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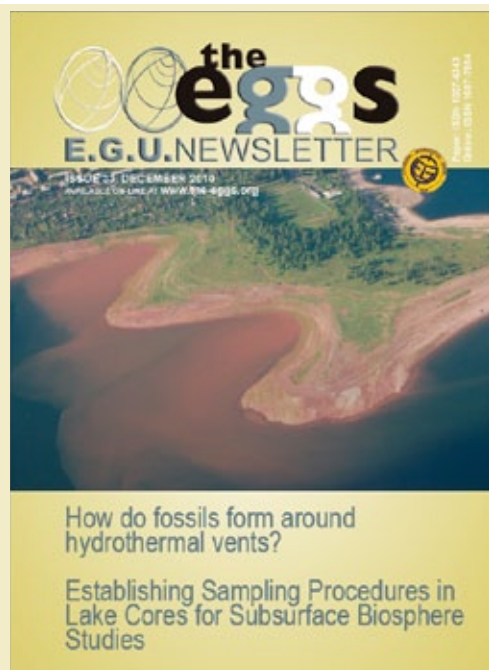
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How do fossils form around
hydrothermal vents?

Establishing Sampling Procedures in
Lake Cores for Subsurface Biosphere
Studies



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Cover photo: Lake shore in Siberia. Photo was taken near a large dam in Bratsk, Siberia.
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The Editors of Biogeosciences Discuss the Journal's Success

In this interview, ScienceWatch.com (SW) talks with the editors about the history and citation achievements of Biogeosciences.

SW: Did you expect Biogeosciences to become highly cited, or is this surprising to you?

Biogeosciences (BG) was launched in 2004 as one of the open-access journals of the EGU. As an open-access journal it is open without costs to all readers in the world who have access to the Internet. Open access was not new at that time but a journal like BG was filling a gap.

The objectives of the journal were defined to cut across the boundaries of established sciences and achieve an interdisciplinary view of these interactions. The interdisciplinary approach, the accessibility of all papers without the usual restrictions, as well as the transparency of the review process, were the driving forces for BG to become quickly visible and accepted by the community. Therefore, we were not too surprised by the success of the journal.

SW: How would you account for the high citation rate of Biogeosciences?

One aspect is the open access itself. Papers which can be read and distributed without restrictions except to cite the authors can be expected to be cited more often than those which can only be accessed after payment by the readers. Another point is the quality of papers. As all papers are published in an open discussion forum before being reviewed and accepted for final publication, we believe that the contributions we receive are generally of very high quality.

SW: Would you give us a brief history of the journal?

BG was launched in 2004. The number of submitted papers has been constantly growing and BG got its first impact factor for the year 2006. Being indexed and highly visible due to a high impact factor the journal has been making steady progress.

SW: What historical factors have contributed to the success of Biogeosciences?

BG was accepted by the scientific community from the very beginning. A few years before, Atmospheric Chemistry and Physics (ACP), the first journal of such a style, was successfully launched by the EGU. The popularity of ACP was probably a factor contributing to the success of BG as well.

There are a few special features of the publication process of these journals that should be mentioned. The two-stage publication process secures the authors' rights, as every discussion paper and interactive comments remain permanently archived and individually citable. Furthermore, the copyright position differs from other journals in that the authors retain all rights of the publication.

SW: Have there been specific developments in the fields served by Biogeosciences that may have contributed?

The increased focus on interactions between biogeosciences and atmospheric sciences in the course of global change

discussions has probably contributed to a rapid development of BG in recent years.

SW: What, in your view, is this journal's main significance or contribution in the field of Environment & Ecology?

The emphasis on a broad interdisciplinary approach for understanding biogeochemical-ecological interactions, instead of a narrow focus on specialized disciplines, has created a special niche for BG.

SW: How do you see your field(s) evolving in the next few years?

The interactive open-access approach of the EGU has been practiced successfully since 2001, and the usefulness of discussion papers and interactive commenting are well-established and appreciated by the geoscientific community. Open access will gain more and more territory in future. Results of research paid for by the taxpayer should be available to everybody free of charge.

The EGU is a non-profit organization, and so the publication cost of articles appearing in its journals has to be borne by the authors. On a first view, this seems like a disadvantage for all open-access journals. However, the procedure for cost-sharing is very transparent, with no hidden costs charged to other channels. Moreover, the service charges are more than compensated for by the advantages one gains; in the case of BG, for example, we do not levy additional charges for color figures, and as has been stated earlier, the authors retain the copyright. This is as fair an arrangement as one can think of.

SW: What role do you see for your journal?

EGU's Biogeosciences and all other open-access EGU journals demonstrate that it is possible to publish with open access at fair costs. The EGU journals demonstrate further that open access can be regarded to be as reliable as other journals in terms of quality and safe archiving. The journal's role is to provide a platform for quality research that is accessible to all. The discussion phase insures that novel ideas can receive a chance to be heard, even if controversial.

Biogeosciences

Emmanuel Boss, Jürgen Kesselmeier, S.W.A. Naqvi, and Albrecht Neftel, Co-Editors-in-Chief Copernicus GmbH, publishers, on behalf of the European Geosciences Union.

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Second Circular and Call for Abstracts for the 7th EGU Alexander von Humboldt Conference

on ocean acidification and its consequences for marine ecosystems and society

December 6, 2011.- We kindly inform you that the Second Circular and Call for Abstracts for the 7th EGU Alexander von Humboldt Conference, co-organized by EGU and AOGS on "Ocean Acidification: Consequences for marine ecosystems and society" to be held June 20-24, 2011 in Penang/Malaysia.

Can be downloaded from http://meetings.copernicus.org/avh7/avh7_second_circular.pdf

It contains further details related to the venue, milestones, registration fees, accommodation, and further items of interest.

Important: Please note that the deadline for abstract submission is March 15, 2011.

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

On behalf of the organizers

Peter Fabian, European Geosciences Union (EGU)

Zulfigar Yasin, University Sains Malaysia (USM)

Climate of the Past Fifth Birthday

June 2005-June 2010

Climate of the Past co-editors in chief and founding editors would like to thank all those who have contributed to the growth of the journal since its launch in 2005: authors, editors, reviewers, guest editors, and all the Copernicus staff, and would like to share with all of you a little present: IF (impact factor) 2009: 3.826.

Martin Claussen, Gerald Ganssen, Hugues Goose, Thorsten Kiefer, Denis-Didier Rousseau, Eric Wolff

365 days under Antarctic ice

A film presented at the EGU 2010 Geocinema



During the last Assembly, many films were presented at the Geocinema event which took place at a room near the entrance of the Vienna Convention Center (see

<http://egu2010.wordpress.com/2010/04/30/geocinema-at-egu->

[ga-2010/](#)). Among them, the film 365 days under Antarctic ice, a Djamel Tah film, produced by Terra Incognita, presented the 365-day adventure of three Frenchmen at the Charcot station near South Pole. One of them, Roland Schlich, has served for many years (and continues to serve) as EGU Treasurer.

Film synopsis

The 1st July 1957 marks the beginning of the International Geophysical Year. The scientific world decided to explore the Antarctic. Twelve nations would join efforts to initiate a vast research programme aimed to penetrate the mysteries of the white continent. Three Frenchmen, Jacques Dubois, a meteorologist, Roland Schlich, a geophysicist, and Claude Lorius a glaciologist, occupied the Charcot Station built near the South magnetic pole and lo-

cated 320 km from the coast, during a whole year without any possibility of relief. They wintered from January 1957 to January 1958 in an aluminium hut only 24 m² in size, buried under the ice.

Today, Roland Schlich of the School and Observatory of Earth Sciences, Strasbourg and Claude Lorius of the Laboratory of Glaciology and Geophysics of the Environment, Grenoble, are the last witnesses of this wintering and they remember ...

The film traces this human and scientific adventure, thanks to their evidence and unpublished documents, filmed 50 years ago.

The English version of the film is sponsored by the European Geosciences Union (EGU) and the Scientific Committee on Antarctic Research (SCAR).



How do fossils form around hydrothermal vents?

Crispin Little describes how he and his team found out – by making their own fossils

Crispin Little describes how he and his team found out – by making their own fossils.

Research on the deep-sea floor is a serious undertaking. It requires specialised equipment like the famous manned submersible Alvin and very expensive oceanographic vessels capable of operating far from land for a long time. Potential problems are not only technical – ships' engines malfunctioning or submersible cables tangling, for example – but can also be due to factors beyond anyone's control: bad weather has scuppered many a well-planned research cruise.



Collecting vent mussels and crabs using one of Alvin's manipulators, Credits: Crispin Little

Working on the mid-ocean ridges is even harder, because these are among the most geologically active areas on the planet. Here, new ocean crust is being formed as lava erupts onto the sea floor, accompanied by strong earthquakes (see Searle, 2009). Not only that, but the ridges are also sites of intense hydrothermal activity, with highly acidic vent fluids at 370 °C gushing out of towering mineral chimneys on the sea floor. At these depths, the high pressure raises the boiling point of water enough for it to stay liquid even at these temperatures.

This challenging environment was the setting for our project to study fossilisation in deep-sea hydrothermal vents. Indeed, these challenges were confirmed when we lost an entire set of experimental devices to a major sea-floor volcanic eruption early on in the experiment.

Why are we interested in fossilisation at deep-sea hydrothermal vents? The aim of the study was to better understand the evolutionary history of the extraordinary communities of animals that live only at hydrothermal vents. First discovered in 1979 on the Galapagos Rise, these communities have radically changed our view of the diversity of life in the deep sea, partly because their primary energy source is not sunlight,



Crispin Little extracting a pair of fossilisation cages from Alvin's collection basket (Alvin's claw can be seen on the right), recovered from 2.5 km down on the sea floor. After around a year in the high-temperature vent fluid, the cages have a pyrite chimney growing through them, Credits: Crispin Little

but geochemical energy from hot rocks. The most important compound in vent fluid is hydrogen sulphide, and many vent animals, including giant tube worms (vestimentiferans), vent mussels and clams, depend for food on symbiotic bacteria that live by oxidising this sulphide.

This dependence on geochemical rather than solar energy may have shielded vent communities from major environmental events, like the mass extinctions and global climate change that affected contemporary photosynthesis-based ecosystems. Thus, the evolutionary history of vent fauna is probably very different from that of other marine biotas.

The only direct evidence for this history comes from the fossil record. But at present this is sparse, with only 25 examples known from the past 550 million years, and there are fundamental questions about why this is. For example, why do some ancient vent deposits contain fossils, while others in the same state of preservation don't? There are also significant groups of animals, such as crabs and shrimps, that are abundant at modern vents but which do not appear in the vent fossil record. Why should this be? Is it a case of imperfect preservation, or were these groups not present at vent sites in the past?

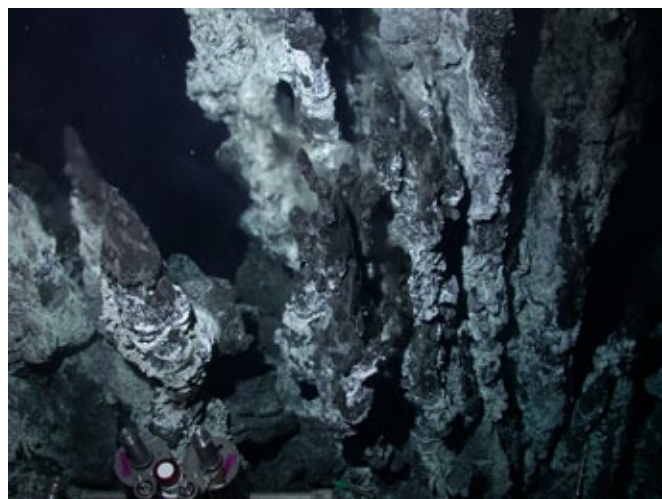
To find out, we decided to investigate how modern deep-sea hydrothermal vent animals (molluscs, crustaceans and tube worms – both vestimentiferans and polychaetes) become fossilised at vents. To do this we chose an area on the East Pacific Rise, 500 nautical miles south of Mexico, where scientists have been studying vents for two decades.

In partnership with colleagues at Woods Hole Oceanographic Institution and the University of New Hampshire, USA, the plan was to use Alvin to deploy specially designed duplicate sets of experimental materials at different hydrothermal vents in three different micro-habitats: the high temperature 'black smoker' hydrothermal fluid habitat (up to 370 °C), 'diffuse flow' sites where hot fluid and seawater mix (at 10-40 °C, this is where the majority of animals live), and a control site away from active venting (3 °C).

We'd then recover these experimental materials at roughly yearly intervals for transport back to the UK and investigation. The experimental devices consisted of identical titanium mesh cages, inside which were wired a variety of control materials and biological substrates: dried vestimentiferan tubes, vent mussel and clam shells, periwinkle shells and tiger prawn carapaces.

We deployed the first fossilisation cages at two vent sites in May 2005. Unfortunately, our hard work came to nothing – the cages (together with all the other research groups' scientific equipment) were destroyed by a major submarine volcanic event in the area late in 2005, in which an estimated 22 million cubic meters of lava erupted. Presumably our cages are still there, but covered by several metres of basalt!

We had to restart the project, building new cages and negotiating ship time with our American colleagues. Happily, we have since enjoyed great success. We deployed new sets of fossilisation cages at two different vent sites in November 2006 and December 2007, and recovered them after 373 days and 319 days, respectively. The results are very interesting, and go a long way towards answering many of our questions about fossilisation at hydrothermal vents. For example, we now know that fossilisation is very dependent on exactly where the remains are located around the vent.



*Hydrothermal vent chimneys are formed mainly out of sulphide minerals.
Credits: Crispin Little*

In our experiment, fossilisation by the growth of sulphide minerals on the biological materials (vestimentiferan tubes, periwinkle, mussel and clam shells) only occurred in the high-

temperature areas of the vent sites, or where the vent changed over time – for example, where a diffuse flow vent turned into a black smoker during the experiment. Sulphide mineralisation did not generally occur at diffuse flow sites, although mollusc shells suffered considerable dissolution here, or at control areas away from active venting. The implication is that the fossils found in ancient vent deposits reflect only the parts of those communities that lived at the higher-temperature areas around the vents.

We found that the mollusc shells and tubes acted as simple substrates for the growth of pyrite (iron sulphide), with mineralisation occurring on both shells and tubes. This is exactly what we might expect from the preservation of vent fossils in ancient vent deposits.

We also discovered that the apparent bias towards the fossilisation of worm tubes and mollusc shells is a real phenomenon and reflects how well the various biological substrates resist chemical dissolution in the vent environment, which puts them under high pressure due to depth and exposes them to hot, acidic vent fluid. Thus, no shrimp carapaces remained in any of the ten cages, including those from the control sites away from active venting. Vestimentiferan tubes, by contrast, proved resistant enough to decay to become fossilised.

