the eggs

E.G.U. NEWSLETTER

ISSUE 29, DECEMBER 2009
AVAILABLE ON-LINE AT www.the-eggs.org

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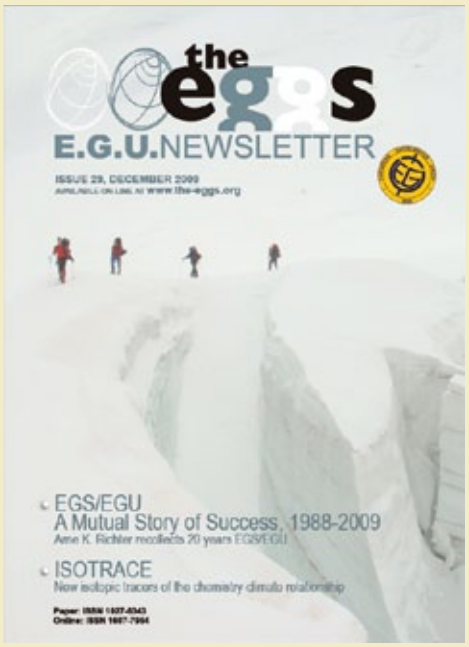
Paper: ISSN 1027-6343
Online: ISSN 1607-7954



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THE EGGS | ISSUE 29 | DECEMBER 2009

Cover photo: Ice crevasse in Pamir, Image Credit: E. Zervas.
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EGU's interactive open access journals

among the highest ranking scientific journals

Monday 5 October 2009.- The open access journals published by the European Geosciences Union have become very succesful in a matter of a few years. Among them are Atmospheric Chemistry and Physics (ACP), Biogeosciences (BG), Climate of the Past (CP), Hydrology and Earth System Sciences (HESS), Ocean Science (OS), and a rapidly growing number of new journals as detailed below. To the surprise even of the editors who pioneered this new publishing philosophy, it took only a few years for the new journals to move to the ranks of the world's highest impact journals.

Dr Ulrich Pöschl, the editor in chief of ACP and chairman of the EGU publications committee says: "We are very pleased that the results of the Science Citation Index confirm the high standards and success of our journals. For example, ACP started in 2001 and from 2005 onwards has had one of the highest ISI impact factors (average number of citations per paper and year) of several hundred journals across the fields of "Meteorology and Atmospheric Sciences", "Geosciences", and "Environmental Sciences". We had expected the journal to break even financially in 2010, but we reached the break-even point already in 2008."

The traditional peer review system has several shortcomings, which are resolved in interactive open access publishing. Among these are the poor transparency of the review process, which makes it vulnerable to scientific fraud, and the large proportion of carelessly prepared scientific papers that dilute rather than enhance scientific knowledge.

The system that the EGU adopted for its journals uses clever publishing software, allowing editors to send manuscripts to reviewers and discussion forums with the push of a button and preparing them for final online publication fully automatically. This makes this system very cost effective. But the main advantages for the readers as well as for the authors are the transparency of the reviewing process, the speed at which new scientific results are published and the completely free access for everyone, scientists and the general public alike.

Articles in EGU's open access journals are published in two stages with public peer review and interactive discussion. In the first stage, manuscripts that pass a rapid pre-screening are immediately published as "discussion papers" on the journal's website. They are then subject to interactive public discussion for a period of eight weeks. During this time, the comments of designated referees, additional comments by other interested members of the scientific community, and the authors' replies are published alongside the discussion paper. While referees can choose to sign their comments or remain anonymous, comments by other scientists must be signed. In the second stage, manuscript revision and peer review are completed in the same way as in traditional journals. If accepted, final papers are published in the main journal. Every discussion paper and interactive comment remains permanently archived and individually citable. This provides a lasting record of review and secures the authors' publication precedence.

The interactive two-stage publication process resolves an apparent dilemma between rapid communication and quality control. It promotes open scientific discussion with great advantages for the scientists involved and other interested parties. Firstly, the Discussion Papers allow authors to speak freely and publish their results almost instantly. Secondly, the users of the Discussion Forums have immediate access to new data and developments. Quite often, the publication and documentation of controversies and background information is as interesting as the paper itself. Thirdly, the completely public and transparent review process is a stimulus for referees to produce high-quality comments thus fostering a high quality of the final publications. Finally, authors will think twice before submitting papers that are not ready for publication since they can expect to be publicly critcised. This leads to low rejection rates and helps saving referee capacities, which are the most limited resource in scientific publishing.

While traditional journals from commercial publishing houses often charge high subscription rates, EGU's open access journals are completely free to read. This gives scientists from anywhere in the world, including developing countries, in fact anyone interested in science including policy makers, access to scientific information that may benefit society. Because the journal production is very cost effective, the process is financed by relatively modest paper charges payed by the authors or their institutions.

Today, the EGU publishes nine interactive open access journals:

Atmospheric Chemistry and Physics, Atmospheric Measurement Techniques, Biogeosciences, Climate of the Past, e-Earth, Geoscientific Model Development, Hydrology and Earth System Sciences, Ocean Science, The Cryosphere.

More to read: EGU Mission Statement for Publications and list of publications http://www.egu.eu/publications/statement.html

EGU Press Release
Dick van der Wateren
EGU Press Officer

EARTH FROM SPACE

The busy waterways of the Venetian Lagoon

The Venetian Lagoon, credit: European Space Imaging (EUSI)

18 September 2009.- This Ikonos-2 image captures the busy waterways of the Venetian Lagoon and the islands located northeast of the city of Venice (not visible).

The Venetian Lagoon, a crescent-shaped body of water between the Italian mainland and the Adriatic Sea, covers 550 sq km and has an average depth of approximately one metre. The lagoon and Venice were declared a UNESCO World Heritage Site in 1987.

The lagoon's largest island is Saint Erasmus (centre right). Saint Erasmus and its neighbouring island Le Vignole (bottom left) have long been referred to as Venice's countryside because they are covered in fields, groves and vineyards.

Le Vignole once functioned as a market garden for Venice, which is located west of Le Vignole.

The lagoon's labyrinth of waterways is made visible by boats and their contrails. The shallowness of the lagoon makes it essential to travel in navigation channels to avoid sandbanks and mudflats.

Given the strong connection of those that live in the lagoon with water, Venice was chosen as the setting for the upcoming OceanObs'09 Conference held from 21-25 September.

More than 500 participants from 30 countries will attend the conference to discuss the societal and economic needs that ocean-observing systems should address over the next 10 years. ESA, EUMETSAT and the UNESCO Intergovernmental Oceanographic Commission are sponsoring the conference along with other partners.

This image was acquired on 22 June 2008 by Ikonos-2, a commercial satellite that provides panchromatic and multispectral high-resolution imagery. ESA is supporting Ikonos-2 as a 'Third Party Mission', which means ESA utilises its multi-mission European ground infrastructure and expertise to acquire, process and distribute data from the satellite to its wide user community.

ESA

ESF-LESC EUROCORES Themes

three Themes approved for further developement

We are pleased to announce that 3 EUROCORES themes in the LESC domain have been approved by the ESF Governing Council for further development. The ESF is now in the process of securing financial commitments from interested Funding Organizations. The deadline for establishing the required level of financial commitments to enable the launch of the Programme (i.e. funding commitments for at least 30 Individual Projects) is 10 December 2009. Should the Programme be found viable, the call for Outline Proposals will be opened by 18 December 2009. These three themes are:

a) Molecular Science for a Conceptual Transition from Fossil to Solar Fuels – EuroSolarFuels
http://www.esf.org/eurosolarfuels

b) European Trans-Atlantic Coral Ecosystem Study – EuroTRACES
http://www.esf.org/eurotraces

c) Ecology of Plant Volatiles, from Molecules to the Globe – EuroVOL
http://www.esf.org/eurovol

If you are aware of some other research funding agencies or organisations (for e.g. national ministries, universities or other relevant R&D actors or stakeholders - from public and private sectors) other than the ESF Member Organisations (see, www.esf.org/about-us/80-member-organisations.html), please do not hesitate to e-mail the relevant contact person mentioned on the theme webpage. Your list will be used as a pool from which the ESF management will select either all or only those that are most relevant and appropriate for joining the Programme.

EUROPEAN SCIENCE FOUNDATION - UNIT FOR LIFE, EARTH AND ENVIRONMENTAL SCIENCES (lesc@esf.org)

Implementing GEOSS

ESA member states approve full and open Sentinel data policy principles

7 December 2009.- The member states of the European Space Agency (ESA) recently approved the new principles for the Sentinel Data Policy. These principles establish full and open access to data acquired by the upcoming Sentinel satellite missions.

The Sentinels comprise five new missions being developed by ESA specifically for the operational needs of the Global Monitoring for Environment and Security programme (GMES).

GMES is an EC-led initiative to ensure the provision of Earth observation services that are tailored to the needs of users, both public policymakers and citizens, on a sustainable basis. As part of the ESA-led GMES Space Component, which guarantees access to a variety of Earth observation data, ESA and the European Commission (EC) worked together to define the principles and the implementation scheme for the Sentinel Data Policy.

The new data policy ensures free-of-charge access to all Sentinel data as well as the products generated via the Internet by anyone interested in using them, mainly for GMES data use but also for scientific and commercial use. Other access modes and the delivery of additional products will be tailored to specific user requests, but not necessarily within ESA's remit.

The policy continues the international trend for full and open access to Earth observation data, in line with the intergovernmental Group on Earth Observations (GEO) data sharing principles. Furthermore, it responds directly to the increasing demand for Earth observation data in the context of climate change initiatives and in support of the implementation of environmental policies.

The policy is part of a more overarching GMES data and information policy that aims to strengthen Earth observation markets in Europe, enabling growth and job creation, and to support European research communities.

ESA's role within GMES is to be the development and procurement agency for the Sentinels and the coordinator for the whole GMES Space Component, including contributions made available by Member States, EUMETSAT and other GMES partners. In addition, ESA is the ad interim operator of some space infrastructure, i.e. Sentinel-1, -2 and the land component of Sentinel-3.

Read more on http://www.esa.int/esaEO/SEMXK570A2G_environment_0.html

GEO

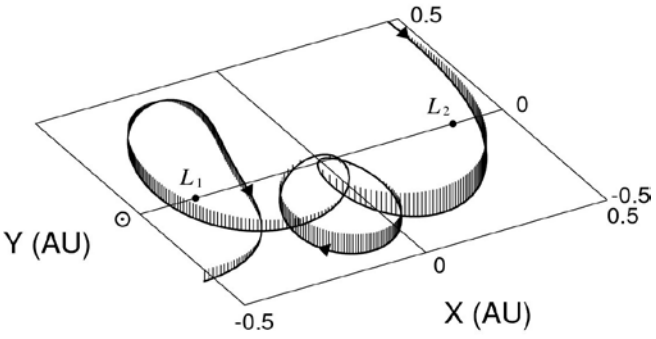
Jupiter captured comet for 12 years in mid-20th Century

according to new simulation results

14 September 2009.- Comet 147P/Kushida-Muramatsu was captured as a temporary moon of Jupiter in the mid-20th century and remained trapped in an irregular orbit for about twelve years.

There are only a few of known comets where this phenomenon of temporary satellite capture has occurred and the capture duration in the case of Kushida-Muramatsu, which orbited Jupiter between 1949 and 1961, is the third longest. The results (http://meetings.copernicus.org/epsc2009/) were presented at the European Planetary Science Congress in Potsdam by Dr David Asher on Monday 14 September.

A team by Dr Katsuhito Ohtsuka modelled the trajectories of 18 "quasi-Hilda comets", objects with the potential to go through a temporary satellite capture by Jupiter that results in them either leaving or joining the "Hilda" group of objects in the asteroid belt. Most of the cases of temporary capture were flybys, where the comets did not complete a full orbit. However, Dr Ohtsuka's team used recent observations tracking Kushida-Muramatsu over nine years to calculate hundreds of possible orbital paths for the comet over the previous century. In all scenarios, Kushida-Muramatsu completed two full revolutions of Jupiter, making it the fifth captured orbiter to be identified.



Comet Kushida-Muramatsu's orbital path around Jupiter, credit: Ohtsuka/ Asher

The object that impacted with Jupiter this July, causing the new dark spot discovered by Australian amateur astronomer Anthony Wesley, may also have been a member of this class.

Europlanet

The international Commission on Stratigraphy moves the Quaternary Boundary

by 800,000 years

22 September 2009.- After decades of debate and four years of investigation an international body has formally agreed to move the boundary dates for the prehistoric Quaternary age by 800,000 years, reports the Journal of Quaternary Science (Gibbard.P, Head.M Formal ratification of the Quaternary System/Period and the Plestocene series/Eoch with a base at 2.58 Ma, Journal of Quaternary Science, 2009 DOI: 10.1002/jqs.1338).

