECTIVES

The interaction between flow structure, mobile sediment and surface morphology has become of central importance in understanding the dynamics of the Earth's surface. Additionally, managing such flows is a key component of sustainable engineering design/construction as well as in the maintenance of ecological habitats. All such flows, in environments ranging from deserts to rivers to the oceans, are structured across a wide range of spatio-temporal scales, from small-scale turbulent vortices generated at the bed and responsible for grain-motion, to large-scale circulation patterns that generate geomorphic features visible from space. Substantial advances have taken place in the last decade in theoretical/numerical modeling, physical experimentation and field instrumentation, which have greatly expanded our understanding of the dynamics of these flows across this wide range of scales.

This conference will bring together the research community who use numerical simulations, laboratory modeling and field observation to study coherent flow structures, their interaction with sediment, vegetation, and benthic communities, the manipulation of such flow structures for managing sedimentary environments, and the key role they play in Earth surface dynamics. We seek to draw contributions from researchers working on the links between flow structure and the larger scale morphodynamics of sedimentary features within different geomorphic environments, and from across the Earth, environmental and engineering sciences.

### KEYNOTE SPEAKERS

1) Structure of Turbulent Boundary Layers, Ron Adrian, Arizona State University

2) Inter-relations Between Coherent Flow Structures, Eddy Cascades, and Secondary Flows, Vladimir Nikora, University of Aberdeen

3) Coherent Flow Structures in Atmospheric Flows, Gabriel Katul, Duke University

4) Coherent Flow Structures and Vegetation, Heidi Nepf, Massachusetts Institute of Technology

5) Revealing Coherent Flow Structures in Open Channel Flows by Large Eddy Simulation, Thorsten Stoesser, Georgia Institute of Technology

6) The Universe of Coherent Turbulent Structures in Gravity Current Flows, Marcelo García, University of Illinois

### ORGANIZING COMMITTEE

- Jeremy G Venditti, Simon Fraser University, Burnaby, BC, CAN, Ph: 778-782-3488 Email: [jeremy\\_venditti@sfu.ca](mailto:jeremy_venditti@sfu.ca)

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### SCIENTIFIC ADVISORY COMMITTEE

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- Jeremy G Venditti, Simon Fraser University, CAN ([jeremy\\_venditti@sfu.ca](mailto:jeremy_venditti@sfu.ca))

- Ian Walker, University of Victoria, CAN ([ijwalker@uvic.ca](mailto:ijwalker@uvic.ca))

### PARTICIPATION

We welcome contributions for oral presentation and poster sessions. A formal call for abstracts will be issued in October with a submission deadline of January 30, 2011.

### PUBLICATION PLAN

Our publication plan for the conference is evolving, but we intend to produce a peer-reviewed, SCI-rated book, in the 'tradition' established by the conference on Coherent Flow Structures in Open Channel Flows held at Leeds University in 1995. The book will consist of select research papers based on conference presentations and contributions from keynote speakers.

Invitations to contribute to the book will be extended by the organizers following the abstract submission deadline in January. The paper submission deadline will be 2 months after the conference.

## CONTACTS

You can contact us for further details at [CoherentFlowStructures@sfu.ca](mailto:CoherentFlowStructures@sfu.ca).

## Organizer:

Simon Fraser University

[www.sfu.ca/CoherentFlowStructures/](http://www.sfu.ca/CoherentFlowStructures/)

## Regional Geographic Conference UGI 2011 - (Meeting)

14/11/2011 - 18/11/2011 - Santiago, Chile

For the first time, Chile will host this international event that shall be performed in Santiago, between 14th and 18th November 2011 at Escuela Militar Libertador Bernardo O'Higgins.

## Programme Activities

### Conference Plenary Sessions

These sessions, related to the conference slogan "United and Integrated with the World", will present figures of great international prestige in scientific and other domains, invited as keynote speakers.

### Scientific Conference

These are presentations of scientific submissions in technical sessions and a poster exhibition. The full schedule will be posted 60 days before the start of the conference in the conference web site ([www.ugi2011.cl](http://www.ugi2011.cl)). Potential authors are invited to prepare their research and projects for submission to this major event.

### Seminars

There will be seminars with special theme titles; the schedule for these will be announced in advance.

### Meetings of IGU Commissions

All the Commissions and Task Forces of the IGU are invited to hold their business and coordination meetings. Convenors should communicate their requirements to the local organizers by October 1st, 2011.

### Corporate Presentations

As a complement to the scientific conference, the program includes a series of interesting talks and presentations on technical and corporate issues, organized by the entities participating in UGI 2011 as sponsors. The program of speeches and presentations will be announced on the conference web site.

### Field Trips

A programme of field trips made away from the conference venue to the main sites of geographic interest in Chile will be available.

### Technical – Commercial Trade Show

UGI 2011 will be a major opportunity for the institutions and business organisations linked to the geosciences to present to

the world their mission, services, projects, products, solutions and technical applications.

### Geographic Competition

This competition is aimed at promoting knowledge of Geography. Participants will compete to be awarded a special recognition at the end of the conference.

### Technical Visits

Several visits lasting one day or half a day will be offered, enabling attendees to visit institutions involved with geography and spatial information.