The organic coating of mollusc shells, called the periostracum, protects them to some extent from dissolution and makes it more likely that shells with thick periostracal layers will be preserved as vent fossils, particularly as the periostracum on its own can be mineralised. The implication is that crustaceans such as crabs and shrimps were present at hydrothermal vents in the past, but were just not preserved.

Our results are consistent with observations from ancient vent sites and let us better interpret the fossil record of vent communities. From this, we now know more of how vent fauna evolved, because we now understand how organisms are preserved in these environments, including the extremely rapid pathway to fossilisation – less than a year.

However, because fossilisation at vent sites happens so quickly, we still don't fully understand the very early stages of mineralisation of shells and tubes by pyrite, and future experiments should have shorter durations – in the order of a few months. Ship time and submersible seats, anyone?

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Crispin Little

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Establishing Sampling Procedures in Lake Cores for Subsurface Biosphere Studies

Assessing In Situ Microbial Activity

During the PASADO (Potrok Aike Maar Lake Sediment Archive Drilling Project) ICDP (International Continental Scientific Drilling Program) drilling, more than 500 meters of sedimentary cores were retrieved from a crater lake. A 100-m-long core was dedicated to a detailed geomicrobiological study and sampled in order to fill the gap of knowledge in the lacustrine subsurface biosphere. Here we report a complete in situ sampling procedure that aims to recover aseptic samples as well as determining active in situ biological activity.

Introduction

Sub-recent sediments in modern lakes are ideal to study early diagenetic processes with a combination of physical, chemical, and biological approaches. Current developments in the rapidly evolving field of geomicrobiology have allowed determining the role of microbes in these processes (Nealson and Stahl, 1997; Frankel and Bazylnski, 2003). Their distribution and diversity in marine sediments have been studied for some years (Parkes et al., 1994; D'Hondt et al., 2004; Teske, 2005). Comparable studies in the lacustrine realm, however, are quite scarce and mainly focused on the water column (Humayoun et al., 2003) and/or very shallow sediments (Spring et al., 2000; Zhao et al., 2007). Thus, there is a need to determine the presence of living microbes in older lacustrine sediments, their growth, and metabolic paths, as well as their phylogenies that seem to differ from already known isolates.

During the PASADO (Potrok Aike Maar Lake Sediment Archive Drilling Project) ICDP (International Continental Scientific Drilling Program) drilling, more than 500 meters of sedimentary cores were retrieved from this crater lake (Zolitschka et al., 2009). A 100-m-long core was dedicated to a detailed geomicrobiological study and sampled in order to fill the gap of knowledge in the lacustrine subsurface biosphere.

Here we report a complete in situ sampling procedure that aims to recover aseptic samples as well as determining active in situ biological activity. Preliminary results demonstrate that these procedures provide a very useful semi-quantitative index which immediately reveals whether there are biologically active zones within the sediments.

The PASADO Project

Laguna Potrok Aike is a 770-ka-old maar lake located at 51°58' S and 70°22' W in the Santa Cruz Province, Argentina, within the 3.8-Ma-old Pali Aike Volcanic Field (Fig. 1; Zolitschka et al., 2006). Although annual precipitation ranging between 200 mm and 300 mm gives a semi-arid character to the area, the lake is presently the only permanently water-filled lacus-

trine system in the southeastern Patagonian steppe. Today it has a maximum diameter of 3.5 km, a total surface of 7.74 km², and a maximum water depth of 100 m. The lake regime is polymictic, and the water-column is non-stratified with an anoxic sediment-water interphase.

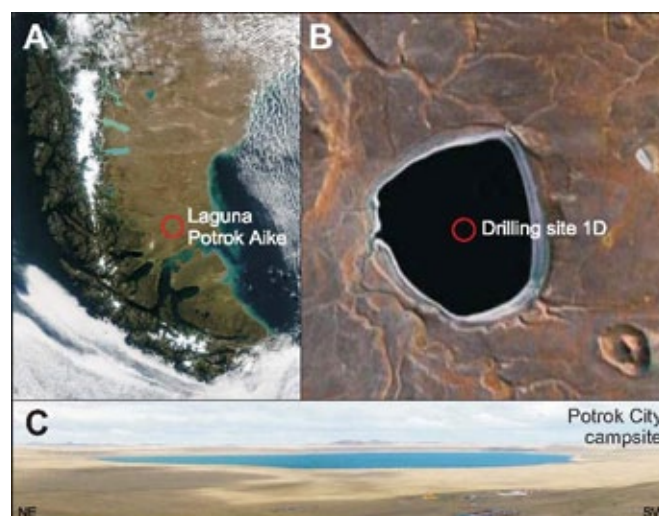


Figure 1. [A] Satellite image of Laguna Potrok Aike located in southernmost continental Patagonia, north of the Strait of Magellan, from <http://www.zonu.com>; [B] close-up of the lake showing the position of the drilling site discussed here, from <http://earth.google.com>; [C] panoramic view of the lake site with the field camp in the foreground. Credits Figure 1C: Aurèle Vuillemin.

A seismic study of this lacustrine basin showed a thick sedimentary sequence (Anselmetti et al., 2009; Gebhardt et al., in review) that was the target of the PASADO project. This international research initiative had a key objective: quantitative climatic and environmental reconstruction of this remote area through time. The multiproxy study also provides unique material to initiate, for the first time in an ICDP project, a systematic study of the living lacustrine subsurface environment. From a total of 533 meters of sediment cores recovered at 100m water

depth (Fig. 1), a one-meter-long gravity core PTA-1I and the 97-m-long hydraulic piston core PTA-1D were sampled following a newly established strategy to obtain aseptic samples for geomicrobiological studies.

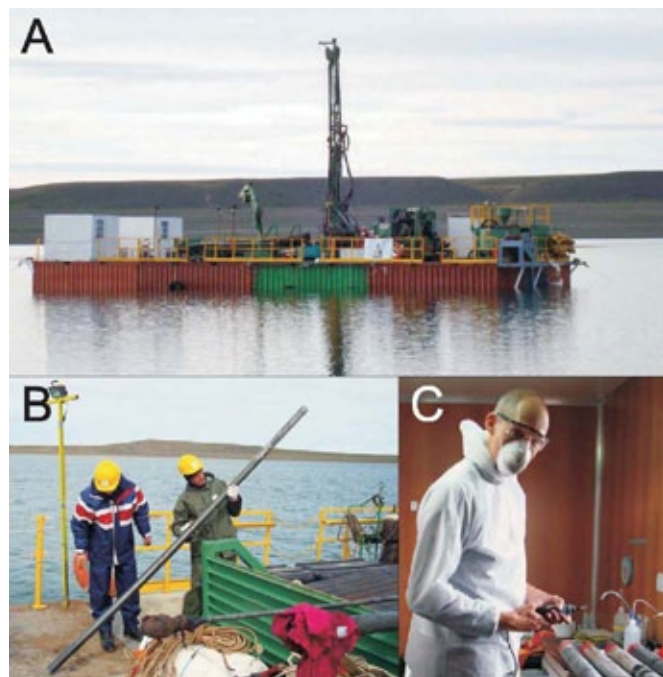


Figure 2. [A] Drilling platform GLAD 800. After retrieval [B], the cores were transported from the platform to the laboratory where they were sampled at once [C]. Credits: Aurèle Vuillemin

Sampling Procedure

A procedure was designed to minimize contamination risks in the field and laboratory. The size and configuration of the drilling platform prevented the setting up of a sampling laboratory with maximum conditions of asepsis. Thus, the retrieved cores were transported every 90 min from the platform to a laboratory in the campsite where they were sampled (Fig. 2). The liners of hydraulic cores were first disinfected with isopropanol and then sprayed with fungicide. Thereafter, cut in the liner using a portable circular saw every one or two meters and at higher resolution for the upper 15 m (Fig.3). Conversely, in the gravity core twenty windows were cut at 5-cm spacing in the empty liner and sealed with strong adhesive tape prior to

coring. This latter technique facilitated opening windows and allowed sampling quickly at a higher resolution. Samples from these windows were immediately chemically fixed and/or frozen, optimizing the preservation of their initial conditions for further analyses.

A rapid biological activity test, which is commercially available for industrial hygiene monitoring, was applied immediately after coring in order to test for microbial activity in the sediments. In situ adenosine-5'-triphosphate (ATP) measurements were taken as an indication of living organisms within the sediments. The presence of ATP is a marker molecule for metabolically active cells (Bird et al., 2001), since it is not known to form abiotically. ATP can be easily detected with high sensitivity and high specificity using an enzymatic assay (Lee et al., 2010).

ATP + luciferin + O₂ → AMP + oxyluciferin + PPi + CO₂ + light

ATP is degraded to adenosine monophosphate (AMP) and pyrophosphate (PPi) while luciferin is oxidized. Light is emitted as a result of the reaction, and the light is detected by a photomultiplier. We used the Uni-Lite NG Luminometer (Bio-trace International Plc, Bridgend, U.K.), in combination with the "Clean-Trace" and "Aqua-Trace" swab kits (3M, U.S., Fig. 3E). The sensitivity of the test is on the order of 10⁻²⁰ moles of ATP per mL of water, corresponding to a standard of 5 cells of *Escherichia coli* as expressed in RLU (relative luminescence units). This handheld device was previously tested at the Geomicrobiology Laboratory, ETH Zurich (Switzerland), where it was determined that this method could be applied on geological material such as rock surfaces and other environmental biofilms. It was also successfully used for fast and accurate measurements of life activity for freshly retrieved cores in lithified sediments of the IODP Expedition 310 in Tahiti (Camoin et al., 2007). The performance of this instrument in fresh sediments was uncertain, however, and to our knowledge this is the first time that it was successfully applied to lacustrine sediments. Additionally, the application of this test to water samples can aid in the evaluation of the degree of contamination of the drilling water which percolates along the inside of the core liner.

Figure 3A-3F summarizes the sequence and sampling procedures established in this project. Part of the sampling required precise volumes that were obtained using sterile syringes. Thus, samples of 3 mL and 5 mL of sediment were extracted from freshly opened windows using these syringes whose narrow tips were cut off in order to collect "minicores" (Fig. 3B). The first extracted sample was designated for methane analyses because of its immediate release into the environment due to volume expansion when exposed to ambi-



Figure 3. [A] Window cut for sampling; [B-D] sampling for methane headspace determinations; [E] preparation of the sample for in situ ATP measurements: sample is mixed with deionized water prior to centrifugation, then tested with the Uni-Lite[®] NG water tester (shown); and [F] storage of the remaining sediment for cell culture. Refer to text for details. Credits: Aurèle Vuillemin.

ent pressure. Hence, a portion (3 mL) of this first sample was chemically stabilized using 10 mL of 2.5% sodium hydroxide, and then sealed in vials for headspace analysis (Figs. 3C and 3D). The sediments were further sampled for different techniques using 5-mL syringes and portioned out as follows: the first 1-mL portion of sample was placed in an Eppendorf tube and kept frozen for further DNA extraction; a second 1-mL portion was chemically fixed in formaldehyde (final concentration, 2%) for DAPI (4',6-diamidino-2-phenylindole) cell count; a third 1-mL portion of the sediment was mixed with 1-mL of deionized water in an Eppendorf tube and centrifuged for five minutes. Commercially available water testers (Biotrace International) were carefully submerged in the supernatant, and ATP content was measured with the Uni-Lite NG luminometer as an index of in situ microbial activity (Fig. 3E). The remaining sediment in the syringe was coated with plastic foil and hermetically sealed into aluminum foil bags (Fig. 3F). These bags were flushed with nitrogen (to prevent oxidation) prior to sealing with a heating device. These samples can be further used for microbial culture experiments back at the home laboratory. Once the sampling was accomplished, the windows were sealed with strong adhesive tape. This sampling procedure was carried out non-stop over a 48-hour period. A comparable sampling procedure for marine sediments can be found in Bird et al. (2001).

Assessing In Situ Microbial Activity in Sediments

The presence of nutrients as energy sources is critical, promoting an active behavior of the inner microbial communities within sediments. When certain nutrient concentrations are below a threshold, microbial metabolism and population density are lowered progressively as these microbial communities en-

ter in dormant state. Thus, microbial communities in deep sediments can be considered as mainly oligotrophic and dormant.

The 97-m-long sediment core retrieved from Laguna Potrok Aike provided us the opportunity to identify a transition from a weak but active to a dormant state of microbial communities as reflected by in situ ATP measurements (Fig. 4A). These results were further compared with those from DAPI counting on the fixed samples carried out several months later in the laboratory (Fig. 4B). The DAPI fluorochrome dyes DNA without distinction -active, dormant, and dead cells, either eukaryote or prokaryote- and it is considered as a semi-quantitative index of cell density within the sediment. ATP and DAPI datasets, however, show an increasing trend from the sediment surface to ~6-m depth within sediments mainly composed of black mud and subject to gas expansion. The DAPI and ATP trends throughout depth suggest an exponential decrease in microbial activity that is most probably linked to a progressive compaction and gradual nutrient depletion within the sediments. There is, however, detectable microbial activity down to 40–50 m and recoverable DNA down to 60 m sediment depth.

The sediments recovered from Laguna Potrok Aike are dominantly argillaceous but are occasionally interrupted by coarser sandy layers associated to slumps triggered by erosional and/or volcanic activities (Zolitschka et al., 2009). The latter are very important since allochthonous organic matter is harder to degrade, and microbial preservation is highly dependent on grain size. Different sediment features further constrain microbial activity, as they provide colonization niches. Although microbial communities may adapt to trophic changes by shifting either their activity and/or dominant species, they are still highly representative of the lake catchment and their dominating climate. Ongoing multiproxy analyses of these cores will allow characterizing the sedimentary sequence and provide the critical grounds to interpret the results of the observed microbial behavior.

Validating In Situ ATP Measurements

Metabolic microbial activity can change drastically when samples are exposed to ambient temperature and pressure, light, and oxygen. In order to identify and possibly quantify the magnitude of these metabolic changes, a second set of ATP measurements was produced ten months after cores were retrieved (Fig. 4C). Both results indicate very similar distributions of microbial activity displaying the highest values at the same depths. In spite of the liner disinfection and the sealing of the sampling windows, mold had grown superficially on some windows, as shown in Figure 4D. The development of mesophilic aerobic microorganisms explains the comparatively higher ATP index of this second data set. These measurements warn about the omnipresent risks of contamination during sampling and further storage of the samples. They secondarily provide information about the nutrient resources of the sediments and their accessibility and use by microbes. Thus, this comparison between in situ and later ATP measurements highlights the relevance of the immediate measurement of microbiological living activity in the field. The comparison presented here between ATP values quickly obtained with a handset device further validates those in situ results produced by more established and tedious analyses such as DAPI cell counting of microbial cells.