The decision has been made by the International Commission on Stratigraphy (ICS), which has acted to end decades of controversy by formally declaring when the Quaternary Period, which covers both the ice age and moment early man first started to use tools, began. In the 18th Century the earth's history was split into four epochs, Primary, Secondary, Tertiary, and Quaternary. Although the first two have been renamed Palaeozoic and Mesozoic respectively, the second two have remained in use for more than 150 years. There has been a debate over the position and status of Quaternary in the geological time scale and the intervals of time it represents. "It has long been agreed that the boundary of the Quaternary Period should be placed at the first sign of global climate cooling," said Professor Philip Gibbard. "What we have achieved is the definition of the boundary of the Quaternary to an internationally recognised and fixed point that represents a natural event, the beginning of the ice ages on a global scale."

Controversy over when exactly the Quaternary Period began has been there for decades, with attempts in 1948 and 1983 to define the era. In 1983 the boundary was fixed at 1.8 million years, a decision which sparked argument within the earth science community as this point was not a 'natural boundary' and had no particular geological significance.

Up to now it has been widely felt within the scientific community that the boundary should be located earlier, at a time of greater change in the earth-climate system.

"For practical reasons such boundaries should ideally be made as easy as possible to identify all around the world. The new boundary of 2.6 million years is just that," concluded Gibbard, "hence we are delighted at finally achieving our goal of removing the boundary to this earlier point."

"The decision is a very important one for the scientific community working in the field," said Journal Editor Professor Chris Caseldine. "It provides us with a point in geological time when we effectively did move into a climatic era recognisably similar to the geological present."

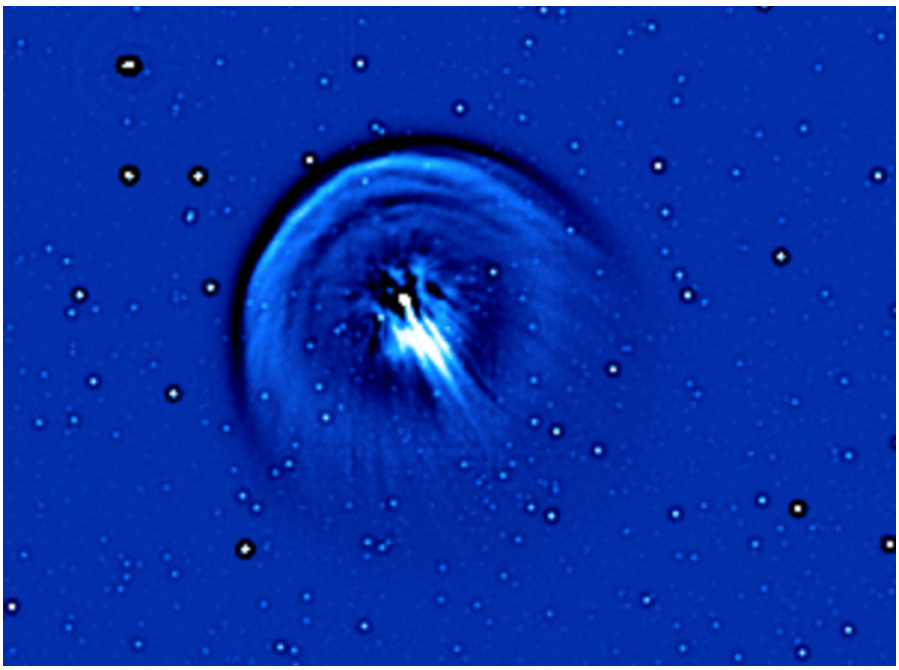
17P/Holmes lit up during outburst

ejecting multiple fragments

16 September 2009.- Astronomers from the University of California, Los Angeles and the University of Hawaii have discovered multiple fragments ejected during probably the largest cometary outburst witnessed. Images and animations showing fragments rapidly flying away from the nucleus of comet 17P/Holmes were presented by Rachel Stevenson at the European Planetary Science Congress in Potsdam, Germany, on Wednesday 16 September (http://meetings.copernicus.org/epsc2009/).

The astronomers examined a sequence of images taken over nine nights in November 2007 using a digital filter that enhances sharp discontinuities within images. The Laplacian filter is particularly good at picking out faint small-scale features that would otherwise remain undetected against the bright background of the expanding comet. They found numerous small objects that moved radially away from the nucleus at speeds up to 125 metres per second (280 mph). These objects were like mini-comets creating their own dust clouds as the ice sublimated from their surfaces.

The solid nucleus of comet Holmes survived the outburst and continued on its orbit. Holmes takes approximately 6 years to circle the Sun, and travels between the inner edge of the asteroid belt to beyond Jupiter. The comet is now moving away from the Sun but will return to its closest approach to the Sun in 2014.



The expansion of the coma of comet Holmes over 9 nights in 2007 November. The images have been spatially filtered to reveal fine structure. Inside the expanding envelope of the dust coma, a set of faint objects and their associated dust trails can be seen receding from the nucleus. Black/white circles that jump from image to image are background stars. Credit:Jewitt/Stevenson/Kleyna

Europlanet

Responses to Environmental and Societal Challenges for our Unstable Earth (RESCUE) Foresight

RESCUE) is a joint ESF/COST `Frontiers of Science` foresight initiative organised around a few topical Working Groups

Humankind is currently facing unprecedented changes in the Earth system, that have arisen at a rapidly growing rate because of human activities: among others, unsustainable exploitation and consumption of natural resources and accelerating perturbations of the environment. The systemic understanding of global environmental change has expanded markedly, but societal and policy-relevant drivers and consequences are still to be fully explored. In particular, the complex Earth system requires interdisciplinary studies at scales compatible to political and societal agendas, and some stronger common, integrated foundations between natural, social and human sciences to be established.

The Forward Look “Responses to Environmental and Societal Challenges for our Unstable Earth” (RESCUE) is a joint ESF/COST “Frontiers of Science” foresight initiative that involves the ESF Standing Committees for Life, Earth and Environmental Sciences (LESC), Social Sciences (SCSS), Humanities (SCH), and Physical and Engineering Sciences (PESC), and the COST Domain Committees for Earth System Science and Environmental Management (ESSEM), Individuals, Societies, Cultures and Health (ISCH), and Forests, their Products and Services (FPS).

The main goal of RESCUE is to develop a series of key recommendations to help Europe address the societal and scientific challenges related to global environmental change, including its human dimensions, and help stimulating

an integrated response from natural, social and human sciences. RESCUE is organised around a few topical Working Groups (WGs).

RESCUE will help address the societal and scientific challenges related to global change, including the human dimension, and will help stimulate an integrated response from natural, social and human sciences to such challenges. Through its analyses and recommendations, RESCUE will enable the scientific community, together with other actors and key stakeholders, to develop medium to long-term strategies for future research activities and applications. It is anticipated that RESCUE will impact society by favoring common strategic understanding and coordination, and transformative education delivery, to help ensuring global sustainable governance.

This will be achieved through the following key objectives:

a. To propose a strategic process for natural, social and human sciences to improve their interdisciplinary synergy, to respond efficiently to societal and policy-relevant needs;

b. To articulate new scientific issues related to global change, especially those of transdisciplinary nature or of major society-driven relevance;

c. To explore new approaches towards interdisciplinary science, and to facilitate the 'revolution' in education and capacity building it requires.

d. Through its analyses and recommendations, RESCUE will help enabling the scientific community, together with other actors and key stakeholders, to develop medium to long-term strategies for future research activities and applications.

It is anticipated that RESCUE will impact society by favouring common strategic understanding and coordination, and transformative education delivery, to help ensuring global sustainable governance. The proposed foresight study is especially organised around the following series of topics and Working Groups:

1. New, emerging and neglected science questions in RESCUE remit: The Earth System is very complex and there are key uncertainties to be studied and resolved in relation to its global change. In terms of research, the science community should thus not only try to understand but also contribute to address key issues and problems. RESCUE will identify the new, emerging and neglecting research areas, integrate across disciplines major environmental and developmental issues (i.e., natural, social and human sciences), and develop new approaches and paradigms. These science-related challenges require urgent and marked engagement of key disciplines and organisations, with adequate mobilisation of key science actors and stakeholders from the onset. RESCUE offers a unique opportunity for gathering a critical mass throughout Europe, for initiating innovative, systemic and integrative science to understand better the Earth System and to contribute to better informed decision making and global sustainable governance.

2. Collaboration between the natural, social and human sciences in global change studies: In nearly all domains of global change science, the role of humans is a key factor as, e.g., a driving force, a subject of impacts, or an agent in mitigating impacts. For effective research collaboration to take shape, pro-active collaboration of scientists of different disciplines is required from the onset in order to build up a joint research framework including agreed semantics and a common agenda. The RESCUE Forward Look should develop a strategic vision to break down the individual and institutional barriers that hamper collaboration across Europe between the physical, natural, medical and social sciences and humanities in global change studies.

3. Requirements for research methodologies and data: Earth System science is crucially dependent on methodologies and infrastructure for observing and monitoring many natural and social processes, and for conceptualising and modelling those processes at many space and time scales. In both the natural and social science domains, this need has driven calls for partnerships between the research community, funding agencies, and operational monitoring entities. Increasingly, the cost of collecting, integrating, and archiving accessible data is becoming a significant problem and calls for a new and ambitious strategy for data and metadata acquisition and management across many disciplines. Such efforts will help to optimise resources of research organisations and science funding agencies and to mobilise and engage relevant science communities, especially in Europe.

4. Towards a 'revolution' in education and capacity building: In education as in science related to global change issues, the dualism of nature and culture as it appears in human organisations and endeavours is clearly part of the RESCUE challenges. This dualism obstructs our understanding of what is global change and weakens our ability to address those challenges. In this respect, the next generation of researchers in Earth system science will have to integrate disciplines such as human-related ecology and social theory in a truly transdisciplinary way. It appears thus essential to overcome the current academic division of work also through a revolution in the education system, especially in Europe.

5. Interface between science and policy, communication and outreach: Because the interdisciplinary science required to address the RESCUE-relevant challenges involves simultaneously many variables and forcings, and is driven more by operational than strategic needs, global change researchers tend not to give policy makers exactly what they want, when they want it. However, researchers have developed valuable information, especially in the form of best practices, scientific consensus and guidelines or targets, that can feed into research policy development for the benefit of policy makers and through transfer of knowledge to other stakeholders.

The RESCUE Forward Look thus aims at facilitating the dialogue between the scientists, the other relevant actors, the policy makers and the civil society. The RESCUE 1st Scientific Committee meeting was held on 9th September 2009 in CNRS Headquarters (minutes available upon request). The RESCUE launching conference, held on 10th-11th September 2009 in Rueil-Malmaison, France, brought together about 75 expert scientists and research managers representing key science communities and initiatives, and served as a kick-off effort for the topical RESCUE Working Groups (presentations available on RESCUE website). The RESCUE workplan and key WG activities will soon be announced in the near future on the RESCUE website: www.esf.org/rescue. Email: fl-rescue@esf.org

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GOCE gravity field satellite

now six months in orbit

30 September 2009.- Following launch and in-orbit testing, ESA's GOCE satellite is now in measurement mode.

The 'Gravity field and steady-state Ocean Circulation Explorer' (GOCE) satellite was launched on 17 March from northern Russia. The data being received will lead to a better understanding of Earth's gravity resulting in a unique model of the 'geoid' – the surface of an ideal global ocean at rest.

A little over six months after launch, GOCE is now delivering the first set of data. Before entering this mode, the satellite was tested thoroughly. It was then brought down from an altitude of around 280 km to its current orbit slightly below 255 km, which is extremely low for an Earth observation satellite.

Rune Floberghagen, ESA's GOCE Mission Manager, said that, "The completion of the commissioning and first in-flight calibration marks an important milestone for the mission. We are now entering science operations and are looking forward to receiving and processing excellent three-dimensional information on the structure of Earth's gravity field."

ESA

European Severe Weather Database awarded Landmarks prize

by the German government

Handover of the prize.

13 October 2009.- The European Severe Weather Database (ESWD) operated by the European Severe Storms Laboratory (ESSL) was awarded the "365 Landmarks" prize in this year's Land of Ideas contest of the German government. The prize certificate was handed over to ESSL's technical director Pieter Groenemeijer during the opening ceremony of the 5th European Conference on Severe Storms ECSS in Landshut (Bavaria) on 12 October 2009. The scope of the conference covers all aspects of severe convective weather. Keynotes in the 100 talks and about 130 poster presentations are the climate change impacts on severe storms, nowcasting and warning strategies, and socio-economic aspects of severe storms.

Local extreme weather events pose a threat to life and safety of citizens and lead to property damage estimated at about € 5-8 billion per year all over Europe and this threat may grow due to climate change. However, homogeneous information about the occurrence of severe storms was rather limited in the past. The ESWD database collects and provides detailed & quality-controlled data on severe convective storm events over Europe. Via web-based interfaces both collaborating national weather services and the public can contribute or retrieve reports. The ESWD comparises now more than 25000 events.

