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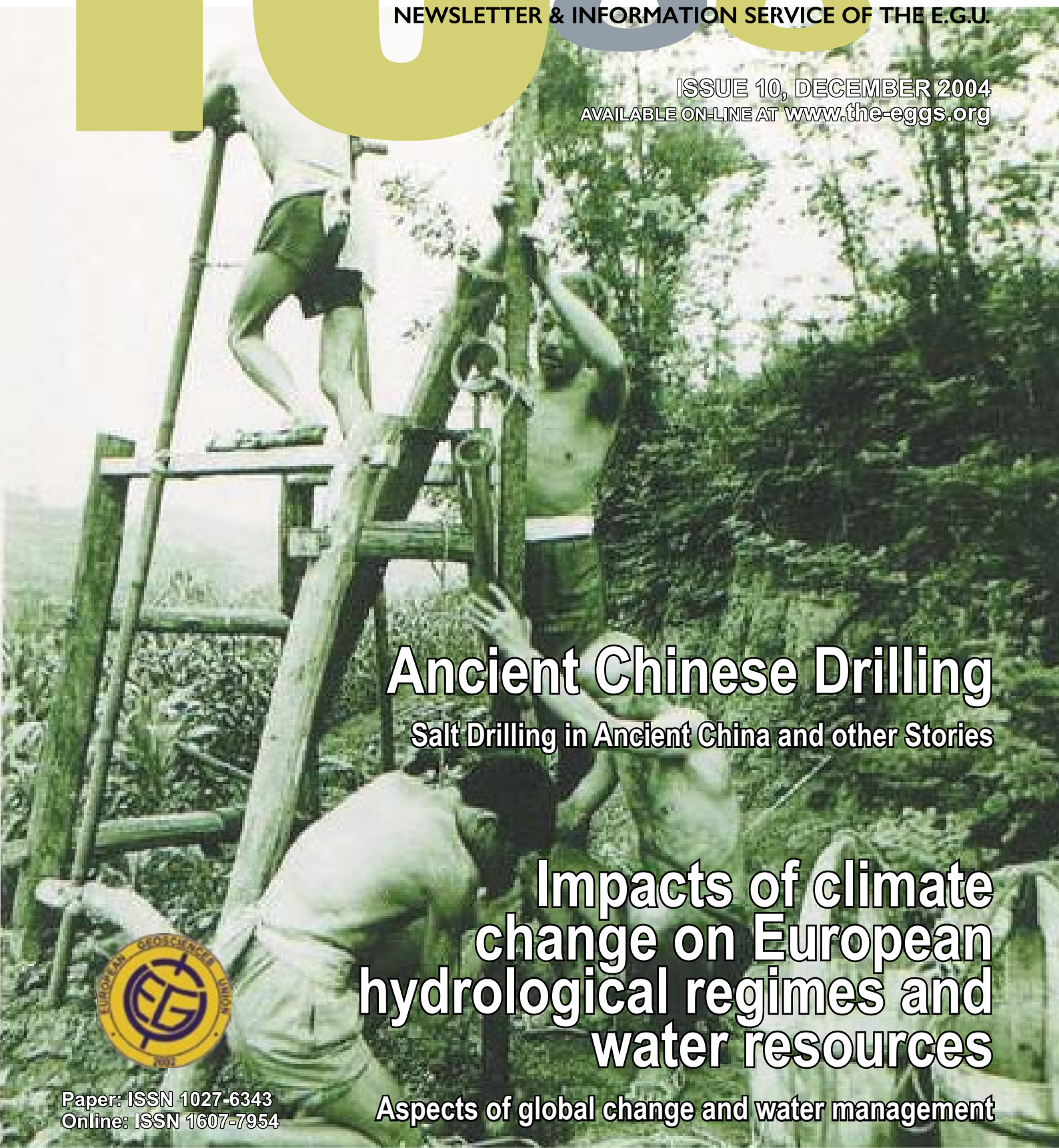