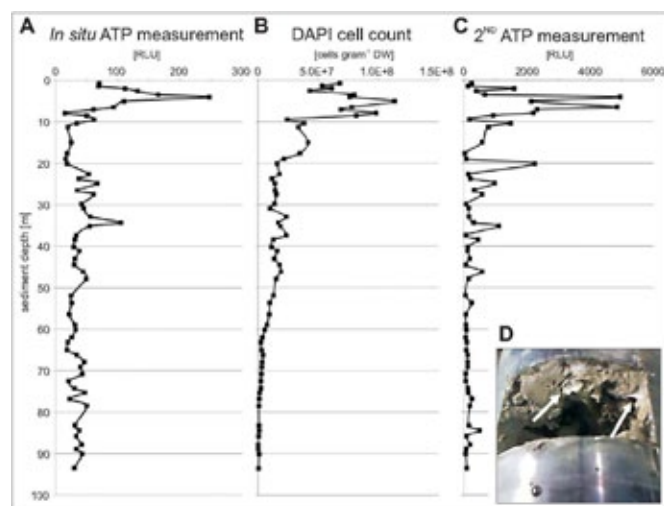


Figure 4. [A] The first ATP measurements were taken in an average of an hour and a half after each core recovery. They are considered as excellent indicators of in situ microbial activity. Noise was measured around 30 RLU (relative luminescence unit); [B] DAPI cell count provides a quantification of DNA present in the same samples; [C] second ATP measurements performed ten months later to test for eventual shifts in microbial activity. Although ATP indexes of active layers increased up to 20-fold, the originally nutrient-depleted layers remained inactive. Insert [D] shows a picture of mold (white arrows) which developed after exposure of the sediments to oxygen and pressure temperature (PT) ambient conditions. This partially caused the increased ATP values for the second run of measurements. Credits Figure 4D: Aurèle Vuillemin.

Future Improvements in Detecting the Living Biosphere in Lake Sediments

Lacustrine systems gather widely diverse water types such as brackish (Banning et al., 2005), acidic (Chan et al., 2002), hypersaline (Cytryn et al., 2000), or alkaline (Jones et al., 1998), among others. Each of them contains very different sediment and associated microbial assemblages. Understanding trophic states within the water columns and the sediments is essential to reconstructing past climates (Nelson et al., 2007) as well as to managing anthropogenic impact on modern lakes (Ye et al., 2009).

The assessment of microbial activity presented here provides information on various ongoing organic matter mineralization processes in the sediments and helps to understand the influence of microbes during early diagenesis. Our procedure can be easily applied as routine, adding valuable microbiological information that is complementary and relevant to several standard lacustrine proxies such as the stable isotope composition of authigenic carbonates and organic matter. Thus, the Uni-Lite NG ATP tester is an excellent alternative to previously proposed complex ATP extractions (Stoeck et al., 2000; Bird et al., 2001; Nakamura and Takaya, 2003).

We are confident that the sampling protocol proposed here will allow scientists to sample cores in other ICDP projects with minimal contamination risks. It further points towards new research avenues and technical developments to better detect microbial activity and metabolic functions of the subsurface lacustrine biosphere.

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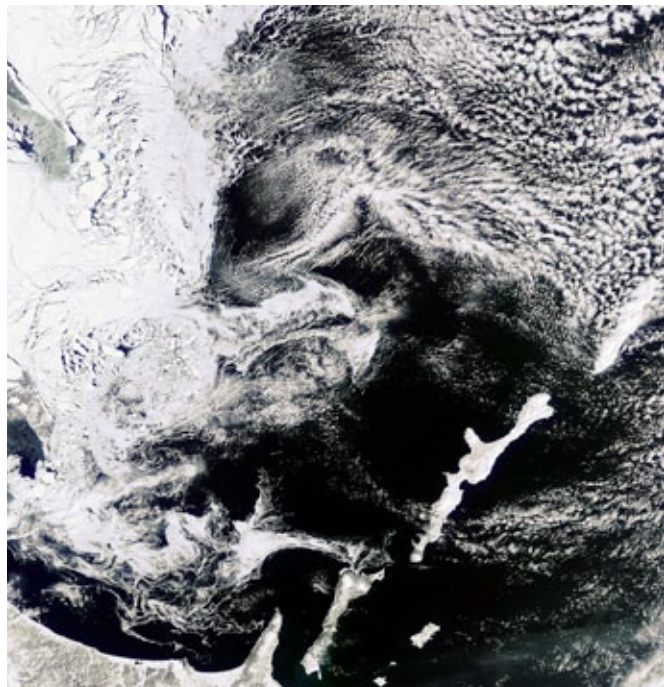
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EARTH FROM SPACE

sea ice in the Sea of Okhotsk



Sea ice in the Sea of Okhotsk, Credits: ESA

12 March 2010.- This Envisat image captures sea ice in the Sea of Okhotsk off the northeastern coast of Russia's Sakhalin Island (top left) and the northern tip of Japan's Hokkaido Island (bottom left).

Sea ice began forming in the northern area over the Sea of Okhotsk in November 2009. Since then, it extended down to about 30 km off the northern coast of Hokkaido and has likely reached its maximum.

Sakhalin is separated from the east coast of Russia by the narrow Strait of Tartary and from the northern tip of Japan by the Strait of La Pérouse, which appears to be ice-free.

Sitting astride an active seismic zone, Sakhalin is prone to earthquakes that can trigger mudslides. The formal penal colony is covered in ice during the winter months, and its surrounding cool, fertile waters support enormous fisheries. But that's not all; an estimated 45 billion barrels of oil equivalent are believed to lie beneath the icy seas off its shores.

Hokkaido is the northernmost and second largest island of Japan's four main islands. The three islands visible northeast of Hokkaido belong to the Kuril Island chain, which comprises 22 main islands and some 30 smaller islets.

Stretching for 1250 km northwards from Hokkaido to the southern tip of Russia's Kamchatka Peninsula (not visible), the Kuril Islands form a boundary between the Sea of Okhotsk and the Pacific Ocean (bottom right).

This image was acquired by Envisat's Medium Resolution Imaging Spectrometer (MERIS) instrument on 9 March 2010, working in Full Resolution mode to provide a spatial resolution of 300 m.

ESA

Scarcity of New Energy Minerals

A lot of rare metals are needed to make photovoltaic panels, magnets for wind generators, fuel cells and high-capacity batteries for hybrid and electric vehicles

01 November 2010.- It's not hard to argue in favor of alternatives to fossil fuels these days, but one popular argument – domestic energy security – may be standing on shaky legs. A lot of rare metals are needed to make photovoltaic panels, rare earth magnets for wind generators, fuel cells and high-capacity batteries for hybrid and electric vehicles. But most industrialized nations are almost entirely dependent on foreign sources for those metals. The only way this is going to change is if there is more domestic exploration and mining.

'There's a misunderstanding in the public about moving to alternative energy and moving from mining, which can't be done', said James Burnell of the Colorado Geological Survey. Burnell was speaking about the resource demands

of alternative energy technologies on 2 Nov. at the annual meeting of the Geological Society of America in Denver.

There is a long list of scarce metals needed for alternative energy and transportation. Metals like gallium, indium, selenium, tellurium, and high purity silicon are needed to make photovoltaic panels. To make batteries there's zinc, vanadium, lithium and rare earth elements as well as platinum group minerals for fuel cell-powered vehicles. One of the biggest players in the scarce metals game is China, and they are starting to play hard ball, says Burnell.

China is preparing to build 330 gigawatts worth of wind generators. That will require about 59,000 tons of neodymium to make high-strength magnets – more than that country's annual output

of neodymium. China supplies the world with a lot of those rare earth elements, like neodymium, and will have little or none to export if it moves ahead with its wind power plans.

'So the source for the West is problematical', said Burnell. Trade wars are on the horizon, he predicted. Yet policy makers and the public seem only superficially aware of the problem.

'It is obvious that Japan was upset by the practical pause of rare earth export by China in late September', said Yasushi Watanabe of the Institute for Geo-Resources and Environment in Tsukuba, Japan. On Nov. 1 at the same Geological Society of America meeting Watanabe presented his work on the geology of these critical elements and where they can be found.

New sources of these critical metals are needed, said Watanabe, as well as new methods for extracting the rare elements from different kinds of rocks.

We also need to find those ores and start exploiting them, said Burnell. That means more mining. It's the only way we can stay competitive in the new energy future.

Paper No. 205-3: Resource Demands of Alternative Energy Technologies

Abstract link: http://gsa.confex.com/gsa/2010AM/final-program/abstract_180221.htm

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Reference URL:

<http://www.geosociety.org/news/pr/10-65.htm>

Paper No. 132-1: Critical Metals for the New Energy Future
Abstract link: http://gsa.confex.com/gsa/2010AM/final-program/abstract_178652.htm

Kickoff for Norwegian Arctic Earth Observing System

The initiative is part of the roadmap for the European Strategy Forum on Research Infrastructures (ESFRI)

10 November 2010.- With EUR 4 million secured for the preparatory phase, the Norwegian ESFRI project Svalbard Integrated Arctic Earth Observing System (SIOS) is now underway. Partners from 14 countries recently gathered for the kickoff conference.

‘The project has received very broad support, with 27 partner institutions’, says Project Director Karin Refsnes of the Research Council of Norway. Fifty representatives of these partners participated in the conference to launch the project in Oslo in October.

The SIOS initiative is part of the roadmap for the European Strategy Forum on Research Infrastructures (ESFRI). The initiative’s primary objective is to develop an optimised observational infrastructure which can support advanced Earth System models and provide near-real-time information on Arctic change to relevant stakeholders.

The project will prepare upgrades to the existing infrastructure, as well as organise a limited number of observation platforms and provide a basis for establishing a joint knowledge centre in Longyearbyen.

The SIOS initiative has now entered the preparatory phase. In this phase there is no funding for research or monitoring. The main tasks are to gain an overview of the existing infrastructure on Svalbard and establish the organisational, administrative and financial parameters.

Source: Research Council of Norway

Geoinformatics: Transforming data to knowledge for geosciences

In a short but timely contribution in the *Geology* journal, A. Krishna Sinha of Virginia Tech and colleagues propose an informatics system that would allow the seamless melding and interpretation of data from disparate fields in the sciences. For them, it is all about integration -- the establishment of an infrastructure system to facilitate communication, to transform, as they say, ‘data into knowledge’.

The authors argue that the solutions to the most significant problems currently facing us are fundamentally

multidisciplinary and that these different disciplines commonly use different languages. An example, that of Quito, Ecuador, shows the criticality of communication by geoscientists -- who might be concerned with natural disasters such as volcanism or flooding -- with other disciplines, such as epidemiology, so that medical attention can be prompt and effective. Recent events in Haiti, for example, underscore the importance of the authors’ approach. For the authors, the problem is one of semantics -- that is, the development of an integrated ma-

chine and Web language that pertains to all sciences and scientists, so that data can be not only displayed, but understood. The vision of the authors ‘is to create a fully integrated geosciences information network with free access to Earth-science related data, tools, and services’.

Reference: A. Krishna Sinha et al., *GEOLOGY*, December 2010, pages 4-10.

Geological Society of America

Egyptian desert expedition on meteorite impact site

A 2008 Google Earth search led to the discovery of Kamil crater, one of the best-preserved meteorite impact sites

23 September 2010.- A 2008 Google Earth search led to the discovery of Kamil crater, one of the best-preserved meteorite impact sites. Earlier this year, an expedition reached the site in the Egyptian desert to collect iron debris and determine the crater's age and origins.

One day within the last several thousand years, a rare metallic meteorite travelling over 12 000 km/hr smashed into Earth's surface near what is today the trackless border region between Egypt, Sudan and Libya. The impact of the 1.3 m, 10-tonne meteorite generated a fireball and plume that would have been visible over 1000 km away, and drilled a hole 16 m deep and 45 m wide into the rocky terrain.

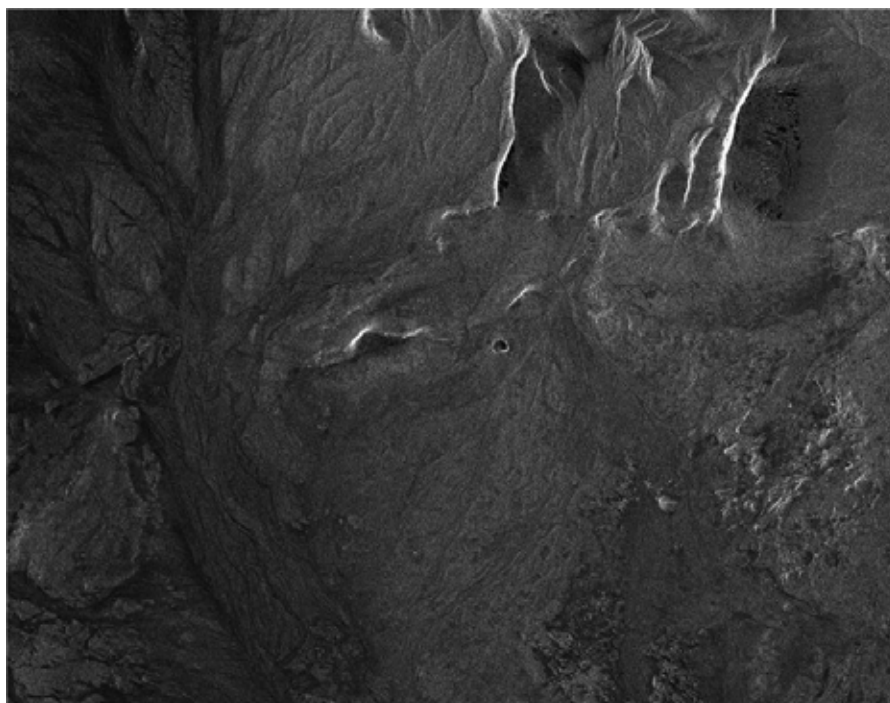
Since then, the crater had sat undisturbed by Earth's geologic and climatic processes. It was also, as far as is recorded, unseen by humans.

But that changed in 2008, when the crater was spotted during a Google Earth study conducted by mineralogist Vincenzo De Michele, then with the Civico Museo di Storia Naturale in Milan, Italy. He was searching for natural features, when by chance he saw the rounded impact crater on screen.

De Michele contacted an astrophysicist, Dr Mario Di Martino, at the INAF (National Institute for Astrophysics) observatory in Turin, who, together with Dr Luigi Folco, of Siena's Museo Nazionale dell'Antartide, organised an expedition to the site in February this year.

It took over a year to plan and obtain permissions for the journey; in the meantime, and in collaboration with Telespazio, e-Geos and the Italian space agency ASI, the Kamil region was analysed using satellite data and in particular high-resolution radar images provided by the ASI-operated COSMO-SkyMed satellite constellation.

The two-week, 40-person expedition included Egyptian and Italian scientists,



A radar image of the Kamil crater provided by the COSMO-SkyMed satellite constellation of the Italian Space Agency (ASI). Credits: ASI 2009

as well as numerous local support workers, and was conducted as part of the 2009 Italian-Egyptian Year of Science and Technology (EISY). It was also supported with funding by ESA's Space Situational Awareness (SSA) programme.