The ESSL was established as a non-profit research organisation in 2006 and is an spin-off of the DLR Institute of Atmospheric Physics in Oberpfaffenhofen. It's objectives are fundamental and applied research on severe convective storms, operation and further development of the ESWD and organisation of the biannual ECSS conferences.

http://www.essl.org/ECSS/2009

European Severe Storms Laboratory e. V. (ESSL)

SMOS successfully lofted into orbit

it is the second satellite launched under the Earth Explorer series of ESA

2 November 2009.- ESA PR 28-2009. The second satellite in ESA's Earth Explorer series – the Soil Moisture and Ocean Salinity (SMOS) mission – and the second demonstration satellite under ESA's Project for Onboard Autonomy (Proba-2) were launched into orbit last night from northern Russia.

SMOS designed to map sea surface salinity and to monitor soil moisture on a global scale. It features a unique interferometric radiometer that will enable passive surveying of the water cycle between oceans, the atmosphere and land.

Travelling piggyback on the launch of SMOS, Proba-2 is a follow-on to the Proba-1 satellite launched in 2001. It will demonstrate advanced satellite technologies. The satellites were launched atop a Rockot launch vehicle provided by Eurockot GmbH. Liftoff from the Plesetsk Cosmodrome in northern Russia took place at 01:50 UTC (02:50 CET) on Monday 2 November.

Some 70 minutes after launch, SMOS successfully separated from the Rockot's Breeze-KM upper stage. Shortly after, the satellite's initial telemetry was acquired by the Hartebeesthoek ground station, near Johannesburg, South Africa. The upper stage then performed additional manoeuvres to arrive at a slightly lower orbit and Proba-2 was released too, some 3 hours into flight.

Both satellites are currently circling the Earth on their respective sun-synchronous orbits, at an altitude of some 760 km in the case of SMOS. The Proteus mission control centre operated by the Centre National d'Etudes Spatiales (CNES) in Toulouse, France, is in control of SMOS on behalf of ESA, while the Proba control centre, at ESA's tracking station in Redu, Belgium, has taken over Proba-2.

The payload onboard SMOS will take long to check and calibrate, and the spacecraft will enter fully operational mode within six months.

Looking for water exchange

SMOS is a 658-kg satellite developed by ESA in cooperation with France's CNES and Spain's Centro para el Desarrollo Tecnológico Industrial (CDTI). It is based on the Proteus small satellite platform designed and built by Thales Alenia Space and its payload is composed of a single instrument, the Microwave Imaging Radiometer using Aperture Synthesis (MIRAS), developed by EADS CASA Espacio.

MIRAS is an interferometer that connects together 69 receivers mounted on three deployable arms to measure the temperature of the reflection of the Earth's surface in the microwave frequency range. This temperature is linked to both the actual temperature of the surface and its conductive characteristics, which are in turn linked to soil moisture for land surface and to water salinity for sea surface.

"The data collected by SMOS will complement measurements already performed on the ground and at sea to monitor water exchanges on a global scale. Since these exchanges – most of which occur in remote areas – directly affect the weather, they are of paramount importance to meteorologists" said Volker Liebig, ESA's Director of Earth Observation Programmes. "Moreover, salinity is one of the drivers for the Thermohaline Circulation, the large network of currents that steers heat exchanges within the oceans on a global scale, and its survey has long been awaited by climatologists who try to predict the long-term effects of today's climate change," Liebig added, witnessing the launch from the Plesetsk Cosmodrome.

SMOS is the second satellite launched under the Earth Explorer programme conducted by ESA to foster the acquisition of new environmental data for the science community. It follows the Gravity and steady-state Ocean Circulation Explorer (GOCE), also launched on a Rockot, in March 2009. More Earth Explorers are already undergoing preparation. Cryosat-2, which will measure the thickness of the ice sheets, is due for launch in February 2010. It will be followed by ADM-Aeolus to study atmospheric dynamics and the Swarm mission to monitor the weakening of the Earth's magnetic field, in 2011, as well as by the EarthCARE mission on clouds and aerosols in 2013.

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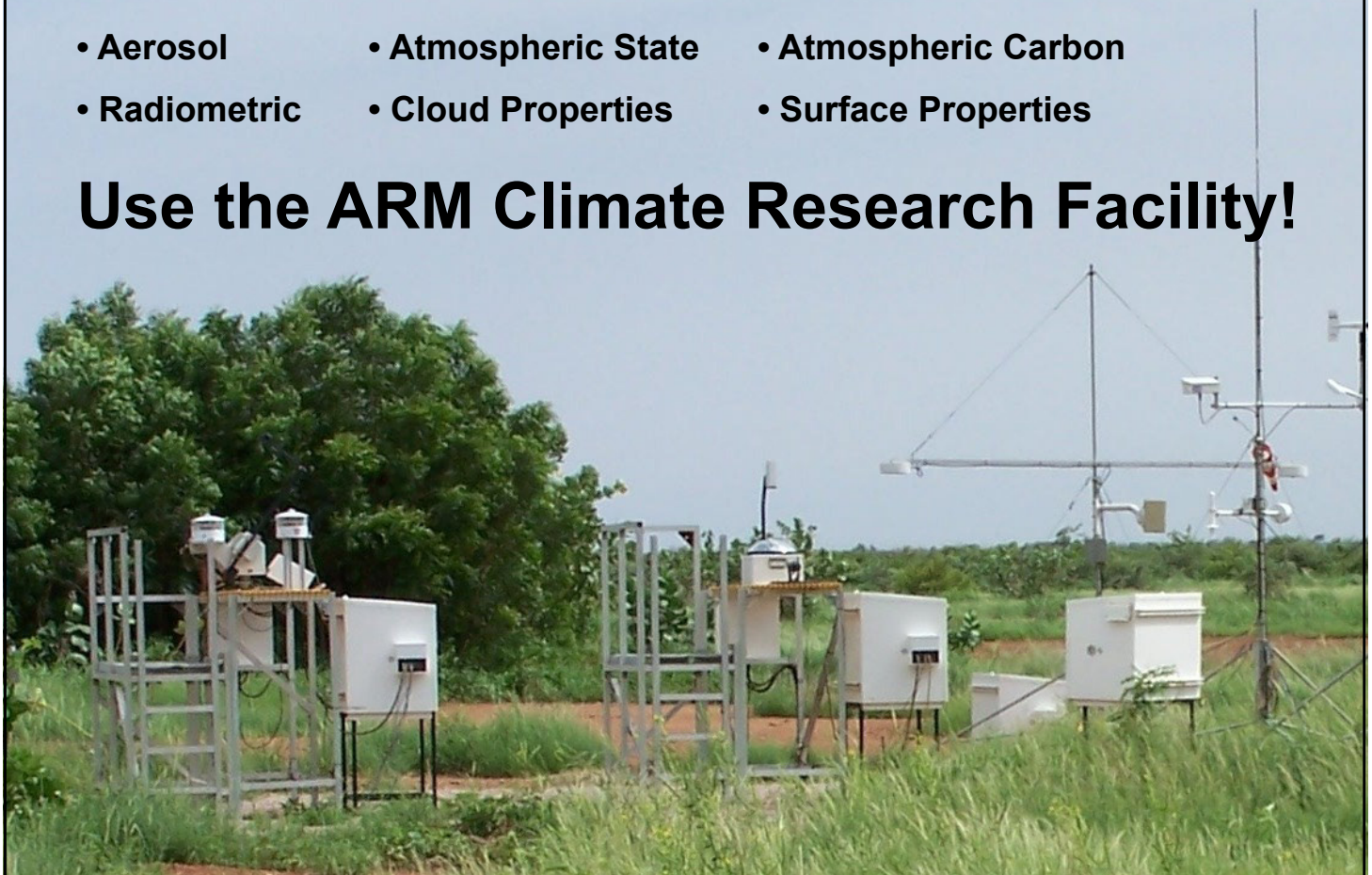

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Influence of atmospheric CO2 on vegetation

evidence from past climates

Changing levels of the greenhouse gas carbon dioxide have a direct influence on vegetation. Plants depend on CO2 for growth and development. Thus, when the atmosphere contains low levels of CO2, as during ice ages, forests are reduced. Taking this effect into account makes climate models more reliable. This is the conclusion of a recent article in EGU's open access journal Climate of the Past by Colin Prentice and Sandy Harrison of the University of Bristol, UK.

In their paper, Prentice and Harrison summarize evidence that atmospheric CO2 has directly affected both plant growth and ecosystem composition in the past, and therefore will likely continue to do so in the future. These direct effects are included in dynamic global vegetation models (DGVMs). DGVMs predict, correctly, that land ecosystems are taking up about a quarter of anthropogenic CO2 emissions. This is similar to the total amount taken up by the world's oceans. According to DGVMs, direct effects of CO2 on plants are the main cause of the current land uptake of CO2, and also of the encroachment of trees which has been observed in savanna ecosystems all over the world. These attributions are supported by evidence from the past.

There is more CO2 in the air today than there has been for 20-30 million years. But there were natural variations, long before humans started to clear forests and burn fossil fuels. Low CO2 levels kept the world cold in ice ages; higher levels kept climate warmer at other times.

CO2 is unique among greenhouse gases because it provides the carbon that plants need to grow. Ice ages were hard for plants; low CO2 nearly starved the trees! When climate and vegetation models are given this information, they simulate a realistic ice-age world, in which forests were greatly reduced. Without this information, the simulated reduction of forest area is less than half what it should be (according to fossil pollen data, which record the past distribution of forests). So when reconstructing past climates, we need to use models that allow CO2 to affect plant growth.

This insight explains why for a long time climate models were thought to underestimate ice-age cooling. The Mediterranean region is a case in point. For a long time it was thought that ice-age temperatures in the Mediterranean region were perhaps as much as 20 degrees lower than today, based on pollen records showing vegetation similar to central Asian steppes. But this analogy proved false. Steppe-like vegetation is also favoured by low carbon dioxide levels. When this effect is factored in, it appears that a more moderate cooling of 5 to 10 degrees is all that is needed to explain the ice-age vegetation. Unlike the previous reconstructions of very cold conditions, the moderate cooling suggested by new, model-based reconstruction methods agrees with climate-model predictions of the ice-age climate.

There was also about 10-30% less biomass and soil carbon on land during the last ice age. The numbers are rough, but they point the same way. Climate change alone cannot explain why the land stored less carbon. The key is the effect of low carbon dioxide levels on plant growth.

Large-scale field experiments in forests have confirmed that raising CO2 concentration does increase plant growth, but there is still no consensus on whether this effect is persistent, or whether it really applies at a global scale. Similarly, there is no consensus as to whether tree encroachment in savannas is really an effect of rising CO2. The evidence from the past speaks to both issues. It suggests that changing CO2 concentration does produce long-lasting effects, both on global land carbon storage and on the competitive success of trees, that are consistent with the findings of DGVMs.

The full paper is available free of charge at
http://www.clim-past.net/5/297/2009/cp-5-297-2009.html

I. C. Prentice and S. P. Harrison, Ecosystem effects of CO2 concentration: evidence from past climates, Clim. Past, 5, 297-307, 2009.

A new global fully coupled mercury-chemistry and transport model

with emissions, chemistry, transport and deposition coupled on-line to the GCM.

Mercury is a global pollutant due to its long lifetime in the atmosphere. Its hemispheric transport patterns and eventual deposition are therefore of major concern. For the purpose of global atmospheric mercury chemistry and transport modelling the ECHMERIT model was developed. ECHMERIT, based on the global circulation model ECHAM5 differs from most global mercury models in that the emissions, chemistry (including general tropospheric chemistry and mercury chemistry), transport and deposition are coupled on-line to the GCM. The chemistry mechanism includes an online calculation of photolysis rate constants using the Fast-J photolysis mechanism, the CBM-Z tropospheric gas-phase mechanism and aqueous-phase chemistry based on the MECCA mechanism.

Additionally, a mercury chemistry mechanism that incorporates gas and aqueous phase mercury chemistry is included. A detailed description of the model, including the wet and dry deposition modules, and the implemented emissions is given in this technical report. First model testing and evaluation show a satisfactory model performance for surface ozone and mercury mixing ratios (with a mean bias of 1.46 nmol/mol for ozone and a mean bias of 13.55 fmol/mol for TGM when compared with EMEP station data). Requirements regarding measurement data and emission inventories which could considerably improve model skill are discussed.

The article is available free of charge at
http://www.geosci-model-dev.net/2/175/2009/gmd-2-175-2009.html

Jung, I. M. Hedgecock, and N. Pirrone, ECHMERIT V1.0 – a new global fully coupled mercury-chemistry and transport model, Geosci. Model Dev., 2, 175-195, 2009.