Ancient Chinese Drilling

Salt Drilling in Ancient China and other Stories

Impacts of climate change on European hydrological regimes and water resources

Aspects of global change and water management

Paper: ISSN 1027-6343
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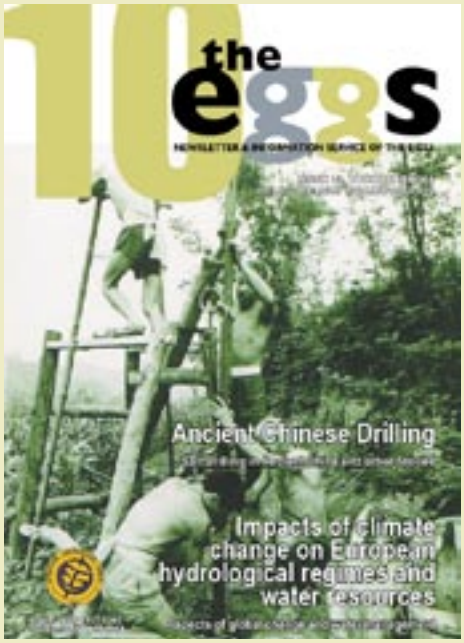

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Open Access version of HESS

The EGU journal "Hydrology and Earth System Sciences (HESS)" launched its Open Access web version.

We are pleased to announce the new Open Access (or free-to web) version of the EGU journal "Hydrology and Earth System Sciences (HESS)". Please study the new web-site for all details concerning the renewed journal:

http://www.copernicus.org/EGU/hess/hess.html

In its eight years of existence, HESS has gained a strong position among other hydrological journals. The journal is now ready for an exciting new step, which will raise it profile and accessibility even further. The new journal will be:

- **fast:** manuscript online within one week of submission;
- **transparent:** all reviews, comments, discussions online;
- **community-based:** EGU journal, financed by modest page charge;
- **interactive:** web-based portal for all contributions;
- **accessible:** full access free of charge.

The new journal is still published by the European Geosciences Union (EGU). It is fully peer-review and aims to publish papers of the highest quality covering all aspects of hydrological sciences.

Papers under review are published in the sister journal "HESS-Discussions". This journal is not fully peer-reviewed but it is designed to allow an interactive public discussion of the latest developments in the field.

A free alert service will inform you of the papers published in your areas of interest.

All papers are available free on-line from the moment of publication. Publication is paid for by a small service charge with no extra cost for colour or additional material such as movies. Paper bound volumes and CD copies are available at low cost. During the initial period there is no service charge.

Papers are published with a Creative Commons license which allows any number of electronic and paper copies to me made for non-commercial purposes. The authors and their employers retain copyright.

We invite you to discuss this new journal with your colleagues and students and look forward to receiving your manuscripts from the start of 15 November 2004.

Hubert Savenije, Murugesu Sivapalan and Kurt Roth
Executive Editors of HESS

Ocean Science:
New Open Access EGU journal

Ocean Sciences is published with a Creative Commons license which allows any number of electronic and paper copies to me made for non-commercial purposes. The authors and their employers retain copyright.

We are pleased to announce a new Open Access Journal with the title "Ocean Science",

www.ocean-science.net

The new journal is published by the European Geosciences Union (EGU). It is fully peer-review and aims to publish papers of the highest quality covering all aspects of ocean science. At is core are the areas of ocean science represented at the EGU meeting each year but our aim is to use modern developments in publishing to create an open access journal covering the whole of the field.

Papers under review are published in the sister journal "Ocean Science Discussions". This journal is not fully peer-reviewed but it is designed to allow an interactive public discussion of the latest developments in the field. A free alert service can inform you of the papers published in your areas of interest.

All papers are available free on-line from the moment of publication. Publication is paid for by a small service charge with no extra cost for colour or additional material such as movies. Paper, bound volume and CD copies are available at low cost. During the initial period there is no service charge.

Papers are published with a Creative Commons license which allows any number of electronic and paper copies to me made for non-commercial purposes. The authors and their employers retain copyright.

We include some extra details below. Further information,

including details on submitting manuscripts is given in the web pages.

We invite you to discuss this new journal with your colleagues and students and look forward to receiving your manuscripts from the start of 1 November 2004.