After a three-day drive across the desert in 40°C heat, the team reached the crater. They collected over 1000 kg of metallic meteorite fragments, including one 83-kg chunk thought to have split from the main meteorite body shortly before impact (it was found 200 m away from the crater). The team also conducted a thorough geological and topographical survey, using ground-penetrating radar to create a 3D digital terrain model. Geomagnetic and seismic surveys were also carried out.

Kamil crater, named after a nearby rocky outcrop, remains pristine, and

must have been created relatively recently.

'This demonstrates that metallic meteorites having a mass on the order of 10 tonnes do not break up in the atmosphere, and instead explode when they reach the ground and produce a crater,' says ESA's Dr Detlef Koschny, Head of Near Earth Objects segment for the SSA programme.

'We are still determining the geochronology of the impact site, but the crater is certainly less than ten thousand years old — and potentially less than a few thousand. The impact may even have been observed by humans, and archaeological investigations at nearby ancient settlements may help fix the date', says Dr Folco.

ESA

African Dust Caused Red Soil in Southern Europe

11 November 2010.- Spanish and American researchers have conducted a mineralogical and chemical analysis to ascertain the origin of terra rossa soil in the Mediterranean. According to the study, mineral dust from the African regions of the Sahara and Sahel brought about the reddish soil in Mediterranean regions such as Mallorca and Sardinia between 12,000 and 25,000 years ago.

‘The first hint of the relationship between African dust and certain soils in the region of the Mediterranean is their reddish or reddish-brown colour, similar to that of African aerosol filters, caused by their clay content’, co-author of the study from Centre for Ecological Research and Forestry Applications (CREAF) at the Universidad Aut3noma de Barcelona, Anna 3vila, explained.

The study, which has been published in Quaternary Science Reviews, finds that African mineral dust additions play an important role in the origin of the soils (palaeosols) in the Mediterranean region, namely on the island of Mallorca. The results resemble those published regarding the soils on Sardinia, ‘which indicates the likelihood of Africa being a

common source’. In turn, ‘African dust explains the origin of the ‘terra rossa’ soils in the Mediterranean region located on top of mother carbonate rock’.

In order to explain the origin of the reddish soils, the study authors considered three hypotheses: the non carbonate residual accumulation theory (soils are derived from the product of non carbonate weathering of the mother carbonate rock), the ascending ‘sesquioxide’ theory (accumulation of iron and aluminium hydroxides following capillary ascent from the bedrock) and the non-native soil accumulation theory (soil is formed by external sources, including airborne contributions).

The first two hypotheses were discarded due to the geochemical composition of the trace elements of red soils and the underlying rock being different.

However, although the analysis of the soil indicates that African dust is the main contributor to the formation of the palaeosol, the underlying rock also contributes, probably with residual quartz.

Terra rossa (red soil in Italian) is located on carbonate rock (with a high content of carbonate) and is spread

throughout the Iberian Peninsula, the South of France, the islands in the Mediterranean, Italy and along the coast of the Adriatic Sea, from Slovenia to Greece.

The largest sources of airborne mineral dust can be found in the Sahara and Sahel regions, with emissions of between 600 and 700 tonnes per year. The destination of this dust has recently aroused great interest among the scientific community for various reasons.

Reference:

Muhs, Daniel R.; Budahn, James; 3vila, Anna; Skipp, Gary; Freeman, Joshua; Patterson, DeAnna. “The role of African dust in the formation of Quaternary soils on Mallorca, Spain and implications for the genesis of Red Mediterranean soils” Quaternary Science Reviews 29(19-20): 2518-2543, 2010.

Source: Plataforma SINC

European Polar Board position paper

EPB launches strategic position paper on 7 December

Brussels, 7 December 2010.- Polar research must become an integral part of the European Union’s research activities if Europe is to benefit from the dramatically changing face of the Polar Regions, the European Polar Board (EPB) said today at the launch of its strategic position paper on European polar research: ‘Relevance, Strategic Context and Setting Future Directions’.

The European Polar Board (EPB) is Europe’s strategic advisory body on science policy for the Polar Regions of Arctic and Antarctica. Established in 1995, it is a platform for European engagement in international science programmes and provides strategic science policy advice to the European Commission and international bodies. Its members are the national operators and research institutes in 20 countries.

European research activities in the Polar Regions are significant, amount-

ing to over 300 million euro per year in recognition of the regions’ key role as driver of the Earth’s climate and the functioning of the oceans. But this research is often fragmented with considerable overlap between the various participating nations within Europe.

To remedy the situation, the position paper calls for mainstreaming polar research into the European Research Area so that it becomes a priority within both the upcoming 8th R&D Framework Programme from the European Commission and polar funding agencies at national level in EU member states. It also urges increased links with international partners to preserve the Polar Regions so that research can help answer global scientific questions affecting the dynamic Earth system itself.

‘We need an ambitious and broad strategy for investment in research activities in the Polar Regions for the long-

term benefit of Europe’, said Professor Carlo Alberto Ricci, Chairman of the European Polar Board. ‘This approach will also serve to increase the weight of European science within the international polar science effort’, he added.

The overlap of European spending and resource allocation will become more critical as climate change dramatically increases accessibility of the Polar Regions and opens up enormous new opportunities in fisheries, tourism, oil, gas and transport. The position paper therefore urges a special effort notably to coordinate European research activities in Antarctica, through common programmes, shared resources and networking of scientific stations, and other facilities and infrastructures.

Source: ESF

Two new Earth observation missions chosen for further study

CarbonSat to quantify carbon dioxide and methane and FLEX to provide global maps of vegetation fluorescence

26 November 2010.- As part of the procedure to realise ESA's series of Earth Explorers, two new mission proposals have been selected for further development. The missions, called FLEX and CarbonSat, now vying to be the eighth Earth Explorer, both address key climate issues.

The selection follows ESA's Call for Earth Explorer Proposals that was released in October last year and ended in the Agency receiving 31 mission concepts. Subsequently, the proposals were evaluated by four peer review panels.

This evaluation process, which included a programmatic and technical assessment, resulted in ESA's Earth Science Advisory Committee selecting the

two most scientifically relevant and programmatically feasible concepts - recommending that the Fluorescence Explorer (FLEX) and CarbonSat be presented to ESA's Programme Board for Earth Observation.

At the Earth Observation Programme Board Member States meeting, held on 24 November, it was decided to go ahead with the recommendation for FLEX and CarbonSat to move forward to 'Phase-A/B1'. This phase includes feasibility study and further consolidation of the various components that make up a satellite mission.

In this case, FLEX and CarbonSat aim to provide key information on different aspects of the carbon cycle.

The CarbonSat mission would quantify and monitor the distribution of carbon dioxide and methane. Data from the mission would lead to a better understanding of the sources and sinks of these two gases and how they are linked to climate change.

The FLEX mission aims to provide global maps of vegetation fluorescence, which can be converted into an indicator of photosynthetic activity. These data would improve our understanding of how much carbon is stored in plants and their role in the carbon and water cycles.

ESA

Oceans Day in Nagoya, Japan

tackles marine and coastal biodiversity

4 November 2010.- On 23 October 2010, the 'Oceans Day' event was held in Nagoya, Japan, in conjunction with the 10th meeting of the Conference of the Parties (COP 10) to the Convention on Biological Diversity (CBD).

The Day brought together some 150 participants from 35 countries representing sectors of the global oceans community.

Building on the discussions on marine and coastal biodiversity held at the Global Oceans Conference 2010, held in Paris on 3-7 May 2010, Oceans Day at Nagoya addressed the threats to the world's marine and coastal biodiversity, which are exacerbated by climate change.

Oceans Day featured presentations from panelists organised by theme and focused on major issues in marine and coastal biodiversity.

The co-chairs of the Nagoya Oceans Day drafted the Nagoya Oceans Statement, which calls for the high-level government representatives gathered at the CBD COP 10 to:

- * Rekindle political will and commit resources to halt marine biodiversity loss;
- * Restore degraded marine habitats;
- * Establish global representative and resilient networks of marine and coastal protected areas in the next decade, 2011-2020.

The Statement further stresses the need for new marine and coastal biodiversity targets at the UN Conference on Sustainable Development 2012 (UNCSD, or Rio+20) and at the CBD COP 11 in 2012 in order to move the marine biodiversity agenda forward.

Oceans Day at Nagoya was organized by the Global Forum on Oceans, Coasts, and Islands, in association with the Secretariat of the CBD, the Global Environment Facility (GEF), and the Ocean Policy Research Foundation (OPRF), Japan, with funding support from various governments and intergovernmental and UN organisations.

Ocean acidification: questions answered

in a new guide produced by the Ocean Acidification Reference User Group

The Ocean Acidification Reference User Group (<http://www.epoca-project.eu/index.php/what-do-we-do/outreach/rug.html>) has launched a new guide 'Ocean acidification: questions answered'.

In this guide four new things are done. We answer some key questions many people are now asking about ocean acidification. We say how sure the international scientific community is about what is already happening to the

ocean, we discuss what the future may hold for the ocean in a high carbon dioxide (CO₂) world, and we explore the consequences for all of us of what is now happening.

Questions Answered follows on from the highly successful multilingual guide called Ocean Acidification: The Facts (<http://www.epoca-project.eu/index.php/what-do-we-do/outreach/rug/oa-the-facts.html>), which was launched in winter 2009 at the UN climate change conference at Copenhagen. Questions Answered is inevitably more technical in nature than The Facts as it begins to help champion the science and reasoning behind frequently asked questions.

By getting to the point and improving understanding around these critical issues, we hope that many more people will not only be better informed about ocean acidification, but will also act with greater consensus, greater ambition and greater urgency to tackle one of the most significant environmental issues faced by present and future generations.

Ocean Acidification Reference User Group, 2010. Ocean acidification: questions answered, Laffoley D. d'A. & Bax-

ter J. M. (Eds.), 24 p. European Project on Ocean Acidification (EPOCA).

The guide can be downloaded in five languages here: <http://www.epoca-project.eu/index.php/what-do-we-do/outreach/rug/oa-questions-answered.html>

**Ocean Acidification Reference
User Group**

2010 Albert Maucher Prize Awarded to Potsdam Palaeoclimatologist

DFG Recognises Junior Professor for Outstanding Geoscientific Research

07 October 2010.- Professor Ulrike Herzschuh was awarded the Albert Maucher Prize in Geoscience on 10 October 2010. With the prize, presented as part of the celebration marking the 100th anniversary of the Geologische Vereinigung (GV) in Frankfurt am Main, the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) recognises the junior professor at the Alfred Wegener Institute and the University of Potsdam for excellent research in various DFG-funded projects. The prize, worth 10,000 euros, was donated by Munich geologist Albert Maucher, who himself received DFG funding at the beginning of his scientific research career.

According to Maucher's wishes, the prize expressly recognises unconventional research approaches and methods as well.

As a junior professor for palaeoecology and palaeoclimatology at the Institute for Geosciences of the University of Potsdam, Professor Ulrike Herzschuh (35) studies the climate of prehistoric times. For this purpose, she researches in Asia (Tibetan high plateau, China, Mongolia and Siberia), examining fossil pollen, chironomid midges and other fossils in marine sediments to determine past climatic conditions. This is in addition to data from isotope measurements and the analysis of biomarkers in or-

ganic components of the sediments. In a further step, Herzschuh studies what the findings reveal about the global palaeoclimate. Her work focuses on the role of the permafrost on the climate of the polar regions.

The young researcher and two-time mother was recommended for the prize on account of her diverse international collaborations and her outstanding publication output. In addition, she has successfully secured funding for and completed her own projects and is committed to academic teaching and university self-administration.

Isotopic evidence of C4 grasses in southwestern Europe during the Early Oligocene-Middle Miocene

million years earlier than previous isotopic evidence of first C4 plants and before carbon dioxide concentrations fell during the Oligocene

C4 plants account for approximately 25% of terrestrial primary production on earth, dominate warm-climate grasslands, and include important crops such as maize. Thus, the evolution of the C4 photosynthetic pathway, which occurred first in the grass family, was a significant event in plant evolutionary history. Unlike the ancestral C3 pathway, the C4 pathway has a carbon-concentrating mechanism that provides C4 plants with a competitive advantage over C3 plants when atmospheric carbon dioxide concentrations are low. It has long been thought that declining atmospheric

carbon dioxide concentrations in Earth's history should have caused, or been a precondition for, the origin of C4 grasses.

But testing this idea using geological records has been challenging. In a paper published in the *Geology* journal, Urban et al. employed a novel technique for analysis of carbon isotopes in individual grains of grass pollen extracted from Oligocene-Miocene sediments in southwestern Europe. They found that C4 grasses occurred on the landscape during the early Oligocene, about 14 million years earlier than previous isoto-

pic evidence of first C4 plants, and before carbon dioxide concentrations fell during the Oligocene. So, rather than carbon dioxide concentrations, factors such as warm temperatures and/or aridity may have been important controls of the origin of C4 photosynthesis.

Reference: Michael A. Urban et al., *GEOLOGY*, December 2010, pages 1091-1094.

Geological Society of America

New deep-sea hot springs discovered in the Atlantic

Hydrothermal vents may contribute more to the thermal budget of the oceans than previously assumed

Scientists from the MARUM Center for Marine Environmental Sciences and the Max Planck Institute for Marine Microbiology in Bremen on board the German research vessel Meteor have discovered a new hydrothermal vent 500 kilometres south-west of the Azores. The vent with chimneys as high as one meter and fluids with temperatures up to 300 degrees Celsius was found at one thousand metres water depth in the middle of the Atlantic Ocean. The discovery of the new deep-sea vent is remarkable because the area in which it was found has been intensively studied during previous research cruises. The MARUM and Max Planck researchers describe their discovery in their video blog.

The Bremen scientists were able to find the hydrothermal vent by using the new, latest-generation multibeam echosounder on board the research vessel Meteor, that allows the imaging of the water column above the ocean floor with previously unattained precision. The scientists saw a plume of gas bubbles in the water column at a site about 5 kilometers away from the known large vent field Menez Gwen that they were working on. A dive with the remote-controlled submarine MARUM-QUEST revealed the new hydrothermal site with smokers and animals typically found at vents on the Mid-Atlantic Ridge.

Since the discovery of the new vent, the scientists have been intensively searching the water column with the mul-

tibeam echosounder. To their astonishment, they have already found at least five other sites with gas plumes. Some even lie outside the volcanically active spreading zone in areas where hydrothermal activity was previously not assumed to occur.

"Our results indicate that many more of these small active sites exist along the Mid-Atlantic Ridge than previously assumed", said Dr. Nicole Dubilier, the chief scientist of the expedition. "This could change our understanding of the contribution of hydrothermal activity to the thermal budget of the oceans. Our discovery is also exciting because it could provide the answer to a long standing mystery: We do not know how animals travel between the large hydrothermal vents, which are often separated by hundreds to thousands of kilometres from each other. They may be using these smaller sites as stepping stones for their dispersal".