Impact of ocean acidification

on a key Arctic pelagic mollusc (Limacina helicina)

Thecosome pteropods (shelled pelagic molluscs) can play an important role in the food web of various ecosystems and play a key role in the cycling of carbon and carbonate. Since they harbor an aragonitic shell, they could be very sensitive to ocean acidification driven by the increase of anthropogenic CO2 emissions. The impact of changes in the carbonate chemistry was investigated on Limacina helicina, a key species of Arctic ecosystems. Pteropods were kept in culture under controlled pH conditions corresponding to pCO2 levels of 350 and 760ìatm. Calcification was estimated using a fluorochrome and the radioisotope 45Ca. It exhibits a 28% decrease at the pH value expected for 2100 compared to the present pH value. This result supports the concern for the future of pteropods in a high-CO2 world, as well as of those species dependent upon them as a food resource. A decline of their populations would likely cause dramatic changes to the structure, function and services of polar ecosystems.

The full paper is available free of charge at http://www.biogeosciences.net/6/1877/2009/bg-6-1877-2009.html

Comeau S., Gorsky G., Jeffree R., Teyssié J. L., Gattuso J.-P., Impact of ocean acidification on a key Arctic pelagic mollusc (Limacina helicina), Biogeosciences, 6, 1877-1882, 2009.

Bacteria in the global atmosphere

Review and synthesis of literature data for different ecosystems

Bacteria are ubiquitous in the atmosphere, with concentrations of bacterial cells typically exceeding 104 m−3 over land. Numerous studies have suggested that the presence of bacteria in the atmosphere may impact cloud development, atmospheric chemistry, and microbial biogeography. A sound knowledge of bacterial concentrations and distributions in the atmosphere is needed to evaluate these claims. This review focusses on published measurements of total and culturable bacteria concentrations in the atmospheric aerosol. Emission mechanisms and the impacts of meteorological conditions and measurement techniques on measured bacteria concentrations are discussed. Based on the literature reviewed, representative values and ranges for the mean concentration in the near-surface air of nine natural ecosystems and three human-influenced land types are suggested. The authors discuss the gaps in current knowledge of bacterial concentrations in air, including the lack of reliable, long-term measurements of the total microbial concentrations in many regions and the scarcity of emission flux measurements.

The article is available free of charge at http://www.atmos-chem-phys.net/9/9263/2009/acp-9-9263-2009.html

S. M. Burrows, W. Elbert, M. G. Lawrence, and U. Pöschl, Bacteria in the global atmosphere – Part 1: Review and synthesis of literature data for different ecosystems, Atmos. Chem. Phys., 9, 9263-9280, 2009.

Rosetta and Mars Express observations of the influence of high solar wind pressure

on the Martian plasma environment

New simultaneous in-situ observations at Mars from Rosetta and Mars Express provide insight on how the Martian plasma environment is affected by high pressure solar wind. A significant sharp increase in solar wind density, magnetic field strength and turbulence followed by a gradual increase in solar wind velocity is observed during ~24 h in the combined data set from both spacecraft after Rosetta's closest approach to Mars on 25 February 2007. The bow shock and magnetic pileup boundary are coincidently observed by MEX to become asymmetric in their shapes.

The fortunate orbit of MEX at this time allows a study of the inbound boundary crossings on one side of the planet and the outbound crossings on almost the opposite side, both very close to the terminator plane. The solar wind and interplanetary magnetic field (IMF) downstream of Mars are monitored through simultaneous measurements provided by Rosetta. Possible explanations for the asymmetries are discussed, such as crustal magnetic fields and IMF direction. In the same interval, during the high solar wind pressure pulse, Mars Express observations show an increased amount of escaping planetary ions from the polar region of Mars. The authors link the high pressure solar wind with the observed simultaneous ion outflow and discuss how the pressure pulse could also be associated with the observed boundary shape asymmetry.

The article is available free of charge at http://www.ann-geophys.net/27/4533/2009/angeo-27-4533-2009.html

N. J. T. Edberg et al., Rosetta and Mars Express observations of the influence of high solar wind pressure on the Martian plasma environment, Ann. Geophys., 27, 4533-4545, 2009.

Calcification of the cold-water coral Lophelia pertusa under ambient and reduced pH

Lowering pH by 0.15 and 0.3 units relative to the ambient level resulted in calcification being reduced by 30 and 56%, respectively

The cold-water coral Lophelia pertusa is one of the few species able to build reef-like structures and a 3- dimensional coral framework in the deep oceans. Furthermore, deep cold-water coral bioherms may be among the first marine ecosystems to be affected by ocean acidification. Colonies of L. pertusa were collected during a cruise in 2006 to cold-water coral bioherms of the Mingulay reef complex (Hebrides, North Atlantic). Shortly after sample collection onboard these corals were labelled with calcium-45. The same experimental approach was used to assess calcification rates and how those changed due to reduced pH during a cruise to the Skagerrak (North Sea) in 2007. The highest calcification rates were found in youngest polyps with up to 1% d−1 new skeletal growth and average rates of 0.11±0.02% d−1(±S.E.). Lowering pH by 0.15 and 0.3 units relative to the ambient level resulted in calcification being reduced by 30 and 56%. Lower pH reduced calcification more in fast growing, young polyps (59% reduction) than in older polyps (40% reduction). Thus skeletal growth of young and fast calcifying corallites suffered more from ocean acidification. Nevertheless, L. pertusa exhibited positive net calcification (as measured by 45Ca incorporation) even at an aragonite saturation state below 1.

The full paper is available free of charge at http://www.biogeosciences.net/6/1671/2009/bg-6-1671-2009.pdf

Maier C., Hegeman J., Weinbauer M. G., Gattuso J.-P., Calcification of the cold-water coral Lophelia pertusa, under ambient and reduced pH, Biogeosciences, 6, 1671-1680, 2009.

Surface mixing and biological activity in the four Eastern Boundary Upwelling Systems

Strong mixing in cold nutrient-rich waters along the eastern boundaries of the world's oceans appears to reduce rather than stimulate growth of phytoplankton

Strong mixing in cold nutrient-rich waters along the eastern boundaries of the world's oceans appears to reduce rather than stimulate growth of phytoplankton (microscopic plant-like organisms). In the nutrient-poor open ocean, on the other hand, mixing has a positive effect on phytoplankton growth. This is the surprising conclusion of a recent article by French oceanographer Vincent Rossi and colleagues in EGU's open access journal Nonlinear Processes in Geophysics (NPG). Since phytoplankton are the base of the ocean food chain (they are eaten by zooplankton, which are then eaten by small fish) this finding provides new understanding of some of the most important regions for human food production.

Driven by alongshore winds, cold and nutrient-rich bottom water upwells along the eastern margins of the Atlantic and Pacific Oceans. Although they represent less than 1% of the total surface of the world's oceans, these Eastern Boundary Upwelling Systems (EBUS) are the most productive regions of the world. Their important coastal biological productivities support the largest commercial fisheries and identify them as key regions for human food supply. They include the Canary and the Benguela (South-African/Namibian coast) upwelling systems in the Atlantic Ocean and the Humboldt (Peruvian/Chilean coast) and Californian upwelling systems in the Pacific Ocean. In this multidisciplinary work, we focused on the small scale (1-100 km) processes studying the influence between eddy induced mixing and phytoplankton distributions.

Based on satellite data, we consider chlorophyll concentrations (as a proxy of phytoplankton) from ocean color sensor and we estimate the horizontal mixing of the surface ocean using the combined product from altimetry and scatterometry. The biological and physical characteristics of these four areas reveal similarities as well as differences. Using a comparative approach among EBUS, we documented the variations in space and time of their mixing activity.

The most important finding is the global negative correlation between surface horizontal mixing and chlorophyll contents over the four areas. This negative effect is opposite to the one deduced from previous modelling studies. A positive effect of small-scale turbulence on phytoplankton development was shown in the open ocean. However, in upwelling areas, a high eddy-induced mixing seems to modify the three dimensional flow and in turn diminish the uplift of nutrient rich waters.

To bring together these two theories, we finally suggest the possibility of a changing response of the phytoplankton to small-scale turbulence, from a negative effect in the very productive coastal areas, to a positive one in the open ocean. This study provides new insights for the understanding of the primary productivity in the ocean. Being the base of world marine ecosystems, these results about phytoplankton also contribute to an improved understanding of global marine element cycles and fish stocks variability.

The full paper is available free of charge at http://www.nonlin-processes-geophys.net/16/557/2009/npg-16-557-2009.html

V. Rossi, C. López, E. Hernández-García, J. Sudre, V. Garçon, and Y. Morel, Surface mixing and biological activity in the four Eastern Boundary Upwelling Systems, Nonlin. Processes Geophys., 16, 557-568, 2009.

EGS/EGU-A Mutual Story of Success, 1988-2009

Arne K. Richter recollects 20 years EGS/EGU

When I was an active space scientist under the directorship of Sir Ian Axford at the Max-Planck Institute for Aeronomy in Katlenburg-Lindau, Germany, the American Geophysical Union was our favorite organization: publishing in JGR and attending at least the annual Fall Meetings in San Francisco was an absolute must. Besides we attended the meetings of COSPAR and IAGA and of the German AEP.

1. The early days

When I was an active space scientist under the directorship of Sir Ian Axford at the Max-Planck Institute for Aeronomy in Katlenburg-Lindau, Germany, the American Geophysical Union (AGU, www.agu.org) was our favorite organization: publishing in JGR and attending at least the annual Fall Meetings in San Francisco was an absolute must. Besides we attended the meetings of COSPAR and IAGA and of the German AEP.

On the other hand, I personally had always great sympathy with those that were trying to establish an AGU-type organization in Europe, the European Geophysical Society (EGS). It all started back in Reading, UK, in 1969 with the blessings of the AGU and with both the registration of the EGS as a non-profit association in 1971 and its first General Assembly in 1974 in Zurich, Switzerland. Youthful dreams were, however, destroyed soon when in 1981 a second European association in competition with the EGS was established, the European Union of Geosciences (EUG). Since both organizations were dominated by Solid Earth, Europe entered into a painful struggle, which hits its peak in 1987 at the first joint EUG-EGS Meeting in Strasbourg, at which the EGS President finally threw in his towel when the EUG President declined the proposed take-over of the EGS by the EUG. This was then the time for the Soft Earth and the Extraterrestrial Sciences, represented by André Berger and Ian Axford, to take the lead and to invite the world to the first EGS Spring Meeting in Bologna in 1988, with Antonio Speranza serving as local organizer, and to launch the permanent EGS Secretariat located, first, at the Max-Planck-Institute for Aeronomy (MPAe), and, since 1988, at the Copernicus Gesellschaft, a spin-off of the MPAe, providing secretarial and back-office services as well as assistance in all outreach activities, organizing and conducting meetings and conferences, and, later on, even publishing journals and books.

2. Changing Structure

During the first 10 years the EGS was practically a top-down association, which had to "contract" all of its major activities to outside, rotating third parties: a General Secretary and his/her institute providing the secretariat, a Programme Committee Chair and his/her institute compiling the programme of the General Assembly, distributing invitations and conference posters, receiving the abstracts and compiling the programme, and, finally, a Local Organizer and his/her institute hosting and conducting the actual meeting and undertaking the financial risk, while the journals, Annales Geophysicae Brown and Blue, were contracted out to commercial publishers. This was the situation in 1986/87 for the joint EUG-EGS Assembly in Strasbourg in 1987 when Geoffrey Brown from the University of Wales Aberystwyth was the General Secretary, I from the Max-Planck Institute for Aeronomy the programme committee chair and Michel Cara from the Institut de Physique du Globe de Strasbourg the local organizer. Certainly, the advantage of such a structure was that it was practically for free for the society; however, the disadvantage was that the overall prestige and importance of the society did depend on the actual prestige, expertise and wealth of the officers and their institutes, respectively.

Thus, on the occasion of the comeback in 1988 our common idea was to change EGS into a free and independent, democratic and bottom-up association, open to all disciplines in geosciences and, in particular, to the refreshing ideas and dreams of the younger and more recently established scientists, able to organize and to conduct its meetings just by ourselves, to publish our journals according to our own conceptions and at rates for subscription only we would determine, and, last but not least, to earn our own money to support our own outreach and educational programmes rather than to receive some small royalties from the congress organizers and/

or the commercial publishers, which were not even enough to pay a permanent secretary.