Ocean Science - Further Details

Ocean Science (OS) is an on-line international scientific journal dedicated to the publication and discussion of research articles, short communications and review papers covering all aspects of the ocean, its physics, biology and chemistry, its interactions with the atmosphere above and the sediments below.

Topics: The journal covers instrument development, in situ observations, remote sensing, data assimilation, laboratory, numerical and theoretical studies of:

-Air-Sea Fluxes
-Surface Waves
-Sea Ice
-Internal Waves
-Turbulence and Mixing
-Temperature, Salinity and Density Fields
-Ocean Currents and Eddies
-Tides, Equatorial Waves and Mid-latitudes Waves
-Chemical, Biochemical and Biological Distributions and Transport
-Chemical, Biochemical, Biological and Physical Interactions
-Ocean Productivity
-Ocean Ecology
-Sediment Processes
-Operational Oceanography

The coverage of the journal is worldwide and includes the deep ocean, the shelf seas and inland seas, now, in the past and the future. By publishing articles freely on the web, the journal aims to make the latest oceanographic developments rapidly available to all people wherever they are. By encouraging discussion of each paper, it aims to raise standards, improve the flow of information, identify the limits to our present understanding and stimulate further effective oceanographic research.

Peer Review and Publication: Ocean Science is using the two stage publication and open review system developed for the successful open access journal "Atmospheric Chemistry and Physics". A submitted paper initially undergoes a brief access review by a Topic Editor. If successful it is then published on Ocean Science Discussions and sent to two independent experts for formal review.

At the same time the alert service informs people worldwide of the new paper and it is open for eight weeks of interactive public discussion. During this period, Referee Reports, when received, Author Comments and Short Comments by members of the scientific community are published alongside the discussion paper. At the end of the period the authors are asked to respond with final author comments. Following this period the original paper and any published discussion remain on-line in Ocean Science Discussions. All are fully citable.

The Topic Editor then decides to accept, reject or return the paper for revision in the normal manner making use of both the Referee Reports and the Public Discussion. Once accepted, the fully-refereed final paper is typeset, proof read by the authors and published on the Ocean Science website with links to the OSD paper and discussion.

All publications (original and final papers, and the interactive discussion) are permanently archived and remain freely accessible to the public via the Internet. Printed and CD volumes of Ocean Science are also available.

Service Charges: The cost of web publishing depends primarily on the work needed to convert the authors manuscript and figures into the house style. At present the cheapest option is for papers submitted as latex text and postscript figures. Here the charge is 30 euros per page. Further details are given in the web pages.

During an initial period the service charge will be waived.

Copyright and Licensing: Ocean Science will publish the papers with one of the Creative Commons licenses. Creative Commons have a number of licenses with different options, the one we are using being the Attribution-NonCommercial-ShareAlike version. This allows people to make electronic and paper copies and to make use of text and figures elsewhere (i.e. in lecture notes) as long as the original author(s) are cited, it is for a non-commercial purpose and the copies are distributed with the same license. The licence also allows copies of the journal to be stored on mirror servers and archive servers worldwide.

The authors keep the original copyright so, if asked, they may give permission for the conditions to be waived.

To publish in Ocean Science authors have to agree to this license. They also need to license the EGU to make commercial copies and to give them the sole right to do this for the first three years. This is to allow the EGU to produce the paper, bound volume and CD copies of the journal.

David Webb and John Johnson
Executive Editors of Ocean Science

Guide to the Creation and Use of Ocean-Colour, Level-3

IOCCG announced the release of Report Number 4 entitled "Guide to the Creation and Use of Ocean-Colour, Level-3, Binned Data Products"

16 September, 2004.- IOCCG announced that Report Number 4, "Guide to the Creation and Use of Ocean-Colour, Level-3, Binned Data Products" is off the press and will be distributed.

The report was produced by the IOCCG working group on Data-Binning Issues, chaired by Dr. David Antoine, of Laboratoire d'Oceanographie de Villefranche. The group examined the diversity in current binning schemes used for ocean-colour data and assessed the impact of having different schemes. Eight authors contributed to writing the report, and they concluded that it was important to avoid introducing artefacts when merging data sets from different sensors, resulting from incompatibilities in time or space scales. They also recommended a basic approach that could be used across Agencies - essentially the one used by the SeaWiFS and MODIS missions, with specific modifications.