### Social Events

The social events planned will include the Welcome Cocktail, Equestrian Display and the Gala Dinner.

## Organizer:

International Geographic Union (UGI)

<http://www.ugi2011.cl/>

## Association of American Geographers (AAG) Annual Meeting - (Meeting)

12/04/2011 - 16/04/2011 - Seattle, Washington

## Weather, Geographical Contexts and Spatial Behaviour

For most of us, weather is more than a trivial concern in our daily life. Consider how often we watch the weather forecast and since when we did not discuss pertinent weather elements (e.g., the rain, the snow, the wind, or the hot temperatures). Weather seems to have considerable influence on many aspects of our everyday life, including the way we dress, our decisions whether to go out or not, our destination choice, our use of different transport modes, and even our mood and temper. While the influence of weather on our daily life is pervasive, there has been little debate on how weather may shape our everyday life through geographical perspectives to date. This relative silence is disconcerting in the light of recent dramatic climate changes that may alter the micro climate in cities and other geographical contexts, as well as their behavioural outcomes - even if we consider manifestations of certain climatic extremes, such as hurricanes, tornados and urban heat islands, as exceptions to this observation. We thus seek to organize a session (or sessions) that address(es) the theme of weather, geographical contexts and spatial behaviour. We invite papers that explore the impact of exposure to (changing) local weather on people's attitudes, emotions and spatial behaviours in a diverse range of geographical and cultural contexts. We welcome submissions that examine topics including but not limited to:

- Theoretical, conceptual and methodological issues in studies on weather
- Cognitive and affective aspects of weather
- Geographical contexts and weather conditions
- Differences in meanings of forecast and experienced weather
- Embodied practices of weather
- The meaning of work place, home and garden under various weather conditions

- Changes in the use of public places related to different weather conditions
- Social interactions in time and space over the seasons
- Tourism and leisure activities over the year
- Impact of precipitation and temperature on shopping behaviour
- Relationships between changing weather and changing transport modes
- Cultural and ethnic differences in the meanings of weather
- Gender and weather
- Policies related to weather

Abstracts and Sessions Are Due by October 20, 2010. Find details and guidelines for submitting abstracts and sessions in the July/August issue of the AAG Newsletter and on the AAG Website

Organizer:

Martin Dijst and Lars Böcker (Utrecht University) and Mei-Po Kwan (Ohio State University)

[www.aag.org](http://www.aag.org)



### Biogeosciences-Academic

Post-doctoral position: Carbon fluxes (CO<sub>2</sub> and CH<sub>4</sub>) in Amazonia  
 Company: LSCE (Laboratoire des Sciences du Climat et de l'Environnement)  
 Location: France-Gif sur Yvette, near Paris  
 Date Posted: 22/04/2010  
[\[show details...\]](#)

### Climate-Academic

Tenure-track faculty position in theoretical or computational earth, climate, or environmental science and engineering  
 Company: Harvard School of Engineering and Applied Sciences  
 Location: United States-Cambridge, MA  
 Date Posted: 30/04/2010  
[\[show details...\]](#)

### Geodynamics and Seismology-Academic

Postdoctoral Position in Seismology  
 Company: University of Rhode Island  
 Location: United States-Narragansett, Rhode Island  
 Date Posted: 06/10/2010  
[\[show details...\]](#)

### Climate-Academic

PhD Scholarships in Urban climate and green infrastructure  
 Company: Monash University  
 Location: Australia-Clayton, Victoria  
 Date Posted: 07/10/2010  
[\[show details...\]](#)

### Atmospheric Sciences-Studenship/Graduate

Postdoc position for 12 months: Sensor networks for urban air quality  
 Company: University of Ghent, VITO NV  
 Location: Belgium-Mol  
 Date Posted: 09/09/2010  
[\[show details...\]](#)

### Interdisciplinary / Other-Studenship/Graduate

PhD research position: Local air quality monitoring strategies with heterogeneous networks of low-cost and mobile sensors  
 Company: University of Ghent, VITO NV  
 Location: Belgium-MOL  
 Date Posted: 09/09/2010  
[\[show details...\]](#)

### Interdisciplinary / Other-Other

Job Position at National Ecological Observatory Network  
 Company: National Ecological Observatory Network (NEON, Inc.)  
 Location: USA-Boulder, Colorado  
 Date Posted: 25/08/2010  
[\[show details...\]](#)

### Interdisciplinary / Other-Other

Remote Sensing Specialist - Position 10-141  
 Company: ERCB  
 Location: Canada-Edmonton, Alberta  
 Date Posted: 28/09/2010  
[\[show details...\]](#)

### Interdisciplinary / Other-Other

Vacancy for a Scientist Chromatography-Mass Spectrometry (Pet-rochemical)  
 Company: Royal DSM N.V.  
 Location: Netherlands-Geleen  
 Date Posted: 06/10/2010  
[\[show details...\]](#)

### Ocean Sciences-Other

Sentinel-3 Optical Scientist  
 Company: EUMETSAT  
 Location: Germany-Darmstadt  
 Date Posted: 07/10/2010  
[\[show details...\]](#)

More details on these jobs can be found online at [www.the-eggs.org](http://www.the-eggs.org) (click on the button "Job Positions" on the left). Job positions online are updated twice a week.