In reality, this idea meant that the scientific, non-profit association EGS registered in Zürich had to be accompanied by a not-for-profit yet commercial partner association preferentially of limited liability, an EGS Ltd., encompassing the entire business projects of the EGS, such as e.g. the meetings and conferences and the publications, but also carrying the overall financial risks and liability and employing the EGS staff, including the Executive Secretary. Certainly, in 1988 the EGS was far from being in the position to establish and to run such an EGS Ltd., and therefore Sir Ian Axford and his fellow directors and myself jumped in at the deep end and launched the non-profit Copernicus Gesellschaft e.V. instead to undertake all the tasks and responsibilities of an EGS Ltd. and to enjoy the full support and the infrastructure of the Max-Planck Institute for almost free, since for both sides, the EGS and the Copernicus e.V., the real money was very short for many years to come. Only in 2001, when the turnover exceeded a certain maximum value of EUR 32.000 per year, we had to add the Copernicus GmbH (GmbH = limited liability corporation) in order to stay non-profit. Since then things have changed very much to the better, and since several years the EGU is economically sufficiently strong to launch its own EGU Ltd. and to become really free and independent; unfortunately, the Council has always declined this project so far even when the unity "EGU+Copernicus" broke apart in 2007 - but it remains a fascinating project for the next EGU Executive Secretary.

Anyhow, during that time Sabine Lubba, Katja Gänger and myself were running the EGS+Copernicus Office with great effort, and in April 2000 we received the one-time EGS Atlas Award "in grateful recognition of more than 10 years of dedicated commitment to the Society, laying the solid foundation for continuing development".

3. Moments of Magic

The first magic moment occurred in 1988, when my director, Sir Ian Axford, and the EGS authorized me to work as director of the Copernicus Gesellschaft and, later on, also of the Copernicus GmbH, and, at the same time, first as General Secretary and later on as Executive Secretary of the EGS - yet paid by the Max-Planck Society until my retirement in 2006. In this way dreams and ideas forwarded by the scientific community could be implemented at once and in the most cost-effective way and always to the benefit of the EGS.

In 1989 Solid Earth came back to EGS at the very noisy and truly "open access" meeting held directly on the main market square in Barcelona with, believe it or not, more than 1.000 participants attending for the first time in the history of EGS.

Or the General Assembly in the Bella Centre in Copenhagen in 1990 when we, for the first time, adventured ourselves to fly the 4 EGS flags in the blue sky of Denmark: one for the Society (yellow) and one for each of the 3 Divisions (green, light blue and dark blue) with the EGS logo in their center.

At that time our colleagues in Eastern Europe were really hard up. Many Russian friends earned just 2.000 Roubles a month, which had the purchasing power of about GBP 20. This was the time when EGS introduced the famous "East European Support Award" to assist in particular young scientists to attend our General Assemblies. Out of thankfulness only the yellow EGU posters of our General Assemblies were accepted amongst the western ones to be posted in eastern research institutes. In addition, the EGS opened an appeal to western scientists to donate USD 10 a month to sponsor a Russian colleague of their choice. At that time I was managing director of the German-Russian joint venture company "Eurokosmos Ltd." and partner of the "Eurokosmos Bank" in Moscow where we exchanged the dollars to rubles at exceptional excellent rates to the benefit of our Russian friends. Or in 1992 when the EGS hired the Russian research vessel "Akademik Mstislav Keldysh" for USD 25.000 to give a free passage for more than 70 hard-up Russian scientists to allow them to take part in the EGS General Assembly in Edinburgh and to pay their registration fees and their daily expenses while they were staying on board of the vessel in the harbor of Edinburgh at night. The vessel returned to Kaliningrad at a market day and at the end all vendors gave their remains to the crew, and the 4-day journey home turned out to become a festival of eating and drinking and enduring memories.

Or our first assemblies held in Nice when we were "beamed" from the cold and miserable northern Europe into the sunny Mediterranean spring taking us past sandy beaches, bright flower borders and green palm trees; meetings at which almost all participants were smiling with stars in their eyes. Moments where Sabine, Katja and myself were encouraging ourselves to work even harder for the dreams of our EGS members.

And, last but not least, since tax authorities in Germany require from companies to make at least a small annual surplus, we preferred to donate this money to our own foundation (www.copernicus-stiftung.org), in order to support young children of the age of larger than 2 years and scholars to understand natural sciences incl. our Earth and its environment.

These are just a few magic moments out of many others you may have experienced yourself - but they tell us that we all wanted EGS to become so much more than just another scientific association.

4. Moments of Success

After 1990 the EGS started almost at once to grow with regard to (1) its overall structure from 3 Sections to currently 22 independent Divisions and 6 independent Committees, (2) its number of sustainable outreach and educational projects regarding its internationally acknowledged award programmes, the support of, in particular, young scientists and scientists from developing countries, the education of young scientists and teachers, the cooperation with the media and with organizations and industry (job market), and the increasing number of well attended Topical Conferences, (3) the quality of its General Assemblies organized in a bottom-up way with regard to the scientific programme and their exponential growth in the number of participants from a few hundred to about 10.000, and, finally, (4) the exceptional quality of its publications in particular when joining the open access initiative.

From 1995 onwards we were able to organize our General Assemblies at congress centres we selected ourselves and to conduct the meetings in the way we wanted it to be done. Almost at the same time, in 1994, we started to launch our first journal of our own making, Nonlinear Processes in Geophysics, and in 2001 our first open acces journal with an open peer review and public discussions, Atmospheric Chemistry and Physics, with an present-day impact factor of larger than 4. Only imagine the reaction of our commercial publishers when we would have asked them 10 years ago to publish our journals open access with open peer review and public discus-

sion? Absolutely impossible!

However, to stay free and independent, to serve the scientific community at our very best, and to ensure that all operations are as professional but inexpensive as possible, we had to run all projects also on our own software! Always listening carefully to the ideas and suggestions of our community, we started with Word/Data-Perfect and added smaller, independent tools programmed by Horst-Uwe Keller and Max-Planck software engineers: the administration and management of the society, the organization and accomplishment (since 1995) of the General Assemblies, and for our new journal NPG the editorial support office. In view of an ever increasing number of internal tasks, Sections/Divisions, membership etc and an exponential increase in the number of participants in the General Assemblies, Copernicus took the risk to go totally internet-online in 1995/96 at a much higher level of sophistication in the software. I personally have developed and engineered all the software tools for the administration, the management, the meeting office and the editorial support office and a few young software engineers from Berlin, with whom we established the Copernicus Systems + Technology Ltd. (COST) in 1998, have casted my flowcharts into professional PHP, web-based software. The entire, multi-tool software package was named COSIS, the Copernicus Online Service and Information System. From 2000 onwards we then developed our independent typesetting, text lay-outing and formatting software totally based on LaTeX with specialists from the Max Planck Institute, Patrick Daly and Dieter Schmidt, which was then developed further by the software engineers of Copernicus. The overall result is still a world record with regard to profesionality and time and cost savings: one person for the administration and management of more than 50.000 members, one person for the organization and conduction of conferences with more than 10.000 participants and 15.000 presentations submitted, and one person running the editorial support office for more than 20 journals. This keeps costs low, which is important for inviting also the less well-off colleagues to our meetings and to publish our journals open-access, where for the publisher the income from subscriptions paid by the libraries is replaced by the income from page charges paid by the authors.

5. Moments of Partnership

During all these years the cooperation with the AGU became even stronger: AGU and Copernicus signed a MOU in 1989 for the AGU European Office, the journals “Tectonics”, managed by the AGU, and “Nonlinear Processes in Geophysics”, managed by the EGS, became joint publications, and the membership in each of the two organizations were recognized by each other with regard to the discount in the registration fees at the AGU and EGS meetings and conferences. Personally, however, I have regarded the advices by Fred Spilhaus and Judy Holoviak of the AGU as the most valuable part in our cooperation, in particular at times when I felt pretty much left in lurch: there was the AGU going stronger every year, there were the many national, topical societies and unions which were sometimes very strong in their fields, too, and there was the EUG and the permanent criticism concerning both the professionalism and potential leadership of the EGS and my work for the Society.

In 2001 Fred Spilhaus approached us to suggest a joint EGS-AGU meeting in Nice in 2003 just the week before the EUG meeting in Strasbourg. The presidents of the EUG, David Gee and Max Coleman, suggested to change this event into a joint AGU-EGS-EUG assembly instead. I plucked up my courage and travelled to the lion´s den in Strasbourg to meet the Chief Executive of the EUG, Roland Schlich. It took us just an hour or so and we both were smoking each a cigar of Roland´s famous collection and agreed upon two things: first, on the joint assembly in 2003 and, second, to merge EGS and EUG into one union, the European Geosciences Union (EGU, www.egu.eu), which was finally established in Munich on 7 September 2002 (www.egu.eu/inside-egu/historical-highlights/founding-members.html).

With concentrated forces we continued our success story now with “EGU+Copernicus” and COST as the software house. The joint meeting in Nice in 2003 became a great success: for the very first time far more than 10.000 geo-scientists were meeting at one place, and at all meetings afterwards the participation has been almost 9.000 and even sometimes higher. At the same time the number of journals published open access has also increased to currently 24 registered titles. Besides, a Newsletter is published on a regular basis four times a year under the editorship of Kostas Kourtidis , a special workshop for teachers organized by Carlo Laj is taking place at each General Assembly amongst other educational sessions, and Frederik van der Wateren and his team organizes the cooperation with the international media.

6. Moments of Good-Bye

About two years ago I heralded my retirement: in 2007 Martin Rasmussen became the Managing Director of Copernicus GmbH and he remodelled the company to an independent congress organizer and open access publisher with its own department for software development. This then terminated the unity “EGU + Copernicus” (in 2007) and the cooperation between Copernicus and Copernicus Systems + Technology (in 2008), while the short period of cooperation between EGU and COST (since 2008) has also been terminated for 2010. This leaves, in principle, three independent cooperations behind with their own interests in management and business plans and ideas. The ideal situation for a new start to be managed by the new EGU Executive Secretary, Kerstin Lehnert. All my best wishes for a bright and successful future!

At the end I would like to thank all the friends and colleagues of EGS/EGU for their enduring encouragement, support and assistance in establishing our joint project: the European Geosciences Union.

Arne K. Richter.

Arne K. Richter
EGU Executive Secretary

ISOTRACE

New isotopic tracers of the chemistry-climate relationship

The project ISOTRACE, developed under the umbrella of the European Science Foundation (ESF) and its EURO-CORES EuroCLIMATE program (http://www.esf.org/activities/eurocores/completed-programmes/euroclimate.html) had the aim to test a set of new potential isotope tracers that could be used in ice core science. Because of the complexity to establish a direct relationship between the chemical information buried in ice, the chemical state of the atmosphere and finally the interaction between the chemistry and the climate, ISOTRACE was limited to provide the first elements using a top-down approach, i.e. starting from the present atmosphere down to the air/snow transfer. We explored the possibilities offered by the recently discovered sulfur and oxygen isotope anomalies. We found that the former offers great potentials to derive the climate forcing induced by volcanoes while the latter is a faithful transcription of the oxidative state of the atmosphere. In the years to come, applications of these new tools to ice cores should start to lift part of the veil on the climate-chemistry relationship.

1. Introduction

Understanding the future of our climate depends strongly on our capacity to understand its past. Ice cores have been a gold mine to establish the main features and causes of the climate change of the Earth as it is the only paleo record that gives a direct access to the past atmosphere. Despite being the best proxy of the atmosphere with their trapped air bubbles, ice cores have so far failed to reveal the complexity of the atmospheric chemistry in a changing climate. The ISOTRACE program (New isotopic tracers of the chemistry-climate relationship) was dedicated to test the abilities of a new set of isotopic tracers to provide new insights on two important weaknesses of the current ice core science.

The poor ability of the chemical impurities buried in ice to transcribe the chemistry of the above atmosphere is penalizing our capacity to predict the future of the climate. Indeed the chemistry of the atmosphere, which interacts strongly with the climate by controlling the atmospheric lifetime of many of the climatic active agents (see Figure 1), is driven by reactive short-live species (i.e. its oxidation capacity) that can be not archived in ice. By nature, the oxidative capacity of the atmosphere is made of these unstable reactive chemicals (e.g. hydroxyl radical (OH) or ozone (O3) and thus no direct record of these species is possible in any paleoclimatic archives. Although the histories of certain atmospheric trace gases can be precisely reconstructed (e.g. methane, carbon dioxide), the reconstruction of atmospheric chemical conditions, viz. the oxidative capacity, is extremely difficult because the chemical impurities found in ice are the end-products of the oxidation activity and thus dependent not only of the chemical activity of the atmosphere but also on the emission strength of their precursors. As a consequence, up to date, only numerical simulations have been made to investigate the relationship between climate and chemistry, at times with conflicting results [Valdes, et al., 2005]. In fact, no definitive answers on how the oxida-

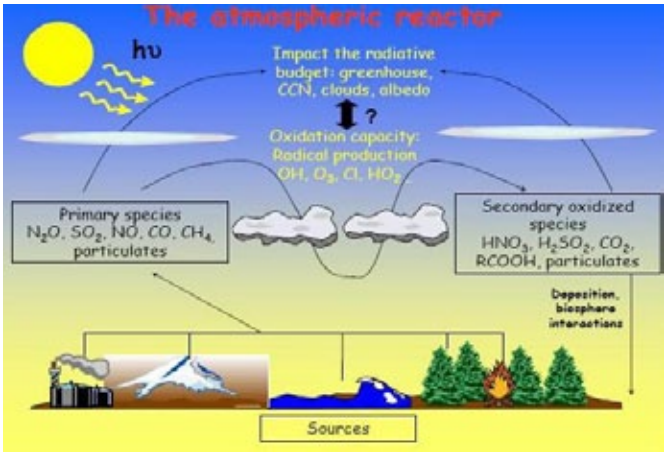

Figure 1: The climate and the chemical state of the Earth's atmosphere are intimately interconnected. While climate change modifies profoundly the chemical species present in the atmosphere by changing the spatial distribution and strength of surface source emissions, the chemistry of the atmosphere in return controls the atmospheric lifetime of many active climatic agents. But as of today, this intricate relationship is largely unexplored. Paleo studies on the climate-chemistry interactions are missing robust proxies. Recently new isotopes tracers have merged.

tive capacity has evolved through time can be given due to the lack of analytical constraints. In this context predicting how the chemistry will react under the anthropogenic forcing: accelerating or dampening the global warming, is an unanswered question and the focus of active researches worldwide.