Research on deep-sea hydrothermal vents in the Atlantic is the objective of the 30 marine scientists from Hamburg, Bremen, Kiel, Portugal, and France who have been on board the German research vessel Meteor since September 6th. The expedition to the submarine volcano Menez Gwen near the Azores is financed by MARUM, the Center for Marine Environmental Sciences in Bremen. "One of the questions that the team would like to answer is why the hydrothermal sources in this area emit so much meth-

ane – a very potent greenhouse gas", says chief scientist Nicole Dubilier, who is also a member of the Steering Committee of the Census of Marine Life Vents and Seeps project ChEss (Chemosynthetic Ecosystem Science). "Another important focus of the research is the deep-sea mussels that live at the hydrothermal vents and host symbiotic bacteria in their gills. The mussels obtain their nutrition from these bacteria".

[Video blog: "News from the main deck"](#)

An expedition on a research vessel is not only marked by great moments, like this discovery; everyday life on the Meteor is also filled with other exciting activities and events. Work on a research vessel goes on round the clock throughout the entire expedition. In his video podcast "Neues vom Peildeck/News from the observation deck", available through the Hamburg-based newspaper Abendblatt, and in German and English on YouTube (see link below), Dennis Fink, a doctoral student at the Max Planck Institute for Marine Microbiology, reports on the activities of the ship's remote-operated vehicle (ROV) MARUM-QUEST, the various instruments used by the scientists and life on board the ship. In the two-minute video blogs, Fink and his colleagues show fascinating images direct from the sea floor.

MARUM

Available dataset of surface measurements collected during the BASE:ALFA project

It includes turbulent, thermodynamic and energy measurements at the surface in addition to soil humidity and temperature profiles, LiDAR observations of the evolution of the BL and high resolution radio-soundings

The Budget of the Atmosphere-Soil Exchange:

A Long-term Fluxes Analysis (BASE:ALFA) project is an ARPA-SIMC sponsored project with the main aim of improving our understanding of the processes that couple the surface to the atmosphere through the boundary layer using ob-

servations, numerical simulations, and physical models. The BASE:ALFA project comprises an observational phase and a two year period of subsequent modelling studies based on the collected datasets. To allow detailed NWP model evaluation and verification a very comprehensive set of surface measurements including radiative and turbulent fluxes, remote observa-

tion of the PBL evolution, and a whole set of hydrological measurements comprising ground temperature and humidity profiles have been acquired.

The dataset spans a period of 4 month from summer 2009 to spring 2010. BASE:ALFA intensive observational periods (IOPs) took place at San Pietro Capofiume (SPC) in the middle

of the Italian Po Valley, where a duly operating observing station managed by ARPA-SIMC is active since 1984. In addition to the conventional meteorological measurements including surface and upper air observations, for the BASE:ALFA project, SPC was equipped with additional in-situ and remote instrumentation.

The thermodynamic observation of the ground and of its interface with the atmosphere was provided by the combination of a Time-Domain Reflectometer (TDR) and a micro-meteorological station comprising a sonic anemometer Metek USA-1, a high-frequency infrared gas analyzer LiCor LI-7500 and a Kipp&Zonen CNR-1 radiometer. The TDR measures soil water content and temperature profiles at 8 unevenly spaced levels below the ground between 10 and 100 cm. The micro-meteorological station instead provides through eddy correlation technique surface fluxes of sensible and latent heat, momentum fluxes, in addition to carbon dioxide and water vapor fluxes. Energy budget both in the shortwave and longwave was also recorded at the soil level by two independent radiometers. Temperature, humidity, zonal and meridional wind and precipitation were recorded in almost continuous mode at 2 m and



Instrumentation located at San Pietro Capofume during the BASE:ALFA Intensive Operational Periods

10 m heights as in a standard synop station. The remote observation of the boundary layer evolution was provided by a commercial LiDARCeilometer, Vaisala LD-40.

The dataset is now made available for scientific purposes through the web-

site: <http://www.smr.arpa.emr.it/base-alfa/>

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Raising Giant Insects

29 October 2010.- Boulder, CO, USA - The giant dragonflies of ancient Earth with wingspans of up to 70 centimeters (28 inches) are generally attributed to higher oxygen atmospheric levels in the atmosphere in the past. New experiments in raising modern insects in various oxygen-enriched atmospheres have confirmed that dragonflies grow bigger with more oxygen, or hyperoxia.

However, not all insects were larger when oxygen was higher in the past. For instance, the largest cockroaches ever are skittering around today. The question becomes how and why do different groups respond to changes in atmospheric oxygen.

The secrets to why these changes happened may be in the hollow tracheal tubes insects use to breathe. Getting a better handle on those changes in modern insects could make it possible to use

fossilized insects as proxies for ancient oxygen levels.

‘Our main interest is in how paleo-oxygen levels would have influenced the evolution of insects’, said John VandenBrooks of Arizona State University in Tempe. To do that they decided to look at the plasticity of modern insects raised in different oxygen concentrations. The team raised cockroaches, dragonflies, grasshoppers, meal worms, beetles and other insects in atmospheres containing different amounts of oxygen to see if there were any effects.

One result was that dragonflies grew faster into bigger adults in hyperoxia. However, cockroaches grew slower and did not become larger adults. In all, ten out of twelve kinds of insects studied decreased in size in lower oxygen atmospheres. But there were varied responses when they were placed into an enriched

to study ancient oxygen levels in the atmosphere

oxygen atmosphere. VandenBrooks will be presenting the results of the work on Monday, Nov. 1 at the annual meeting of the Geological Society of America in Denver.

‘The dragonflies were the most challenging of the insects to raise’, said VandenBrooks because, among other things, there is no such thing as dragonfly chow. As juveniles they need to hunt live prey and in fact undergraduate students Elyse Muñoz and Michael Weed working with Dr. VandenBrooks had to resort to hand feeding the dragonflies daily.

‘Dragonflies are notoriously difficult to rear under laboratory conditions, said VandenBrooks.

Once they had worked that out, however, they raised three sets of 75 dragonflies in atmospheres containing 12 percent (the lowest oxygen has been in the past), 21 percent (like modern Earth’s

atmosphere) and 31 percent oxygen (the highest oxygen has been).

Cockroaches, as anyone who has fought them at home knows, are much easier to rear. That enabled the researchers to raise seven groups of 100 roaches in seven different atmospheres ranging from 12 percent to 40 percent oxygen mimicking the range of paleo-oxygen levels. Cockroaches took about twice as long to develop in high oxygen levels.

‘It is the exact opposite of what we expected’, said VandenBrooks. One possibility is that the hyperoxic reared roaches stayed in their larval stage longer, perhaps waiting for their environment to change to a lower, maybe less stressful oxygen level.

This surprising result prompted the researchers to take a closer look at the breathing apparatus of roaches – their tracheal tubes. These are essentially hollow tubes in an insect’s body that allow gaseous oxygen to enter directly into the insect tissues.

VandenBrooks and his team took their hyperoxic reared roaches to Argonne National Lab’s x-ray synchrotron imaging facility to get a closer look at the tracheal tubes. The x-ray synchrotron is particularly good at resolving the edges where things of different phases meet – like solids on liquids or gas on solids. That’s just what the inside of a tracheal tube is.

What they found was that the tracheal tubes of hyperoxic reared roaches were smaller than those in lower oxygen atmospheres. That decrease in tube size with no increase in the overall body size would allow the roaches to possibly invest more in tissues used for other vital functions other than breathing – like eating or reproducing. The roaches reared in hypoxia (lower oxygen) would have to trade off their investment in these other tissues in order to breathe.

The next step, said VandenBrooks, will be to look closely at the tracheal tubes of insects fossilized in amber to see what they might say about oxygen levels at various

times in the past. These might possibly serve as a proxy for paleo-oxygen levels.

‘There have been a lot of hypotheses about the impact of oxygen on evolution of animals, but nobody has really tested them’, said VandenBrooks. ‘So we have used a two-pronged approach: 1) study modern insects in varying oxygen levels and 2) study fossil insects and understand changes in the past in light of these results’.

Reference:

Paper No. 77-5: Atmospheric oxygen and the evolution of insect gigantism

http://gsa.confex.com/gsa/2010AM/finalprogram/abstract_181665.htm

Reference URL: <http://www.geosociety.org/news/pr/10-60.htm>



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Radon signals at the Roded site, Southern Israel

It is suggested that the observed periodicity reflects a direct link with the solar radiation tide.

Temporal variations of radon in the geological environment (upper crust) are frequent and recognized as unique in terms of the signals encountered and for the lack of substantial and generally applicable explanations. The phenomena observed at the Roded site, located in arid southern Israel, illustrate this situation. The monitoring of radon in the last 10 years or more has been carried out in massive meta-diorite of the Precambrian basement block of Roded.

Systematic temporal variation patterns, manifested as large relative signals are composed of sub-diurnal (SDR) radon, multi-day (MD) and annual (AR) signals. The overall variation is dominated by the intense SDR signals which occur in some days, and may vary from background levels (5 counts or less) to peak values (attaining >1000 counts) and back to background at an interval of 6 to 12 h. Intervals of up to several tens of days without significant SDR signals interchange with times of intense daily occurrences of such signals. Their occurrence indicates very fast variations of radiation from radon at the point of measurement. The peak times, within the diurnal 24-h cycle of SDR signals occur preferentially at an interval of 14–16 h (UT+2). Spectral analysis indicates:

(a) A diurnal periodicity composed of a primary 24-h and a secondary 12-h periodicity, which are attributed to the solar tide constituents S1 and S2. Tidal constituents indicative for gravity tide (O1, M2) are lacking;

(b) An annual periodicity.

A compound relation among the diurnal and annual periodicity is indicated by: (a) Continuous Wavelet Transform (CWT) analysis shows an overall annual structure with a modulation of the S1 and S2 periodicities; (b) Moving-time-window Fourier spectral analysis showing that the amplitudes of S1 and S2 vary in an annual pattern, with relatively high values in summer. The phase of S1, S2 and S3 shows a systematic multi-year variation. It is suggested that the significant signatures of the periodic phenomena and their modulations reflect a direct link with the solar radiation tide.

The full paper is available free of charge at <http://www.solid-earth.net/1/99/2010/se-1-99-2010.html>

Steinitz, G. and Piatibratova, O.: Radon signals at the Roded site, Southern Israel, *Solid Earth*, 1, 99-109, doi:10.5194/se-1-99-2010, 2010.

Trends in coastal upwelling intensity during the late 20th century

give additional support to the hypothesis that the coastal upwelling intensity increases globally because of raising greenhouse gas concentrations in the atmosphere and an associated increase of the land-sea pressure gradient and meridional wind stress

This study presents linear trends of coastal upwelling intensity in the later part of the 20th century (1960–2001) employing various indices of upwelling, derived from meridional wind stress and sea surface temperature.

The analysis was conducted in the four major coastal upwelling regions in the world, which are off North-West Africa, Lüderitz, California and Peru.

The trends in meridional wind stress showed a steady increase of intensity from 1960–2001, which was also reflected in the SST index calculated for the same time period. The steady cooling observed in the instrumental records of SST off California substantiated this observation further. It was also noted that the trends in meridional wind stress obtained from different datasets differ substantially from each other. Correlation analysis showed that basin-scale oscillations like the Atlantic Multidecadal Oscillation (AMO) and the Pacific Decadal Oscillation (PDO) could not be directly linked to the observed increase of upwelling intensity off NW Africa and California

respectively. The relationship of the North Atlantic Oscillation (NAO) with coastal upwelling off NW Africa turned out to be ambiguous due to a negative correlation between the NAO index and the meridional wind stress and a lack of correlation with the SST index.

The results give additional support to the hypothesis that the coastal upwelling intensity increases globally because of raising greenhouse gas concentrations in the atmosphere and an associated increase of the land-sea pressure gradient and meridional wind stress.

The full paper is available free of charge at <http://www.ocean-sci.net/6/815/2010/os-6-815-2010.html>

Narayan, N., Paul, A., Mulitza, S., and Schulz, M.: Trends in coastal upwelling intensity during the late 20th century, *Ocean Sci.*, 6, 815-823, doi:10.5194/os-6-815-2010, 2010.

Internal solitary waves: propagation, deformation and disintegration

a review of applied models

In coastal seas and straits, the interaction of barotropic tidal currents with the continental shelf, seamounts or sills is often observed to generate large-amplitude, horizontally propagating internal solitary waves. Typically these waves occur in

regions of variable bottom topography, with the consequence that they are often modeled by nonlinear evolution equations of the Korteweg-de Vries type with variable coefficients. The authors review how these models are used to describe the

propagation, deformation and disintegration of internal solitary waves as they propagate over the continental shelf and slope.

The full paper is available free of charge at <http://www.nonlin-processes-geophys.net/17/633/2010/npg-17-633-2010.html>

Grimshaw, R., Pelinovsky, E., Talipova, T., and Kurkina, O.: Internal solitary waves: propagation, deformation and disintegration, *Nonlin. Processes Geophys.*, 17, 633-649, doi:10.5194/npg-17-633-2010, 2010.

A simple conceptual model to interpret the 100 000 years dynamics of paleo-climate records

within a general dynamical framework

Spectral analyses performed on records of cosmogenic nuclides reveal a group of dominant spectral components during the Holocene period. Only a few of them are related to known solar cycles, i.e., the De Vries/Suess, Gleissberg and Hallstatt cycles. The origin of the others remains uncertain.

On the other hand, time series of North Atlantic atmospheric/sea surface temperatures during the last ice age display the existence of repeated large-scale warming events, called Dansgaard-Oeschger (DO) events, spaced around multiples of 1470 years. The De Vries/Suess and Gleissberg cycles with periods close to 1470/7 (~210) and 1470/17 (~86.5) years have been proposed to explain these observations.

In this work the authors found that a conceptual bistable model forced with the De Vries/Suess and Gleissberg cycles plus noise displays a group of dominant frequencies similar to those obtained in the Fourier spectra from paleo-climate

during the Holocene. Moreover, they show that simply changing the noise amplitude in the model they obtain similar power spectra to those corresponding to GISP2 d18O (Greenland Ice Sheet Project 2) during the last ice age. These results give a general dynamical framework which allows them to interpret the main characteristic of paleoclimate records from the last 100 000 years.

The full paper is available free of charge at <http://www.nonlin-processes-geophys.net/17/585/2010/npg-17-585-2010.html>

Quiroga Lombard, C. S., Balenzuela, P., Braun, H., and Chialvo, D. R.: A simple conceptual model to interpret the 100 000 years dynamics of paleo-climate records, *Nonlin. Processes Geophys.*, 17, 585-592, doi:10.5194/npg-17-585-2010, 2010.