All subscribers on the IOCCG mailing list will automatically receive a copy of the report (by surface mail) within a few months. A PDF version of the report is available on the IOCCG webpage,

http://www.ioccg.org/reports_ioccg.html#

Reports, and copies of the report can also be requested on-line.

Source: IOCCG

Alexander von Humboldt International Conference

on The El Nino phenomenon and its global impact - 3rd circular

The meeting aims at discussing El Niño-Southern Oscillation (ENSO) in all aspects related to the Ocean, Atmosphere, Climate, Biology and Human Dimensions, its impact in South America and teleconnections worldwide. It is the first of a series of Alexander von Humboldt Conferences initiated by EGU, international meetings related to geophysical topics of particular importance to South America, which are jointly organized by South American and EGU experts.

The Conference will include the following main topics:

1. The El Niño Southern Oscillation (ENSO) Phenomenon
2. ENSO in Climate History (all time scales including Paleo-ENSO)
3. Recent major El Niño Events and their:
   - 3.1. Impacts in South America
   - 3.2. Interaction between Pacific Decadal Oscillation (PDO) and ENSO
   - 3.3. Impacts on Marine Biology
     - 3.3.1. Impacts on Pelagic Ecosystems
     - 3.3.2. Impacts on Benthic Ecosystems
   - 3.4. Impacts on Terrestrial Ecosystems
4. Teleconnections and Worldwide Impact
5. ENSO Prediction
6. El Niño and Global Warming
7. Socio-Economic Aspects

These topics will be covered in conference sessions organized as general symposia, oral presentations, poster sessions and open discussion on "Where to go from here".

Location

The city of Guayaquil is one of the most important harbors in Latin America and it is the largest city in Ecuador. Guayaquil is the economical capital of the nation. Ecuador is one of the few countries which produce and export vegetal ivory (tagua), balsa wood and passion fruit, and it is one of the major shrimp producers of the world. Currently, Guayaquil has around three million people.

Accommodation

There are plenty of good hotels in walking distance to the venue, at prices ranging from US $ 45 up. Less expensive hotels are also available (please contact the Conference Secretariat). CIIFEN can provide discount rates at a couple of hotels. It is important that the participant selects the hotel. If, desired, reservations can be done by the local Committee (send requests to CIIFEN) and they will be attended as the requests arrive, reservations can also be made directly to the hotels. If there is not enough room in a selected hotel, the reservation will be immediately changed into another hotel corresponding to the same category. If it will be necessary to change the category as well we will contact you before. It is extremely important that we have your electronic mail to contact you immediately. We will do our best to satisfy your needs. Prices quoted are valid for 2004, and some might increase around 15% for next year. (Hotel list s. Annex)

Logistics

Participants of some countries require valid visas to enter Ecuador. Please contact the local Ecuadorean Embassy to find out if your country requires a Visa, and for the formalities to be fulfilled to obtain your visas in case they are necessary.

The international "Simon Bolivar" International Airport located in the city of Guayaquil has direct connections to

all South American airports and to several US airports. For Europeans, direct flights are available from Spain and Amsterdam. Otherwise, Miami or Newark are easy transit points. Some hotels provide transportation from the airport, for others, taxi service is available right at the exit of the gate, distance from the airport to the city center (where CIIFEN is located) is about 7 km, and will cost about US $ 5.

Companions

The companions of the delegates are welcome. An official and special program for them has not been elaborated but they will be able to participate in tours and programmed visits by request.

Currencies

Most major currencies may be exchanged for local currency (US $) at local banks, however we recommend that participants bring US dollars for their personal expenses. All major credit cards are accepted at large local establishments.