Major explosive volcanic eruptions emit into the atmosphere large amounts of ash and gases, often with immediate and destructive consequences for humans. Volcanic sulfur compounds (mainly SO2) are quickly oxidized to sulfuric acid, forming sulfate aerosols that linger in the atmosphere for months to a few years. Large eruptions can impact climate [Robock, 2000], via radiative effects of the volcanic aerosols. Extraordinarily large eruptions injecting massive amounts of SO2 directly into the stratosphere can cause significant tropospheric and surface cooling [Robock, 2000]. Such eruptions in the tropics are capable of global impact, for their aerosols are distributed to both Northern and Southern Hemispheres. Polar ice cores provide proxy records of explosive global volcanism over many millennia [Castellano, et al., 2005; Delmas, et al., 1992]. These records are based on the measurement of volcanic-derived sulfuric acid, pioneered by C.U. Hammer and colleagues [Hammer, 1977; Hammer, et al., 1981], and have distinct advantages over the observation-based records such as global and continuous coverage of extended time periods. The climate forcing induced by volcanoes and used in climatic reconstruction is essentially derived from information stored in ice. However, currently based on sulfate concentration only, the ice records suffer from a main drawback. The identification of climatic-significance eruptions is uncertain as it relies mainly on historical records and/or bipolar comparison of simultaneous events. Thus, unknown eruptions are classified as climatically significant only on the premises that the same event should be seen both in Northern and Southern ice at the same time, implicitly excluding the possibility of simultaneous two distinct small eruptions close to ice sheets and/or the imperfection of ice dating.

ISOTRACE had for objective to test new isotopic tracers based on oxygen and sulfur isotope anomalies into these fields of research.

2. The sulfur and oxygen isotopic anomalies and their rationales

Stable isotopic chemistry has been used for decades to constrain source emissions but only recently the use of the minor isotope ratios has proven to be highly valuable. Sulfur is characterized by 4 stable isotopes or three isotopic ratios: 33S/32S, 34S/32S and 36S/32S while with three oxygen stable isotopes two isotopic ratios can be built: 17O/16O and 18O/16O. Classically these ratios are expressed in d notation, where d represents the relative deviation (commonly expressed in Â‰) of the isotopic ratio of a sample with respect to an international standard, defining the origin of the scale. Thermodynamic, kinetic, and biological processes produce isotopic variations (or fractionations) that depend on the relative mass differences between the different isotopes. As a result, observed isotope fractionations are highly correlated in a mass dependent manner with d33S ≈ 0.515 x d34S and d36S≈ 1.90 x d34S and d17O ≈ 0.52 x d18O for oxygen (figure 2), so that usually only d34S or d18O are reported since the other isotopic ratios are redundant information.

However, this picture changed when Mark Thiemens [Thiemens and Heidenreich III, 1983] and James Farquhar [Farquhar, et al., 2000] for oxygen and sulfur isotopes respectively,

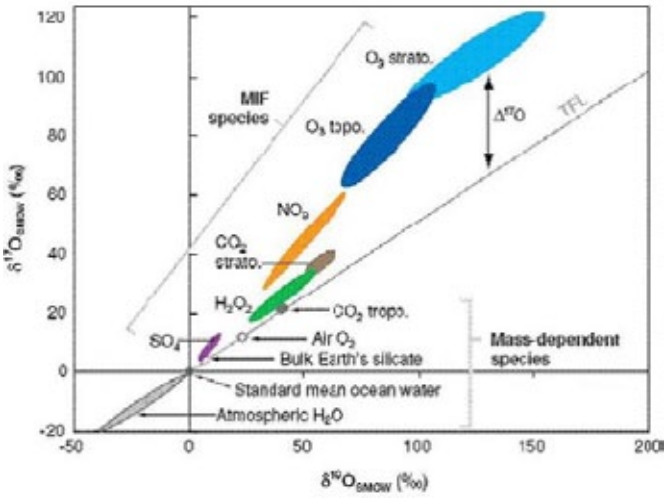

Figure 2: Three-isotope plot showing the mass dependent fractionation line (TFL) where the major oxygen reservoirs of the Earth lay on, the ozone isotopic anomaly (D17O) and the propagation of its isotopic anomaly to other atmospheric species (From [Thiemens, 2006]).

revealed that few specific chemical reactions could produce isotopic compositions that were far outside their respective mass dependent correlation lines. The ThiemensÂ' discovery concerns the formation of ozone in the gas phase, much like it is produced in the atmosphere. For not yet completely understood quantum mechanical reason, ozone displays a unique triple isotope composition with d17O ≈ d18O instead of the expected d17O ≈ 0.52 x d18O. In first approximation, the 17O excess with respect to the mass dependent fractionation line is expressed as:

D17O ≈ d17O - 0.52 x d18O

Because ozone is a strong oxidant, during chemical attacks in the atmosphere the original 17O excess present in ozone is spread among many other atmospheric chemical species (Figure 2). While ozone is chemically destroyed during this process, its chemical attack is isotopically fingerprinted in the end-products of its oxidation reaction. As these end-products are washout from the atmosphere by meteoritic precipitations, they end up eventually archived in ice cores. These oxygenated-bearing species thus contains the chemical activity of the ozone by the mean of a 17O excess or D17O ≠ 0 they carry. Nitrogen oxides show a strong chemical coupling with ozone. As the end-product of nitrogen oxides, nitrate is thus a model molecule to study how ozone transfers its isotopic anomaly and how well this anomaly can be stored in glaciological archives. The first part of the ISOTRACE program was dedicated to document the oxygen isotope anomaly found in nitrate aerosols and how well it is transferred to the snow.

In their pioneer work, Farquhar and colleagues discovered that such correlations were also violated for sulfur and sulfate compounds older than 2.2 billion years. Quantities D33S and D36S (D33S ≈ d33S - 0.515 d34S and D36S ≈ d36S - 1.90 d34S) showed non-zero values, reflecting the deviation of measured isotopic compositions from mass fractionation arrays. Soon after we showed [Farquhar, et al., 2001] that those sulfur isotopic anomalies (D33S and D36S ≠ 0) could be reproduced in the laboratory when SO2 gas was subjected to intense UV photolysis which confirm the initial suggestion of Farquhar that the young EarthÂ's atmosphere was lacking an ozone layer and thus was certainly deoxygenated. In the modern atmosphere, however, strong UV radiations are only available in the stratosphere where the ozone UV shielding starts

to vanish. Consequently, sulfuric acid (H2SO4) formed in this region of the atmosphere during massive injection of SO2 following a volcanic eruption should also carries a sulfur isotope anomaly. Shielding of the solar UV-B and UV-C radiation by stratospheric ozone prevents similar photolysis in the troposphere. Therefore H2SO4 from the oxidation of tropospheric SO2 carries no sulfur isotopic anomaly, and only stratospheric eruptions may result in D33S anomaly in the H2SO4. The sulfur anomaly provides a technique to distinguish climatically important stratospheric eruptions from tropospheric eruptions in polar ice cores, independently of the concentration recorded in ice. The second objective of ISOTRACE was oriented to test the possibilities offered by the sulfur isotope anomaly for identifying stratospheric volcanoes. Here the goal was to see if a new isotope tracer could be arranged to future reconstruct the volcanic climate forcing with an unprecedented level of confidence.

3. Nitrate studies

Nitrate (NO3-) is the chemical species at the end of the oxidation chain of atmospheric reactive nitrogen and is one of the dominant anions present in the polar snowpack. Therefore there has been vital interest in using the polar ice core record of NO3- concentrations to reconstruct past levels of atmospheric nitrogen oxides (NOx=NO+NO2) and rates of stratospheric denitrication. Nitrate buried in snow at low accumulation site is not quantitatively conserved; showing exponential-like decay of its concentration in the first 20 cm of snow. This post-depositional effect has hindered the interpretation of its snow concentration as a faithful image of its atmospheric concentration, pushing further away the used of snow nitrate as a proxy of NOx chemistry. As we anticipated all post-depositional effects (diffusion, evaporation, photolysis, etc) within the snow being mass dependent processes, the oxygen isotope anomaly of nitrate inherited from the ozone-NOx interactions in the atmosphere might be preserved in snow and thus been a conservative tracer of the ozone atmospheric activity.

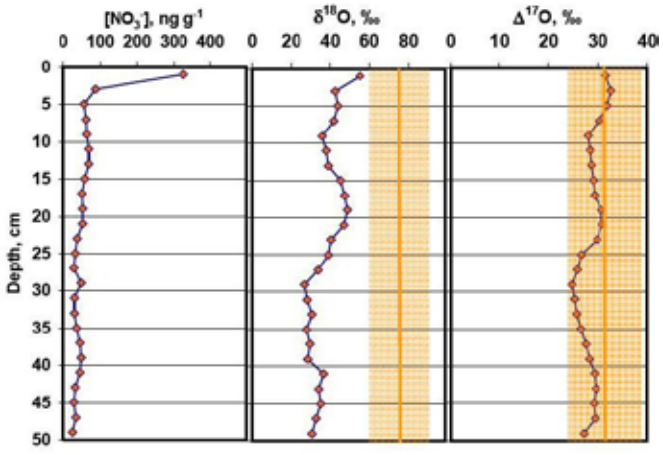

Figure 3: Concentration and isotopic profiles of nitrate collected in a shallow snow pit at dome C (Antarctica). The shaded surfaces and orange lines represent the weighted average and natural variability of the nitrate atmospheric isotopic composition, respectively. Only D17O of snow and atmospheric nitrate are superimposed. For the concentration as well as d18O profile, the atmospheric information is lost by the post depositional effects. D17O is a conservative tracer of atmospheric processes.

During the timeframe of ISOTRACE we initiated a research field study on nitrate oxygen isotopes at the inland Antarctic station Concordia (75.1Â° S, 123.3Â° E, 3233 m asl), established close to the Dome C site. Concordia was the location for the deep drill ice core EPICA which covered more than 800 000 years of the Earth atmosphere history: a major reason to establish our study at this location. Aerosols were collected weekly year round while the surface snow was studied by the mean of shallow snow pits. Nitrate from the filter aerosol loading and from the snow layers was extracted and analyzed for their oxygen isotope content. Figure 3 displays the results obtained for a typical snow pit, showing the sharp decrease of NO3- concentrations with depth in parallel with the d18O and D17O profiles. The orange lines and shaded surfaces represent the weighted average and natural variability of the oxygen isotopic composition of the atmospheric nitrate, respectively. The figure speaks for itself; clearly D17O of the nitrate buried in snow effectively transcribes an atmospheric signal, in opposite to the concentration and the d18O isotopic ratio, which both of them are strongly impacted by post depositional processes. These results strongly suggest that the oxygen isotope anomaly of nitrate snow carries indeed information on the ozone chemical activity and thus open a window on the possibility to reconstruct the chemical activity of ozone through time. We are currently working on the significance of the nitrate D17O in term of ozone activity.