Tree-ring reconstructions in natural hazards research

Special issue at NHSS

Time series of tree rings have considerably contributed to the endeavors of earth-system, earth-surface processes and natural hazards in the past. The potential of dendrogeomorphology lies in the capacity of trees growing in climates with distinct seasons to both preserve evidence of past disasters and to provide critical information on their dating with annual and sometimes monthly resolution. As a result, tree-ring records may represent one of the most valuable and precise natural archives for the reconstruction and therefore for the understanding of past events.

The initial employment of tree rings in earth-surface process studies was simply as a dating tool: it rarely exploited other environmental information that could be derived from studies of ringwidth variations and records of damage contained within the tree itself. However, these unique, annually resolved, tree-ring records usually preserve potentially valuable archives of past geomorphic events on timescales of a few decades to several centuries. The documentation of time series of events as well as the understanding their areal extent and controls provides valuable information that can assist in the prediction, mitigation and defense against these hazards and their effects on society.

This special issue contains a selection of presentations given to session NH10.02 'Tree ring reconstructions in natural hazards research', organized within the General Assembly of the EGU in Vienna on 20 April 2007. The session was convened by Markus Stoffel and Michelle Bollschweiler. A total

of 18 oral communications and poster were presented, from which eight are included in this special volume.

The different contributions illustrate how tree-ring analysis can be used to reconstruct natural hazards and provide information that may be used to understand the future occurrence of events. The papers also illustrate the breadth and diverse applications of contemporary dendrogeomorphology and underline the growing potential to expand these studies, possibly leading to the establishment of a range of techniques and approaches that may become standard practice in the analysis of specific hazards. In addition, data on process dynamics and triggers are of great value for the overall understanding of mass movements and the way they are influenced by changing climatic conditions. Such data represent compulsory prerequisites for realistic estimates of the current and for potential future evolution of earth-surface processes in space and time and a basis for future research in an even larger variety of geographic environments.

In the introductory paper, Stoffel and Bollschweiler (2008) provide a broad overview on current approaches used in tree-ring reconstructions of natural disasters resulting from earth-surface processes and outline the impact that mass movements have on tree morphology, tree growth and wood anatomy.

The second paper by Schneuwly and Stoffel (2008) reconstructs rockfall activity on a slope in the Swiss Alps using 154 wounds from 32 European larch (*Larix decidua* Mill.), Norway

spruce (*Picea abies* (L.) Karst.) and Swiss stone pine (*Pinus cembra* L.) trees. The intra-annual position of wounds points to strong intra- and inter-annual variations of rockfall activity, with a clear peak (76%) in winter. Findings suggest that rockfall activity at the study site is driven by annual thawing processes and the circulation of melt water in preexisting fissures. Data also indicate that 43% of all rockfall events occurred in 1995, when two major precipitation events are recorded in nearby meteorological stations.

Two contributions of the special issue deal with erosion and landscape evolution. Rubiales et al. (2008) used anatomical changes in exposed roots of Scots pine (*Pinus sylvestris* L.) to date denudation along a trail located in the Sierra de Guadarrama (Spain). The moment of root exposure was reconstructed via changes in ring width, tracheid number per ring, percentage of latewood and earlywood lumina. Results indicate that *P. sylvestris* show a statistically significant anatomical response to exposure by sheet erosion. Increased ring widths are accompanied by a slight reduction of earlywood tracheid lumina and several rows of thick-walled latewood tracheids. Scuderi et al. (2008) use a combination of dendroclimatic and dendrogeomorphic approaches to study relationships between climatic variability and hillslope and valley floor dynamics in a small drainage basin in the Colorado Plateau (USA). Root exposure, tree tilting, change in plant cover as well as the burial or exhumation of valley bottom trees and shrubs suggest that the currently observed process of root colonization and rapid breakdown of the weakly cemented bedrock by subaerial weathering has led to a discontinuous, climate-controlled production of sediment from these slopes. High-amplitude precipitation shifts over the last 2000 years may exert the largest control on landscape processes and may be as, or more, important than other hypothesized causal mechanisms (e.g. ENSO frequency and intensity, flood frequency) in eroding slopes and producing sediments.

The application of dendrogeomorphology for the dating of snow avalanches is well established in the natural hazards literature and a variety of methodologies are employed by different authors. However, no standard currently exists for appropriate sample sizes, the “weighting” of tree-ring responses, or the minimum number of responding trees required to infer an avalanche event. Butler and Sawyer (2008) review the literature of dendrogeomorphology as it applies to snow avalanches, and examine the questions of sample size, type of ring reactions dated and weighted, and minimum responses.

Tree-ring data are presented from two avalanche paths in the Rocky Mountains (Montana, USA), from trees uprooted by high-magnitude snow avalanches in the winter of 2002. These data provide distinct chronologies of past avalanche events, and also illustrate how the critical choice of a minimum index number can affect the number of avalanche events in a final chronology based on tree-ring analysis. The second paper dealing with snow avalanches is by Muntan et al. (2009) and reports a regional study of large-scale snow avalanche events in the SE Pyrenees in the last four decades. Results show that dendrogeomorphology may complement written records even for relatively recent events and that results can be of great value for the assessment of runout distances or lateral spread as well as for the realization of hazard maps. Casteller et al. (2008) coupled tree-ring data from Southern Hemisphere beech (*Nothofagus pumilio*) with a two-dimensional snow avalanche model to reconstruct a deadly avalanche which occurred in the Patagonian Andes (Argentina) in winter 2002. Using information released by local governmental authorities and compiled in the field, the avalanche event was numerically simulated using AVAL- 1D and RAMMS. Model simulation results were compared with documentary and tree-ring evidence and show a good agreement between the modeled and reconstructed extent. Differences between observation and simulation are mostly stemming from the low resolution of the digital elevation model used to represent topography.

Solomina et al. (2008) used tree rings to date volcanic eruptions at Shiveluch, one of the most active volcanoes in Kamchatka. The authors report tree-ring dates for a recent pyroclastic flow in the Baidarnaia valley to shortly after AD1756, but not later than AD1758. This date coincides with the decrease of ring-width in trees growing near Shiveluch volcano in 1758–1763. The deposits of the pyroclastic flow in the Kamen-skaia valley probably date back to ~AD1649. This date is in close agreement with previously obtained radiocarbon dates of these sediments and with tephrochronological data and show that tree-ring records can be very valuable to constrain the chronology of volcanic events in remote areas.

The special issue is accessible free of charge at http://www.nat-hazards-earth-syst-sci.net/special_issue76.html

Stoffel, M. and Bollschweiler, M.: Preface ‘Tree-ring reconstructions in natural hazards research’, *Nat. Hazards Earth Syst. Sci.*, 10, 2355-2357, doi:10.5194/nhess-10-2355-2010, 2010.

The Earth system model of intermediate complexity LOVECLIM 1.2

the last model version reproduces well the major characteristics of the observed climate both for present-day conditions and for key past periods but some biases are still present

The main characteristics of the new version 1.2 of the three-dimensional Earth system model of intermediate complexity LOVECLIM are briefly described.

LOVECLIM 1.2 includes representations of the atmosphere, the ocean and sea ice, the land surface (including vegetation), the ice sheets, the icebergs and the carbon cycle.

The atmospheric component is ECBilt2, a T21, 3-level quasi-geostrophic model. The ocean component is CLIO3, which consists of an ocean general circulation model coupled to a comprehensive thermodynamic-dynamic sea-ice model.

Its horizontal resolution is of 3° by 3°, and there are 20 levels in the ocean. ECBilt-CLIO is coupled to VECODE, a vegetation model that simulates the dynamics of two main terrestrial plant functional types, trees and grasses, as well as desert. VECODE also simulates the evolution of the carbon cycle over land while the ocean carbon cycle is represented by LOCH, a comprehensive model that takes into account both the solubility and biological pumps. The ice sheet component AGISM is made up of a three-dimensional thermomechanical model of the ice sheet flow, a visco-elastic bedrock model and a model

of the mass balance at the ice-atmosphere and ice-ocean interfaces. For both the Greenland and Antarctic ice sheets, calculations are made on a 10 km by 10 km resolution grid with 31 sigma levels. LOVECLIM1.2 reproduces well the major characteristics of the observed climate both for present-day conditions and for key past periods such as the last millennium, the mid-Holocene and the Last Glacial Maximum. However, despite some improvements compared to earlier versions, some biases are still present in the model. The most serious ones are mainly located at low latitudes with an overestimation of the temperature there, a too symmetric distribution of precipitation between the two hemispheres, and an overestimation of precipitation and vegetation cover in the subtropics. In addition, the atmospheric circulation is too weak. The model also tends to underestimate the surface temperature changes (mainly at low latitudes) and to overestimate the ocean heat uptake observed over the last decades.

The full paper is available free of charge at <http://www.geosci-model-dev.net/3/603/2010/gmd-3-603-2010.html>

Goosse, H., Brovkin, V., Fichefet, T., Haarsma, R., Huybrechts, P., Jongma, J., Mouchet, A., Selten, F., Barriat, P.-Y., Campin, J.-M., Deleersnijder, E., Driesschaert, E., Goelzer, H., Janssens, I., Loutre, M.-F., Morales Maqueda, M. A., Opsteegh, T., Mathieu, P.-P., Munhoven, G., Pettersson, E. J., Renssen, H., Roche, D. M., Schaeffer, M., Tartinville, B., Timmermann, A., and Weber, S. L.: Description of the Earth system model of intermediate complexity LOVECLIM version 1.2, *Geosci. Model Dev.*, 3, 603-633, doi:10.5194/gmd-3-603-2010, 2010.

Holocene climate variability over Scandinavia

A special issue originating from a workshop organized by the Bert Bolin Centre for Climate Research

Scandinavia has a long tradition of Late Quaternary research – it was in this part of the world that much of the foundations for our current understanding of the post-glacial climate evolution was laid, not the least through analyses of fossil plant evidence in peat bogs (e.g. Andersson, 1902, 1909; Seppä et al., 2010): ‘... in the whole of Scandinavia, from the most northerly to the most southerly parts, there are found, on land and in the sea, traces of a warmer period in post-glacial time during which the time of vegetation was considerably longer than now, and with about 2.5 °C. mean temperature higher, while the winters were presumably about the same as now or considerably warmer’. (Andersson, 1909, p. 65).

Since the earliest investigations more than a century ago, other climate archives with sometimes high temporal resolution, e.g. lake sediments, speleothems and tree-rings, have been explored by the use of various types of proxies, such as the variations of stable oxygen isotope ratios (Lauritzen and Lundberg, 1999) and the sedimentary accumulation rates of organic and minerogenic matter (Ojala and Alenius, 2005). Moreover, the undertaking of numerical simulations with advanced climate models now makes it possible to test hypotheses for patterns of, and processes behind, climate changes inferred from proxy data at different time scales (e.g. Renssen et al., 2009) – something that was hardly even thinkable a century ago.

The recently founded Bert Bolin Centre for Climate Research at Stockholm University launched in 2007, as one of its first activities, a project called “Stable oxygen isotope variations and tree-ring records in Scandinavia and their relations to atmospheric circulation patterns during the Holocene”. The overall project aim was to increase the understanding of climate variability during the Holocene through integrating proxy data analysis and global climate modelling. To gain knowledge from a wider scientific community with an interest in Holocene climate variability over Scandinavia, the Bolin Centre project group invited 28 scientists and arranged a workshop which was held on 1–2 April 2008 at Saby Sateri, Ingarö, near Stockholm.

The aim with the workshop was to bring together scientists working with stable oxygen isotope archives, dendroclimatology and atmospheric or ocean modelling relevant for Scandinavia, and thereby fertilize cross-disciplinary discussions among proxy data experts and climate modellers, and to learn from each others disciplines. Five key-note talks were presented; two of them reviewed the state-of-the-art concerning data availability and interpretation of $\delta^{18}\text{O}$ records from lake sediments and tree-ring records and three others reviewed knowledge from climate modelling studies. The key-note talks served to stimulate subsequent group discussions.

Despite substantial progress in knowledge gained throughout the century of proxy-based research in this region, the discussions held at the workshop revealed that there are still several uncertainties regarding the interpretation of various proxy-data types. From a modelling point of view, these uncertainties together with the rather sparse availability of proxy records in many regions – not the least in many areas outside Scandinavia – led to conclusions that there is not yet sufficient information to firmly validate the simulations. Therefore, the workshop participants agreed that there is still a strong need for improved understanding of the proxy records, reduced uncertainties and increased spatial density of proxy data. The participants further advocated the development of synthetic pseudo-proxy records, in particular methods for forward modelling of synthetic $\delta^{18}\text{O}$ records, in order to use those records for methodological development of data assimilation techniques. Such methods were considered useful to investigate the possibilities to reconstruct circulation patterns, trajectories and flow regimes.

One particular and concrete outcome of the workshop, was the recognition of the usefulness of a special issue that provides an overview of the current state-of-the-art of the Holocene climate variability over Scandinavia – focusing on both proxy-data and modelling issues. Seven workshop participants and two further colleagues volunteered to act as lead authors, whereafter the local organizers contacted the editorial board of *Climate of the Past* which agreed to set up a special issue on the topic in question. The nine papers that now constitute this special issue are:

1. Last nine-thousand years of temperature variability in Northern Europe (Seppa et al., 2009).
2. Stable isotope records for the last 10 000 years from Okshola cave (Fauske, northern Norway) and regional comparisons (Linge et al., 2009).
3. Reconstructing past atmospheric circulation changes using oxygen isotopes in lake sediments from Sweden (Jonsen et al., 2010).
4. Dendroclimatology in Fennoscandia – from past accomplishments to future potential (Linderholm et al., 2010).
5. An introduction to stable water isotopes in climate models: benefits of forward proxy modelling for paleoclimatology (Sturm et al., 2010).
6. Holocene trends in the foraminifer record from the Norwegian Sea and the North Atlantic Ocean (Andersson et al., 2010).
7. Climate change between the mid and late Holocene in northern high latitudes – Part 1: Survey of temperature and precipitation proxy data (Sundqvist et al., 2010).
8. Climate change between the mid and late Holocene in northern high latitudes – Part 2: Model-data comparisons (Zhang et al., 2010).

9. Using data assimilation to study extratropical Northern Hemisphere climate over the last millennium (Widmann et al., 2010).

Workshop participants and references:

See the original article at <http://www.clim-past.net/6/719/2010/cp-6-719-2010.pdf>

The special issue is accessible free of charge at http://www.clim-past.net/special_issue21.html

Moberg, A., Holmgren, K., Renssen, H., Sundqvist, H. S., and Zhang, Q.: Preface "Holocene climate variability over Scandinavia – A special issue originating from a workshop organized by the Bert Bolin Centre for Climate Research", *Clim. Past*, 6, 719-721, doi:10.5194/cp-6-719-2010, 2010.

Field intercomparison of two optical analyzers for CH₄ eddy covariance flux measurements

a quantum cascade laser based absorption spectrometer and an off-axis integrated cavity output spectrometer both yield satisfactory results

Fast response optical analyzers based on laser absorption spectroscopy are the preferred tools to measure field-scale mixing ratios and fluxes of a range of trace gases. Several state-of-the-art instruments have become commercially available and are gaining in popularity.