4. Sulfate studies

We extracted volcanic and background sulfate from South Pole and Dome C snow and ice. Because of the quantity needed to perform such isotopic analyses, only major events could be sampled. Ion chromatography is used to isolate, concentrate and purify the volcanic and background sulfate. After chemical operations, sulfate is converted to SF6 from which all sulfur isotopes can be measured (fluorine is a mononuclear element). Five volcanoes were sampled: the well-observed stratospheric Pinatubo eruption (June 1991, Indonesia) and tropospheric Cerro Hudson (September 1991, Chili), the Tambora (1815 AD, Indonesia), the Kuwae (1450 AD, Vanuatu) and the biggest eruption of the past 1000 years but still unidentified, the stratospheric 1259 AD eruption. Backgrounds were extracted from ice surrounding the volcanoes and from tropospheric aerosol filters. Isotopic results are displayed in figure 4. It seems evident that based on this limited data set, sulfates produced in the stratosphere show an anomalous 33S isotopic composition, while all other sulfate samples have D33S not significantly different than zero. Not shown on the figure is the measurement performed on ashes collected directly at the point source soon after the 1991 Pinatubo eruption in Indonesia. The sulfate extracted from these ashes did not show any sign of sulfur anomaly. A results confirmed by Bindeman and colleagues [Bindeman, et al., 2007] who analyzed a variety of recent and ancient volcanic sulfate collected close to their point source emission, including the Pinatubo ashes, and did not record any sulfur anomaly in the fifteen samples measured. Thus it can be concluded with a high level of confidence that the sulfur anomaly is generated during long-range transport and transformation within the middle atmosphere and that the sulfur isotopic anomaly is independent of the starting isotopic composition of the volcanic source. The precise mechanism responsible for this unique isotopic composition is not well understood yet but indubitably it takes place in the stratosphere

where short wavelengths are present. As far as we know, no sulfur isotopic anomalies have been reported for sulfur oxides produced within the troposphere.

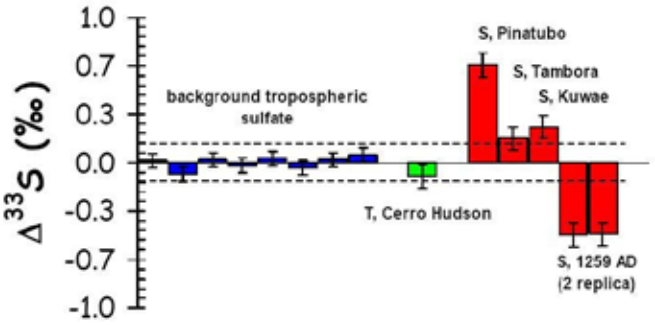

Figure 4: Sulfur anomalies (D33S) of volcanic and tropospheric sulfate measured on aerosols and Antarctic snow. Only sulfate made in the stratosphere carries a significant sulfur anomaly. S, stand for well-known stratospheric eruptions, T for tropospheric volcanic eruption. The sulfur anomaly is a unique tracer of stratospheric-made sulfate and thus a no more less unique tracer of climatic significant eruption.

We further pursue our investigation in order to close the mass balance of the sulfur isotope anomaly. As the point source does not show any sign of 33S anomaly as expected, in order to balance the creation of a reservoir of sulfur with positive anomaly, a reservoir with negative anomaly should be generated at the same time. As displayed in figure 4, the 1259 AD event was the only event exhibiting a negative 33S anomaly, an intrigued observation. To solve the mass balance issue, we decided to study with a high resolution the Pinatubo and Mount Agung (1963) events for which the quantity of snow were almost unlimited due to their proximity with the surface. The bulk events were sub-sampled at a frequency allowing to follow the evolution of the sulfate deposit with time. Only the results for the Pinatubo are displayed in figure 5 but the same observations were obtained for the Mount Agung [Baroni, et al., 2007]. The concentration profile is shown with the associated 33S anomaly. It can be readily see that sulfur mass-independent composition of volcanic sulfate is a time-dependent process, first displaying a positive D33S followed by a negative D33S at the end of the volcanic plume depositional process. This process occurs on a monthly time scale before SO2 is fully oxidized in H2SO4, indicating a rapid process. Not shown here, we also found that the isotopic characteristics of the stratospheric volcanic sulfate were consistent with the lab experiments of the SO2 UV photolysis, comforting the general idea that only stratospheric-made sulfate carries a sulfur isotope anomaly. For the Pinatubo event we found that the mass weighted average D33S observed for the full duration was significantly different than zero, consistent with the previously bulk measurement. However, we also noticed during the time of development that well-known stratospheric eruptions archived at different locations on the ice sheet and measured as bulk showed inconsistencies results, sometimes with no sign of sulfur isotope anomaly, thus in apparent contradiction with the current theory. These contradictions were alleviated when these events were measured in a time-resolved manner. Based on the information we have collected so far, a consistent scenario can be drawn. First, neither at the point source emission of sulfur nor below the ozone layer the produced sulfuric acid carries a sulfur isotope anomaly. When sulfur in the form of SO2 reaches the stratosphere, before being completely converted into sulfuric acid droplets, the photolysis of SO2 creates two reservoirs (remaining SO2 and produced H2SO4) of sulfur anomaly with opposing signs; second, these two reservoirs are physically separated in space and time, probably helped by the gaseous form of the reactants (SO2) and the liquid form of the products (acid droplets of H2SO4). Physically separated, the sulfuric acid droplets escape the stratosphere by sedimentation where they get ultimately trapped in the snow precipitation with the positive S anomaly. As the stratospheric SO2 reservoir vanished with time, the newly formed sulfuric acid acquired slowly the negative S anomaly carried by the diminishing SO2 reservoir before being incorporated at their turn in the snow. The only way to explain the oscillation of the D33S sign is thus to consider the fundamental role of aerosols, microphysical processes and sedimentation in preserving the isotopic signal. When the relationship between aerosols and sulfur isotope anomaly is established, volcanic plume transport may be understood, allowing a precise glaciological record of the climatic impact of stratospheric eruptions. Meanwhile, we recently applied this technique to the coldest decades ever recorded, 1809-1819 and demonstrated that the well-known Tambora eruption (1815) and the undocumented 1809 eruption identified as stratospheric with the sulfur isotopes were together responsible for the unusually cold decade 1809-1819 [Cole-Dai, et al., 2009].

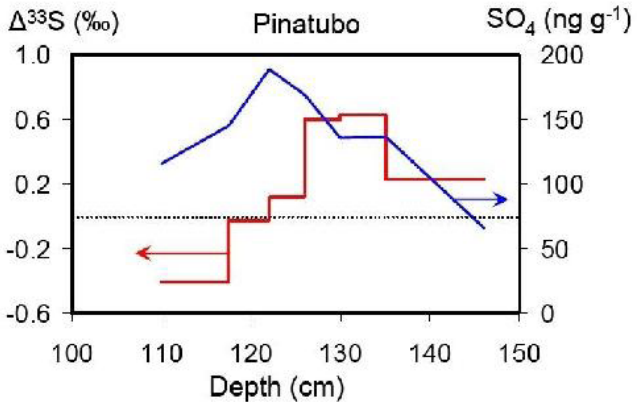

Figure 5: Time-evolution of the sulfur anomaly (red) and sulfate concentration (blue) of the Pinatubo obtained from Antarctic snow. Clearly, the sulfur anomaly shows a positive and negative phase during its time-dependent deposition. The time-resolved analysis confirms the existence of two reservoirs with opposite sign during the evolution of the volcanic sulfur cloud, a necessity to close the mass balance. Only volcanic events resolved in time can be classified with the sulfur anomaly as stratospheric or not.

Acknowledgements

Funding was provided by the Institut PolaireÂ–Paul-Émile Victor, Institut National des Sciences de lÂ'Univers LEFE-CHAT, and the European Science Foundation under the EUROCORES Programme EuroCLIMATE, through contract no. ERAS-CT- 2003-980409 of the European Commission, DG Research, FP6. My deepest thanks go to all the personal and technical staffs that helped me in the harsh and difficult environment of Antarctica.

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The Eggs Climate Editor, Yu Shaocai, and the Eggs Managing Editor, Kostas Kourtidis, would like to thank the author for submitting this manuscript from Antarctica and wish him warmly a pleasant stay.

OPAL Air Survey

with public engagement

29 September 2009.- Many of the factories that belched toxic emissions into Yorkshire's atmosphere have disappeared. But in the 21st Century, the region faces a different and invisible problem -- nitrogen pollution from road traffic and ammonia emitted as a result of intensive agricultural processes.

The University of York is seeking the help of Yorkshire residents to assess the true scale of air pollution and they are planning to use some of the region's oldest living organisms to do it.

Volunteers from across the region are being recruited to join the OPAL Air Survey which started on 29 September. It involves checking the effect of vehicle and other emissions on lichens which are sensitive to air pollution.

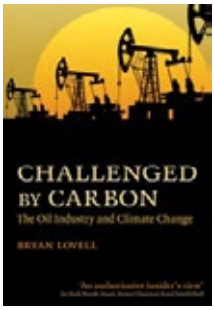
The national survey has been developed with experts from the British Lichen Society and led by Imperial College London as part of the wider OPAL (Open Air Laboratories) initiative. OPAL has been awarded a grant of £11.7 million by the Big Lottery Fund to inspire the new generation (see www.OPALexplorenature.org).

It is led in Yorkshire and the Humber by the University of York, the Environment Department, the Department of Social Policy and Social Work and the Stockholm Environment Institute.

The researchers are encouraging people to find out about the levels of pollution in their local area by looking for lichens on trees, in gardens or local parks. Some lichens thrive on air pollution while others are highly sensitive to it. Volunteers will be given a special survey pack with tips on what to look out for in their local lichens.

The data they will gather will help scientists not only find out about air pollution but also lichen distribution across England. People can upload their results to the OPAL website at www.OPALexplorenature.org.

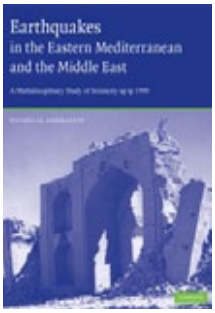
Challenged by Carbon



Authors: Bryan Lovell
Publisher: Cambridge University Press
ISBN: 9780521145596
YEAR : 2010
EDITION : 1st
PAGES : 212
PRICE : 22.00 €
Paperback

Is there a low-carbon future for the oil industry? Faced with compelling new geological evidence, the petroleum industry can no longer ignore the consequences of climate change brought on by consumption of its products. Yet the global community will continue to burn fossil fuels as we manage the transition to a low-carbon economy. As a geologist, oil man, academic and erstwhile politician, Bryan Lovell is uniquely well placed to describe the tensions accompanying the gradual greening of the petroleum industry over the last decade. He describes how, given the right lead from government, the oil industry could be environmental saviours, not villains, playing a crucial role in stabilising emissions through the capture and underground storage of carbon dioxide. Challenging prejudices of both the environmentalists and the oil industry, Lovell ultimately assigns responsibility to us as consumers and our elected governments, highlighting the need for decisive leadership and urgent action to establish an international framework of policy and regulation.

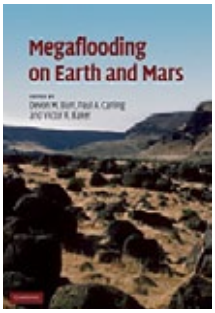
Earthquakes in the Mediterranean and Middle East



Authors: Nicholas Ambraseys
Publisher: Cambridge University Press
ISBN: 9780521872928
YEAR : 2009
EDITION : 1st
PAGES : 947
PRICE : 133.00 €
Hardback

This book examines historical evidence from the last 2000 years to analyse earthquakes in the eastern Mediterranean and Middle East. Early chapters review techniques of historical seismology, while the main body of the book comprises a catalogue of more than 4000 earthquakes identified from historical sources. Each event is supported by textual evidence extracted from primary sources and translated into English. Covering southern Rumania, Greece, Turkey, Lebanon, Israel, Egypt, Jordan, Syria, and Iraq, the book documents past seismic events, places them in a broad tectonic framework, and provides essential information for those attempting to prepare for, and mitigate the effects of, future earthquakes and tsunamis in these countries. This volume is an indispensable reference for researchers studying the seismic history of the eastern Mediterranean and Middle East, including archaeologists, historians, earth scientists, engineers and earthquake hazard analysts.

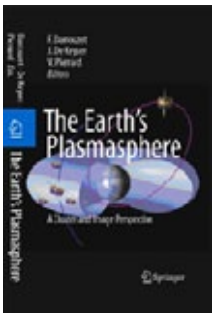
Megaflooding on Earth and Mars



Authors: Devon Burr, Paul Carling, Vic Baker
Publisher: Cambridge University Press
ISBN: 9780521868525
YEAR : 2009
EDITION : 1st
PAGES : 319
PRICE : 89.00 €
Hardback

Megaflooding is the sudden discharge of exceptional volumes of water that significantly alter the regional landscape. Megafloods have occurred repeatedly on both Earth and Mars where they may have acted as triggers for climate change. Research into megaflooding has progressed greatly over the past several years: on Earth, real-time measurements of contemporary floods in Iceland complement multifaceted research into older and even larger terrestrial floods; while on Mars, terabytes of data from several spacecraft orbiting that planet are dramatically revising our view of flooding there. Beginning with an historical overview of flood science, this volume presents sections on morphology and mechanisms, flood sedimentology, and modelling, each illustrated with examples from Earth and Mars. By presenting terrestrial and Martian research together, this volume creates a unique synthesis to further our understanding of these enormous palaeoflood events. It is an invaluable reference for researchers and students of hydrology, geomorphology, sedimentology and planetary science, as well as environmental and hydraulic engineers.