This paper aims for a critical field evaluation and intercomparison of two compact, cryogen-free and fast response instruments: a quantum cascade laser based absorption spectrometer from Aerodyne Research, Inc., and an off-axis integrated cavity output spectrometer from Los Gatos Research, Inc. In this paper, both analyzers are characterized with respect to precision, accuracy, response time and also their sensitivity to water vapour. The instruments were tested in a field campaign to assess their behaviour under various meteorological conditions. The instrument's suitability for eddy covariance flux measurements was evaluated by applying an artificial flux of CH₄ generated above a managed grassland with otherwise very low methane exchange. This allowed an independent verification

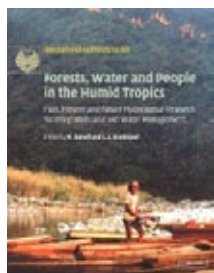
of the flux measurements accuracy, including the overall eddy covariance setup and data treatment. The retrieved fluxes were in good agreement with the known artificial emission flux, which is more than satisfactory, given that the analyzers were attached to separate sonic anemometers placed on individual eddy towers with different data acquisition systems but similar data treatment that are specific to the best practice used by the involved research teams.

The full paper is available free of charge at <http://www.atmos-meas-tech.net/3/1519/2010/amt-3-1519-2010.html>

Tuzson, B., Hiller, R. V., Zeyer, K., Eugster, W., Neftel, A., Ammann, C., and Emmenegger, L.: Field intercomparison of two optical analyzers for CH₄ eddy covariance flux measurements, *Atmos. Meas. Tech.*, 3, 1519-1531, doi:10.5194/amt-3-1519-2010, 2010.



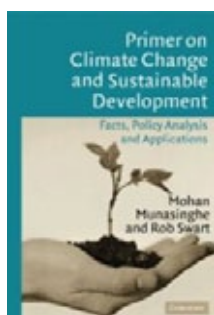
Forests, Water and People in the Humid Tropics



Authors: M. Bonell, L. A. Bruijnzeel (eds.)
 Publisher: Cambridge University Press
 ISBN: 9780521829534
 YEAR : 2005
 EDITION : 2nd
 PAGES : 944
 PRICE : 253.00 €
 Hardback

Forests, Water and People in the Humid Tropics is the most comprehensive review available of the hydrological and physiological functioning of tropical rain forests, the environmental impacts of their disturbance and conversion to other land uses, and optimum strategies for managing them. The book brings together leading specialists in such diverse fields as tropical anthropology and human geography, environmental economics, climatology and meteorology, hydrology, geomorphology, plant and aquatic ecology, forestry and conservation agronomy. The editors have supplemented the individual contributions with invaluable overviews of the main sections and provide key pointers for future research. Specialists will find authenticated detail in chapters written by experts on a whole range of people-water-land use issues, managers and practitioners will learn more about the implications of ongoing and planned forest conversion, while scientists and students will appreciate a unique review of the literature.

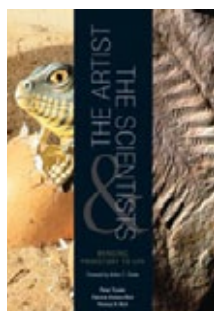
Primer on Climate Change and Sustainable Development: Facts, Policy Analysis, and Applications



Authors: Mohan Munasinghe, Rob Swart
 Publisher: -
 ISBN: 9780521008883
 YEAR : 2005
 EDITION : 1st
 PAGES : 458
 PRICE : 43.10 €
 Paperback

Climate change and variability has become the primary environmental concern of the 21st Century. The potential impacts and mitigation of climate change need to be analyzed within the context of sustainable development. Primer on Climate Change and Sustainable Development presents a condensed and accessible review of the latest state-of-the-art assessments of the Intergovernmental Panel on Climate Change. The book begins with a foreword from the chair of the IPCC. Our current knowledge of the basic science of climate change is described, before moving on to future scenarios of development within the context of climate change. Possible adaptation and mitigation measures, including cost and benefit analysis, are discussed. The book will be an invaluable textbook for students of environmental science and policy, and researchers and policy makers involved in all aspects of climate change.

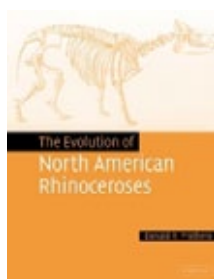
The Artist and the Scientists: Bringing Prehistory to Life



Authors: Peter Trusler, Patricia Vickers-Rich, Thomas H. Rich
 Publisher: Cambridge University Press
 ISBN: 9780521162999
 YEAR : 2010
 EDITION : 1st
 PAGES : 308
 PRICE : 32.80 €
 Paperback

The Artist and the Scientists: Bringing Prehistory to Life presents the extraordinary lives and works of eminent paleontologists Patricia Vickers-Rich and Tom Rich, and Peter Trusler, one of the finest artists of scientific realism Australia has produced. Over more than thirty years, Patricia, Tom and Peter have travelled across Eastern Europe, Asia, the Americas, Africa, Australia and New Zealand in search of the remains of early life, including fish, dinosaurs, birds and mammals. Their successful expeditions, and the many publications and exquisite artworks that have ensued, are a testament to their scientific methodology, thirst for knowledge and eye for detail. The book follows the development of selected works of art covering the last 600 million years of the geological record. Told from the viewpoints of both scientist and artist, the reader is given a unique insight into the process of preserving and recording the evolution of prehistoric life.

The Evolution of North American Rhinoceroses



Authors: Donald R. Prothero
 Publisher: Cambridge University Press
 ISBN: 9780521832403
 YEAR : 2005
 EDITION : 1st
 PAGES : 228
 PRICE : 86.20 €
 Hardback

The family Rhinocerotidae has a long and amazing history in North America. From their first appearance about 40 million years ago, they diversified into an incredible array of taxa, with a variety of ecologies that don't resemble any of the five living species. They ranged from delicate long-legged dog-sized forms, to huge hippo-like forms that apparently lived in rivers and lakes. This book includes a systematic review of the entire North American Rhinocerotidae, with complete descriptions, measurements, and figures of every bone in every species - the first such review in over a century. More importantly, it discusses the biogeographic patterns of rhinos, their evolutionary patterns and paleoecology, and what rhinos tell us about the evolution of North American landscapes and faunas over 35 million years. It is a complete and authoritative volume that will be a reference of interest to a variety of scientists for years to come.



3rd ESA advanced training course on land remote sensing - (Course)

12/09/2011 - 16/09/2011 - Kraków, Poland

The course will be hosted by the Jagiellonian University, Kraków and organised by ESA in cooperation with cosponsoring institutions in Poland.

Ph.D. students, post-doctoral, research scientists and users from Europe and Canada interested in land remote sensing applications are invited to apply to attend the 5 day advanced training course on the subject. Information about

the course, the programme, the teaching team and the application form are available on line at the following web address: <http://earth.eo.esa.int/trainingcourses/LandTraining-Course2011>

The deadline for applications is 30 April 2011.

Organizer:

Yves-Louis Desnos (ESA)
Jacek Kozak (IGiP UJ)
Marek Banaszekiewicz (CBK PAN)
Marek Baranowski (IGiK)
Krystian Pyka (AGH)

Coordination Bureau

Katarzyna Ostapowicz (IGiP UJ)
Andy Zmuda (Serco c/o ESA)
<http://earth.eo.esa.int/trainingcourses/LandTraining-Course2011>

3rd HEPPA (High Energy Particle Precipitation in the Atmosphere) - (Course)

09/05/2011 - 11/05/2011 - Granada, Spain

This is the third in a series of Workshops that started in 2008 in Helsinki and was continued in Boulder/CO 2009.

The precipitation of high energetic particles (mainly protons and electrons) couples directly the Earth's radiation belts to the middle and upper atmosphere. These geomagnetic storms are triggered by both coronal mass ejections and high-speed wind streams from the Sun and thus constitute a clear Solar-Terrestrial connection. Although the amount of energy in these events is much smaller than the total Sun energy output, it concentrates in the polar regions, where, in proportion, it makes a significant impact. Thus, it is nowadays recognized that EPP effects have to be included in climate models. They are also a clear example of the need to treat the atmosphere as a whole system since they have "direct" impacts, their "top-down" penetration into the atmosphere, as well as "indirect" impacts that can be intensified by the surface's meteorology ("bottom-up" effect).

In recent years, many new satellite instruments capable of polar region observations in a wide altitude range have been launched. This, together with the recent developments and completion of General Circulation Models, has provided

unique opportunities to advance on the effects of energetic particle precipitation (EPP) on the atmosphere. These two major factors have literally burst the studies initially pioneered by Nobel Prize Paul Crutzen and IPCC Chair Susan Solomon in the early 70's.

Along these lines, the major topics to be addressed during the workshop are:

- *Precipitating Particle Sources
- *Energetic Particle Precipitation (EPP) effects on the Thermosphere & Ionosphere
- *Direct EPP effects on the middle and lower atmosphere
- *Indirect EPP effects: Atmospheric coupling and Climate effects
- *Future measurements
- *3rd HEPPA coordinated model/measurement inter-comparison

The format of the workshop will be of tutorial talks on each of the different topics, followed by invited talks and contributed oral and poster presentations. For more details, please, see the Scientific Program.

To participate, you have to fill in the "Expression of interest" in the web site.

<http://heppa2011.iaa.es/>

First Announcement for the 8th International Planetary Probe Workshop (IPPW-8) - (Course)

06/06/2011 - 10/06/2011 - Portsmouth, Virginia, USA

Join us for the 8th International Planetary Probe Workshop (IPPW-8) in Portsmouth, Virginia on June 6-10, 2011. The goal of the workshop is to bring together scientists, technologists, engineers, mission designers, and policy makers interested in the exploration of Solar System atmospheres and surfaces using atmospheric entry and descent probes, aerial vehicles, surface landers, rovers and penetrators. The workshop covers the technological challenges and scientific opportunities associated with entry, descent, landing and flight in planetary atmospheres, and surface science and mobility.

The 8th workshop will build on the success of the previous workshops to promote international cooperation in probe missions to solar system bodies, and to provide the opportunity for students – the next generation of planetary explorers – as well as spacecraft engineers, technologists, mission planners, and policy makers to participate in these endeavours.

The preliminary list of session topics includes: outlook for probe missions; science and technology of probes, landers and penetrators; sensors; entry, descent and landing; site selection, terminal descent and trajectory reconstruction; sample return capsules, aerial mobility, and drag, aerobraking and aerocapture techniques.

The space community is engaged in expanding our knowledge of the Moon, planets, their satellites, asteroids and comets. 2011 sees: Launch of the Mars Science Laboratory, continued operation of the Mars Exploration Rover mission, and the Philae comet lander more than half way to its destination. NASA's Space Technology programs will be invigorated, and

the Planetary Decadal Survey will be released. Studies and proposals underway include: various lunar landers and penetrators; Venera-D; plans for Mars exploration beyond 2016 (including network missions and sample return), and for missions within the New Frontiers, Discovery and Cosmic Vision programs. We can also expect further interpretation of data from previous missions including Hayabusa, Huygens and Phoenix.

In addition to the five-day workshop, a two-day short course is normally held on a related topic during the preceding weekend. The topic selected for IPPW-8 is "Atmospheric Flight Systems Technologies" (June 4-5, 2011).

The long-standing goals of the International Planetary Probe Workshops are:

- To Review the state-of-the-art in science, mission design, engineering implementation and technologies for the in situ robotic exploration of Solar System bodies.
- To Share ideas, mission opportunities, and emerging technologies to enable future mission success.
- To Serve as a forum for discussions on innovative methodologies and techniques for upcoming probe and surface science missions.
- To Attract early career scientists and engineers to the field of entry, descent and flight in planetary atmospheres, and surface science, exploration and mobility on other worlds, enabling them to learn from experienced researchers and practitioners.
- To Foster international collaboration among the communities of scientists, engineers, and mission designers interested in planetary probes and landers.

Student Program

Students play an important role in the International Planetary Probe Workshops and are strongly encouraged to attend and participate in all workshop programs. To help defray the costs of attending the workshop and short course, a limited number of student scholarships are available. Priority will be given to those students who are presenting material at the workshop. A program of student social events, activities, and events will be included in the workshop schedule. For more information, please contact Dr. Stephen M. Ruffin, Georgia Institute of Technology, stephen.ruffin@aerospace.gatech.edu.

Al Seiff Award

The Alvin Seiff Award is annually bestowed upon an individual by the International Organizing Committee of the International Planetary Probe Workshop. The Award recognizes an individual's outstanding contributions to the technology, science or mission planning for the advancement of knowledge of planets or moons in the solar system by the use of probes during their entry, descent, landing, and/or surface operations. The award also recognizes the individual's mentoring of younger engineers and scientists, traits are those for which Seiff was legendary in his pioneering of our field.

More information on the Al Seiff award program, and nomination forms may be found on the IPPW-8 website: <http://www.planetaryprobe.org>.

IPPW-8 Preliminary Schedule

- Second Announcement: 14 January 2011
- Abstract deadline: 28 February 2011

- Al Seiff Award nomination deadline: 28 February 2011
- Student scholarship application deadline: 28 February 2011
- Early registration deadline: 28 February 2011
- Selection of papers/posters: 18 March 2011
- Selection of student scholarships: 18 March 2011
- Third Announcement: 18 March 2011
- Final Announcement: 6 May 2011
- Deadline for proceedings contributions: TBD
- Short Course: Atmospheric Flight Systems Technologies: 4-5 June 2011
- IPPW-8: 6-10 June 2011

For More Information: ippw8@planetaryprobe.org

<http://www.planetaryprobe.org>

Second Circular and Call for Abstracts for the 7th EGU Alexander von Humboldt Conference - (Meeting)

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

We kindly inform you that the Second Circular and Call for Abstracts for the 7th EGU Alexander von Humboldt Conference, co-organized by EGU and AOGS on "Ocean Acidification: Consequences for marine ecosystems and society" to be held June 20-24, 2011 in Penang/Malaysia.

Can be downloaded from http://meetings.copernicus.org/avh7/avh7_second_circular.pdf

It contains further details related to the venue, milestones, registration fees, accommodation, and further items of interest.

Important: Please note that the deadline for abstract submission is March 15, 2011.

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

Organizer:

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

http://meetings.copernicus.org/avh7/avh7_second_circular.pdf

39th Scientific Assembly of the Committee on Space Research and Associated Events COSPAR 2012 - (Meeting)

14/07/2012 - 22/07/2012 - Mysore, India

Topics:

Approximately 100 meetings covering the fields of COSPAR Scientific Commissions (SC) and Panels:

- SC A: The Earth's Surface, Meteorology and Climate
- SC B: The Earth-Moon System, Planets, and Small Bodies of the Solar System

- SC C: The Upper Atmospheres of the Earth and Planets Including Reference Atmospheres
- SC D: Space Plasmas in the Solar System, Including Planetary Magnetospheres
- SC E: Research in Astrophysics from Space
- SC F: Life Sciences as Related to Space
- SC G: Materials Sciences in Space
- SC H: Fundamental Physics in Space

- Panel on Satellite Dynamics (PSD)
- Panel on Scientific Ballooning (PSB)
- Panel on Potentially Environmentally Detrimental Activities in Space (PEDAS)
- Panel on Radiation Belt Environment Modelling (PRBEM)
- Panel on Space Weather (PSW)
- Panel on Planetary Protection (PPP)
- Panel on Capacity Building (PCB)
- Panel on Education (PE)
- Panel on Exploration (PEX)

- Special events: interdisciplinary lectures, round table, etc.

Selected papers published in *Advances in Space Research*, a fully refereed journal with no deadlines open to all submissions in relevant fields.

Scientific Program Chair:

Prof. U.R. Rao, Department of Space, India

Abstract Deadline:

Mid-February 2012

<http://www.cospar-assembly.org>

**COSPAR Secretariat, c/o CNES, 2 place Maurice
Quentin, 75039 Paris Cedex 01, France**

Tel: +33 1 44 76 75 10

Fax: +33 1 44 76 74 37

cospar@cosparhq.cnes.fr

28th European Conference of the Society of Environmental Geochemistry and Health - (Meeting)

10/04/2011 - 15/04/2011 - Edge Hill University, Ormskirk,
Lancashire, UK

You are most warmly invited by the Environmental Change Group, Edge Hill University & The Society for Environmental Geochemistry & Health to the: 28th European Conference of the Society of Environmental Geochemistry and Health.

Within the broad theme of Environment and Human Health the conference will explore geographical perspectives on the relationships between environment and human health under the following:

- * Geochemistry of air, water, sediments and soils.
- * Environmental pollution, medical geology and public health protection.
- * Urban geochemistry, contaminated land and waste management.
- * Biogeochemistry of radionuclides, trace elements and organic pollutants.
- * Geospatial patterns of pollution, including the application of GIS technologies.
- * Chemical transport and understanding exposure within urban environments (inter- and intra-urban variability).
- * Temporal trends in geoenvironments and human health.
- * Impacts of and adaptation to climate change scenarios.
- * Aviation and vehicular pollution and exposure/health effects/contamination.
- * Perceptions of environmental issues; communication of environmental health risks and social inequality.

This year will include specialist sessions on:

- * the impacts of the use and manufacture of chemical and radiation weapons technologies on communities.
- * contemporary iodine deficiency diseases.
- * peatlands and lakes as dynamic geochemical systems.

The conference provides an internationally recognised forum for interaction, discussions and the exchange of research between academic scientists, consultants, practitioners and public servants who are engaged and active in the multi-disciplinary area of environment and health.

SEGH conferences over the years have drawn specialists from the disciplines of biology, chemistry, environmental sociology, epidemiology, geography, geology, medicine, nutrition, physics, and toxicology, together with experts from the regulatory and industrial communities.

Keynote Speakers:

Professor Christine Gosden PhD, MRCPPath.

Professor of Medical Genetics in the Department of Cancer Studies at the University of Liverpool, UK.

Professor Ming H Wong.

Professor of Biology Director of the Croucher Institute for Environmental Science Hong Kong Baptist University, China.

Professor Andrew Hunt PhD.

Professor of Earth and Environmental Sciences University of Texas at Arlington, USA Dr Malin Kylander Stockholm University, Sweden.

Professor Jonathan Grigg BSc, MB.BS. MD, MRCP, FR-CPCH.

Professor of Paediatric Respiratory and Environmental Medicine Barts and The London School of Medicine and Dentistry, UK.

Important Dates:

1st October 2010: Abstract submission opens

10th November: Registration opens

10th December 2010: Deadline for abstract submission

24th January 2011: Decision on abstracts notified to authors

Organizer:

Edge Hill University, Ormskirk, Lancashire, UK and The Society for Environmental Geochemistry & Health

<http://www.edgehill.ac.uk/segh2011>

François De Vleeschouwer
Post-Doc Fellow
Department of Ecology and Environmental Sciences
Umeå University, Sweden
fdevleeschouwer@gmail.com

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

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

SCOPE AND PURPOSE

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

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

KEYNOTE SPEAKERS

- 1) Structure of Turbulent Boundary Layers, Ron Adrian, Arizona State University
- 2) The Universe of Coherent Turbulent Structures in Gravity Current Flows, Marcelo Garcia, University of Illinois
- 3) Coherent Flow Structures in Atmospheric Flows, Gabriel Katul, Duke University
- 4) Coherent Flow Structures and Vegetation, Heidi Nepf, Massachusetts Institute of Technology
- 5) Interrelations Between Coherent Flow Structures, the

Eddy Cascade, and Secondary Flows, Vladimir Nikora, University of Aberdeen

6) Modeling of Coherent Flow Structures in Aqueous Flows, Thorsten Stoesser, Georgia Institute of Technology

CONFERENCE PROGRAM

Tuesday August 2, 2011: Registration and Plenary Reception

Wednesday August 3, 2011: Oral and Poster Sessions

Thursday August 4, 2011: Oral and Poster Sessions

Friday August 5, 2011: Oral and Poster Sessions

Poster sessions will be featured prominently in the conference schedule and will include a number of large format LCD screens for displaying simulations, animations and video.

Concurrent oral sessions will not be held in order to promote interactions amongst participants.

POST-CONFERENCE FIELD TRIP

Fluid Flow and Sedimentation in the Lower Fraser River (Saturday August 6, 2011).

Trip Leaders: Mike Church (UBC), Ray Kostaschuk (University of Guelph and SFU) and Jeremy Venditti (SFU).

CALL FOR ABSTRACTS

We welcome contributions for oral presentation and poster sessions. Please indicate your preference (if any) upon submission.

Abstracts should be submitted to CoherentFlowStructures@sfu.ca using the template found at <http://www.sfu.ca/CoherentFlowStructures/CallForAbstracts.htm>

The deadline for abstract submission is March 1, 2011.

CONFERENCE REGISTRATION

Online conference registration will be available in March, 2011. We anticipate the registration costs to be ~\$500 with a discount rate of ~\$250 for graduate students. These costs include catered meals (breakfast, lunch and dinner) for all participants. All dietary needs can be accommodated.

Funds from sponsors will be used to lower the registration costs. If you would like to sponsor the conference, please contact the organizers at CoherentFlowStructures@sfu.ca.

ACCOMMODATIONS

Simon Fraser University sits atop Burnaby Mountain. Accommodations have been reserved in the SFU dormitories (which are unoccupied in summer) at a cost of \$37.50/night (single dormitory room) or \$45.00 per night (single room in a shared townhouse). Space has also been reserved at the Simon Hotel (Queen Suite \$90.00; Queen Sofa Suite \$109.00), which is on campus, and at the Executive Inn Coquitlam (<http://www.executivehotels.net/coquitlamhotel/> booking code: CFS-2) which is 7 km from campus, at the base of Burnaby Mountain. There are a host of other accommodations in Vancouver, Burnaby and Coquitlam that are easily accessible via the Skytrain rapid transit system.

PLANNING TRAVEL TO SIMON FRASER UNIVERSITY

Burnaby is a neighboring suburb of Vancouver, British Columbia. The main campus of Simon Fraser University (SFU – Burnaby), where the conference will be held, is 16.5 km from downtown Vancouver. The Skytrain rapid transit system connects SFU to downtown Vancouver and the Vancouver International Airport (YVR).

The Greater Vancouver area can also be accessed from the following airports:

- 1) Seattle-Tacoma Airport (SEA) which is a 5 hour bus or train ride away in Washington State;
- 2) Bellingham International Airport (BLI) which is 80 km south of Vancouver in Washington State (this airport primarily services the Vancouver area);
- 3) Abbotsford International Airport (YXX) which is 50 km west of Vancouver in British Columbia, Canada.

Vancouver can also be accessed by car, bus, or train (see <http://wikitravel.org/en/Vancouver> for more information).

PUBLICATION PLAN

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

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

ORGANIZING COMMITTEE:

Jeremy G Venditti, Simon Fraser University, Burnaby, BC, CAN, Ph: 778-782-3488, Email: jeremy_venditti@sfu.ca
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On behalf of the organizing committee,
 Jeremy Venditti, Jim Best, Mike Church, Rich Hardy, Ian Walker

Coherent Flow Structures in Geophysical Flows at Earth's Surface, August 3-5, 2011 at Simon Fraser University in Burnaby, British Columbia.

Organizer:

Simon Fraser University in Burnaby, British Columbia

www.sfu.ca/CoherentFlowStructures/

3rd International Conference on Environmental Management, Engineering, Planning and Economics - (Meeting) 19/06/2011 - 24/06/2011 - Skiathos island, Greece

We have the pleasure to invite you to the Third International Conference on Environmental Management, Engineering, Planning and Economics (CEMEPE 2011) and to the SECO-TOX Conference that will be jointly held in Skiathos island, Greece, from June 19 to 24, 2011.

The conference is organized by the Department of Planning and Regional Development, University of Thessaly, the Department of Mechanical Engineering, Aristotle University of Thessaloniki and the Society of Ecotoxicology and Environmental Safety (SECOTOX), in collaboration with the Sector of Industrial Management and Operations Research, School of Mechanical Engineering, National Technical University of Athens, the Food Technology Department, Technological Educational Institute of Thessaloniki and the Technical Chamber of Greece.

The conference is designed to encourage the exchange of ideas and knowledge between diverse groups of the scientific community concerned by current issues in environmental science, engineering, and management. The organizing committee is in contact with international scientific journals and selected articles from the conference proceedings will be published in special issues after they are reviewed. The conference participants will be informed regarding these issues via e-mail.

All professionals, researchers, environmentalists and policy makers involved or interested in the area of the conference are invited to present papers relating to the conference topics. Indicate your preference for an oral or poster presentation. Authors are requested to submit abstracts by e-mail as a Word file attachment to the Symposium Secretariat, by January 7, 2009.

If you have any questions, please do not hesitate to contact the conference secretaries:

Stavros Sakellariou, Tel. +30 24210 74282, Mobile: +30 6946284199, Fax +30 24210 74276, E-mail: stasakel@uth.gr,

Vicky Manakou, Tel. +30 24210 74282, Mobile: +306973328909, Fax: +302421074276, E-mail: vmanak@uth.gr.

Organizer:

Athanassios Kungolos (University of Thessaly), Avraam Karagiannidis (Aristotle University of Thessaloniki), Konstantinos Aravossis (National Technical University of Athens), Petros Samaras (TEI of West Macedonia).

<http://www.cemepe3.prd.uth.gr/>



Geodynamics and Seismology-Academic

Postdoctoral Position in Seismology

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

Ocean Sciences-Academic

FACULTY POSITIONS

Company: Scripps Institution of Oceanography University of California, San Diego
Location: USA-La Jolla
Date Posted: 23/10/2010
[\[show details...\]](#)

Atmospheric Sciences-Academic

WYOMING EXCELLENCE CHAIR IN ATMOSPHERE-BIOSPHERE INTERACTION (Position #4547)

Company: University of Wyoming
Location: USA-Wyoming
Date Posted: 08/11/2010
[\[show details...\]](#)

Interdisciplinary / Other-Academic

Thompson Postdoctoral Fellowship in Geophysics

Company: Stanford University
Location: United States-Stanford, California
Date Posted: 18/11/2010
[\[show details...\]](#)

Climate-Academic

RESEARCH ASSOCIATE POSITIONS

Company: The University of Texas Institute for Geophysics
Location: United States-Texas
Date Posted: 18/11/2010
[\[show details...\]](#)

Hydrological Sciences-Academic

Tenure-track position in Hydrogeology

Company: University of Iowa
Location: United States-Iowa City
Date Posted: 18/11/2010
[\[show details...\]](#)

Climate-Academic

Ph.D. Positions in Urban Climate and Vegetation

Company: University of California
Location: United States-Santa Barbara
Date Posted: 22/11/2010
[\[show details...\]](#)

Interdisciplinary / Other-Academic

Assistant Professor, Geophysics

Company: Syracuse University
Location: United States-New York
Date Posted: 18/11/2010
[\[show details...\]](#)

Tectonics, Str. Geol., Statigr., Sedim., Paleont.-Academic

Assistant Professor, Structural Geology and Tectonics

Company: University of Texas at Austin
Location: United States-Austin, Texas
Date Posted: 18/11/2010
[\[show details...\]](#)

Interdisciplinary / Other-Academic

Probationary (tenure-track) position for a Physical Geographer

Company: University of Western Ontario, Department of Geography
Location: Canada-Ontario
Date Posted: 22/11/2010
[\[show details...\]](#)

Energy Resources and the Environment-Academic

Assistant/Associate Professor and Professor in the School of Energy and Environment

Company: City University of Hong Kong
Location: Hong Kong-Kowloon
Date Posted: 01/12/2010
[\[show details...\]](#)

Geodynamics and Seismology-Academic

Geodynamics and Seismology-Academic Postdoctoral/Assistant Professors Positions in Seismology

Company: University of Vienna
Location: Austria-Vienna
Date Posted: 01/12/2010
[\[show details...\]](#)

Atmospheric Sciences-Academic

Lab Director – NCAR Earth Systems Laboratory (NESL)

Company: National Center for Atmospheric Research (NCAR)
Location: United States of America-Boulder
Date Posted: 06/12/2010
[\[show details...\]](#)

Energy Resources and the Environment-Academic

Postdoc in Solar Meteorology / Solar Energy Grid Integration at UC San Diego

Company: University of California, San Diego
Location: United States-San Diego
Date Posted: 06/12/2010
[\[show details...\]](#)



Atmospheric Sciences-Academic

Lab Director - NCAR Earth Systems Laboratory (NESL)

Company: National Center for Atmospheric Research (NCAR)

Location: United States of America (USA)-Boulder, Colorado

Date Posted: 07/12/2010

[\[show details...\]](#)

Atmospheric Sciences-Government

Proposal for a post-doctoral research position in ATMOSPHERIC CHEMISTRY MODELLING

Company: CNRM/GAME (Centre National de Recherches Météorologiques/Groupe d'études de l'Atmosphère Météorologique), Météo-France

Location: France-Toulouse

Date Posted: 08/11/2010

[\[show details...\]](#)

Interdisciplinary / Other-Other

Vacancy for a Scientist Chromatography-Mass Spectrometry (Petrochemical)

Company: Royal DSM N.V.

Location: Netherlands-Geleen

Date Posted: 06/10/2010

[\[show details...\]](#)

Atmospheric Sciences-Other

Job Position at the National Ecological Observatory Network

Company: National Ecological Observatory Network (NEON, Inc.)

Location: USA-Boulder, Colorado

Date Posted: 01/11/2010

[\[show details...\]](#)

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.