The Earth's Plasmasphere - A Cluster and Image Perspective



Authors: F. Darrouzet, J. De Keyser, V. Pierrard
Publisher: Springer
ISBN: 9781441913227
YEAR : 2009
EDITION : 1st
PAGES : 296
PRICE : 99.95 €
Hardback

The Earth's Plasmasphere reviews the state of the art in plasmaspheric science based on the modern observations provided by ESA's CLUSTER and NASA's IMAGE spacecraft. The plasmasphere, discovered at the beginning of the space age, has remained largely unexplored territory. Now, with innovative observational techniques, new light is being shed on this key region of the magnetosphere. This book sketches the emerging overall picture of a highly structured plasma, sculpted by the ever-changing electromagnetic fields that result from the interaction of the solar wind with the magnetosphere. The Earth's Plasmasphere, written by an international group of scientists representative of the world-wide community, is aimed at researchers and graduate students with an interest in magnetospheric physics, space plasma physics and geophysics. Previously published in Space Science Reviews, Volume 145, Nos 1-2, 2009

An overview of scientific and application-oriented activities in space

Utilization of Space- Today and Tomorrow

The Geological Society of London (GSL) has published several volumes on geological hazards, including earthquakes.

Klaus Reicherter, Alessandro Michetti and Pablo Silva
Published by: Geological Society Special Publication
ISBN: 139781862392762
YEAR : 2009
EDITION : 1st
#PAGES : 332
PRICE : 99.00 €

The Geological Society of London (GSL) has published several volumes on geological hazards, including earthquakes. An important addition to the GSL Special Publication collection is a recent multi-authored volume on palaeoseismology, a discipline that exploits geological information and knowledge to understand past earthquakes, and to improve our understanding of present and future seismic hazards. The book, edited by Klaus Reicherter, Alessandro Michetti and Pablo Silva, contains papers that address scientific and technical problems with the compilation and analysis of historical and pre-historical records of earthquake induced ground and environmental effects, for earthquake intensity mapping and seismic hazard assessment. The articles are the result of an editorial selection from oral and poster contributions presented at two international meetings held in the spring of 2006: (i) a session entitled "3000 years of earthquake ground effects reports in Europe: geological analysis of active faults and benefits for hazard assessment", held in Vienna, Austria, at the annual Assembly of the European Geosciences Union, and (ii) a workshop on "Seismic hazard analyses for critical facilities", which was jointly organized in Trieste, Italy, by the International Centre for Theoretical Physics and the International Atomic Energy Agency, with the co-sponsorship of the sub-commission on Palaeoseismicity of the International Union for Quaternary Research (INQUA).

According to the authors, the ESI 2007 scale is not meant to replace the other scales. It is intended to consider in macroseismic investigations environmental effects caused by earthquakes on the natural environment, to obtain an improved and more informative estimate of the seismic intensity and its geographical pattern and extent.

In this volume, a number of applications of the ESI 2007 scale in different geological settings and tectonic regimes are presented, including discussions of the advantages and problems encountered, and comparisons with other earthquake intensity scales. The other chapters address multiple and partly overlapping topics, including the assessments of the earthquake (seismic) history in relation to the regional and local tectonic and geologic settings, and the application of geophysical, archaeological and speleological techniques for improved macroseismic analysis.

Although the book does not cover the full range of macroseismic and palaeoseismological research– this would have been an unrealistic ambition for a single volume – it provides a good overview of the scopes, techniques, methods and expected results of modern macroseismic studies and palaeoseismology. A limitation of the volume – and of individual chapters – exists because the direct application of palaeoseismology for seismic hazard evaluation remains limited. The individual articles are generally well written and clearly illustrated with numerous colour photographs, diagrams and maps. In a few cases, language is not consistent or precise. In this respect, the volume lacks homogeneity, a result of the complexity, diversity and breath of an evolving discipline.

This review is reproduced from Natural Hazards and Earth System Sciences, 9, 1929–1930, 2009,
http://www.nat-hazards-earth-syst-sci.net/9/1929/2009/nhess-9-1929-2009.pdf

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Published in NHESS, http://www.nat-hazards-earth-syst-sci.net

5th International Conference on Fog, Fog Collection and Dew - (Meeting)

25/07/2010 - 30/07/2010 - Münster, Germany

The scope of this conference is to bring together people who are interested in any aspect of fog and dew. Both advanced scientific findings and fog collection projects will find a broad audience. Participants will include representatives from universities, the private sector, government and international agencies, and educational organizations.

This conference series was started in 1998 in Vancouver, Canada, then visited St. John's, Newfoundland, Canada (2001), Cape Town, South Africa (2004), La Serena, Chile (2007) and will be a guest in Europe for the first time in 2010. The conference is a unique melting pot for scientists and applied users of fog and dew collection techniques from all continents. Many personal contacts arose from past conferences, and several issues of scientific publications as well.

The official language of the 5th International Conference on Fog, Fog Collection and Dew is English. Simultaneous interpretation is not provided. It is therefore expected that authors are able to present their research more or less fluently in the English language.

General Information, Pre-Registration & Submission of Abstracts at:

Copernicus Meetings
Bahnhofsallee 1e
37081 Göttingen
Germany
Phone +49-551-900339-20
Fax +49-551-900339-70

meetings@copernicus.org
http://www.fogconference.org/

Waves and Turbulence in Solar-Terrestrial Plasmas - (Meeting)

12/03/2010 - 12/03/2010 - RAS Lecture Theatre, Burlington House, Piccadilly, London, UK

CALL FOR ABSTRACTS TO "Waves and Turbulence in Solar-Terrestrial Plasmas" Royal Astronomical Society Specialist Discussion Meeting RAS Lecture Theatre, Burlington House, Piccadilly, London Friday 12 March 2010

Wave and turbulent phenomena are fundamental physical processes that have been shown through remote and in-situ observations to occur ubiquitously in all types of solar-terrestrial plasmas, ranging from the Sun, solar wind, magnetosphere to the ionosphere. They are intricately connected with coronal dynamics and heating, solar wind acceleration and interaction with the Earth's magnetosphere and upper atmosphere.

The aim of this meeting is to bring together researchers from the different disciplines to compare theoretical and observational results on waves and turbulence, including shocks. The meeting will provide a forum to share seismological or spectral analysis techniques, and to address interdisciplinary questions such as the solar origin of turbulence in the solar wind and the solar wind drivers of magnetospheric pulsations and ionospheric turbulence. Presentations on applications from planetary and astrophysical research areas are also welcome.

Confirmed invited speakers: Steven Cranmer (Harvard-Smithsonian Center for Astrophysics, Boston, USA), Roberto Bruno (Institute of Physics of Interplanetary Space, Rome, Italy), Tim Yeoman (University of Leicester, UK). Contributions for oral and poster presentations are now solicited.

Abstract submission deadlines: February 8, 2010 (oral) or February 22, 2010 (poster).

Conveners: Erwin Verwichte (erwin.verwichte@warwick.ac.uk) Claire Foullon (claire.foullon@warwick.ac.uk) Bogdan Hnat (b.hnat@warwick.ac.uk) University of Warwick, UK

Royal Astronomical Society Specialist Discussion Meeting
http://go.warwick.ac.uk/ras2010

Dr Claire Foullon
Centre for Fusion, Space & Astrophysics
University of Warwick, UK
Claire.Foullon@warwick.ac.uk

Urban Environmental Pollution - (Meeting)

20/06/2010 - 23/06/2010 - Boston, USA

This conference will focus on the latest information about urban pollution problems and what measures can be taken to overcome obstacles to sustainability and life quality. The role of urban vegetation in storm water retention, pollution and temperature reduction, green roofs, re-surfacing buildings, reducing albedo, reducing asthma and other advances will be presented.

The conference will last for two and a half days and consist of a keynote address, plenary addresses, contributed papers and posters.

Five very general topics will serve as the framework for discussions involving urban environmental pollutants, their effects and mitigation:

* Nature of urban environments
* Air pollutants, heat islands, climate change
* Soil and water pollution, storm water retention
* Ecology, biodiversity, invasive species
* Panel discussion, conclusions, recommendations, planning for future activities

Abstracts are currently invited for oral and poster presentation at the conference using the Online Submission Form by February 1, 2010, according to the abstract preparation guidelines.

Elsevier and the Journal Environmental Pollution
http://www.uep2010.com/

International Polar Year Oslo Science Conference - (Meeting)

08/06/2010 - 12/06/2010 - Oslo, Norway

The IPY Oslo Science Conference will gather the full polar community to celebrate the remarkable accomplishments of International Polar Year 2007–2008, to display and explore the richness of IPY data, and to chart future directions for polar and global science.

A comprehensive scientific programme featuring 39 sessions provides an excellent opportunity to present your research to a global community of polar scientists and abstracts are currently invited for oral and poster presentation within the following main themes of the conference programme:

• Linkages between Polar Regions and global systems
• Past, present and future changes in Polar Regions
• Polar ecosystems and biodiversity
• Human dimensions of change: health, society and resources
• New frontiers, data practices, and directions in polar research
• Polar science education, outreach and communication

Full details regarding the conference sessions within each theme are outlined on the conference website.

Abstracts should be submitted by 20 January 2010 at www.ipy-osc.no.

Registration for the conference will open shortly. Early booking discounts will be available prior to 8 March 2010.

Delegates should download the Second Circular for an overview of the scientific programme, PolarEXPO, PolarFESTIVAL, details of excursions and social events.

www.ipy-osc.no

HydroPredict2010 - (Meeting)

20/09/2010 - 23/09/2010 - Prague, Czech Republic

2nd International Interdisciplinary conference on
"Predictions for Hydrology, Ecology and Water Resources Management: Changes and Hazards caused by Direct Human Interventions and Climate Change"

Deadline for abstract submission: 1 February 2010

E-mail: hydropredict2010@itctravel.cz

- Charles University, Prague, Czech Republic
- International Association of Hydrological Sciences (IAHS)
- Universität für Bodenkultur Wien (BOKU), University of Natural Resources and Applied Life Sciences; Institute of Water Management, Hydrology and Hydraulic Engineering, Vienna, Austria
- Czech University of Life Sciences Prague (Česká zemědělská univerzita v Praze, ČZU), Prague, Czech Republic
- T. G. Masaryk Water Research Institute (VÚV), Prague, Czech Republic

http://www.natur.cuni.cz/hydropredict2010/

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

Geodynamics-Academic

Assistant Professor at MIT Department of Earth, Atmospheric and Planetary Sciences

Company: Massachusetts Institute of Technology Department of Earth, Atmospheric and Planetary Sciences
Location: USA-Massachusetts
Date Posted: 25/09/2009
[show details...]

Climate-Academic

Assistant Professor in Urban Climatology

Company: School of Geographical Sciences and Urban Planning, Arizona State University
Location: USA-Arizona
Date Posted: 19/11/2009
[show details...]

Atmospheric Sciences-Academic

Tenure-track faculty position in Atmospheric Sciences

Company: Michigan Technological University, Dept. of Geological and Mining Eng. & Sci.
Location: USA-Houghton, MI
Date Posted: 19/11/2009
[show details...]

General-Academic

Tenure-track faculty position in Geological Engineering and Sciences

Company: Michigan Technological University, Dept. of Geological and Mining Eng. & Sci.
Location: USA-Houghton, MI
Date Posted: 19/11/2009
[show details...]

Atmospheric Sciences-Academic

PhD position in meteorological dimension of the project 'ClearFLo' at King's College London

Company: King's College London
Location: England, United Kingdom-London
Date Posted: 24/11/2009
[show details...]

Atmospheric Sciences-Academic

Young scientist, Development and integration of the new ICOS atmospheric station

Company: LSCE
Location: France-Gif sur Yvette, near Paris
Date Posted: 27/11/2009
[show details...]

Atmospheric Sciences-Academic

Research Fellows and Research Scientists in Atmopsheric Sciences

Company: Tropical Weather Group, Nanyang Technological University
Location: Singapore-Singapore
Date Posted: 09/12/2009
[show details...]

Climate-Academic

Director Position at Pacific Climate Impacts Consortium

Company: University of Victoria and the Pacific Climate Impacts Consortium
Location: Canada-Victoria
Date Posted: 22/12/2009
[show details...]

Atmospheric Sciences-Academic

Research Assistant/Associate in Observing and Modelling Urban Surface – Atmosphere Exchanges

Company: Geography Department, King's College London
Location: United Kngdom-London
Date Posted: 11/12/2009
[show details...]

Atmospheric Sciences-Studenship/Graduate

PhD studenships in Atmospheric Sciences

Company: Tropical Weather Group, Nanyang Technological University
Location: Singapore-Singapore
Date Posted: 09/12/2009
[show details...]

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