Time Zone

Local Standard Time (i.e. GMT + 7 hrs)

For further information containing all details look to our web-pages:
http://www.copernicus.org/EGU/top-conf/avh1/index.html
http://www.ciifen-int.org

Conference Secretariat
secretaria@ciifen-int.org
egu@copernicus.org

Annex:

Grand Hotel Guayaquil
Phone: (5934) 232-9690
Fax: (5934) 232-7251
Address: Boyaca y 10 de Agosto
E-mail: reserghg@grandhotelguayaquil.com
Group Rates: $ 53 + 22% (single), $ 58 + 22% (double)
(600 m to Conference Secretariat)

Ramada Hotel
Phone: (5934) 256-5555
Fax: (5934) 256-3036
Address: Malecon # 806
E-mail: info@hotelramadaecuador.com
Group Rates: $ 55 + 22% (single), $ 57 + 22% (double)
(800 m to Conference Secretariat)

Hampton Inn Boulevard Hotel
Phone: (5934) 256-6700
Fax: (5934) 256-6427
Address: Av. 9 de Octubre 432 y Baquerizo Moreno
E-mail: reservas@hampton.com.ec
Group Rates: $ 70 + 22% (single), $ 85 + 22% (double)
(100 m to Conference Secretariat)

Oro Verde Hotel
Phone: (5934) 232-7999
Fax: (5934) 232-9350
Address: Av. 9 de octubre y Garcia Moreno
E-mail: reservas_gye@oroverdehotels.com
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(1.500 m to Conference Secretariat)

Hilton Colon Hotel
Phone: (5934) 268-9000
Fax: (5934) 268-9149
ADdress: Av. Francisco de Orellana Mz. 111 Cdla. Kennedy Norte
E-mail: reservas@hiltonguayaquil.com
Group Rates: $ 120 + 22% (single), $ 120 + 22% (double)
(3.500 m to Conference Secretariat)

Las Penas
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Address: Escobedo 1215 y Velez Esq.
Group Rates: $ 40.5 Tax included (single), $ 45 Tax included (double)
(50 m to Conference Secretariat)

Contract signed for GOCE data analysis and modelling

Today, a GOCE (Gravity field and steady-state Ocean Circulation Explorer) mission contract, worth € 7.8 million, was signed between ESA and the Institute for Astronomical and Physical Geodesy (IAPG) from the Technical University of Munich.

26 October 2004.- Today, a GOCE (Gravity field and steady-state Ocean Circulation Explorer) mission contract, worth € 7.8 million, was signed between ESA and the Institute for Astronomical and Physical Geodesy (IAPG) from the Technical University of Munich.

The contract means that the scientific data resulting from the GOCE mission will be analysed by a consortium of 10 European universities and research institutes. The consortium will use the data to produce an unprecedented high-accuracy and high spatial-resolution global model of the Earth's gravity field and of the geoid. Scientists from Switzerland, Germany, Denmark, the Netherlands, Austria, Italy and France will all cooperate in this project. The work will be managed by IAPG as prime contractor with the help of the National Institute of Space Research in the Netherlands (SRON).

GOCE, due for launch in 2006, is the first Earth Explorer Core mission to be developed as part of ESA's Living Planet Programme. This mission is entirely dedicated to the exploration of the Earth's gravity field.

The primary instrument is the newly developed gravity gradiometer. In order to attain the required sensitivity it is combined with precise GPS tracking, and active drag-free control of the spacecraft. Because the gravitational signal is stronger closer to the Earth, GOCE has been designed to fly in a particularly low orbit of just 250 km. The satellite has no mechanical moving parts since it has to be completely stable and rigid to ensure the acquisition of true gravity readings.

First Space Council paves the way for a European space programme

a major political milestone for Europe in Space

Paris, 25 November 2004.- The first ever European "Space Council" was held in Brussels today. This is a political milestone for Europe in Space, offering ministers representing the 27 European Union (EU) and/or European Space Agency (ESA) Member States the first opportunity to jointly discuss the development of a coherent overall European space programme. In the footprint of the Treaty establishing a Constitution for Europe, signed by the Heads of State or Government of the European Union on 29 October and defining for the first time "space" as a shared competence of the Union, the Space Council acknowledges the importance of space activities for a wide range of European policies.

In today's meeting ministers recognised that it is essential to utilise the available resources in an efficient and effective way so that the supply of space-based services and infrastructures can meet the demand from users, such as the European Union's policies, Member States' policies and for the benefit of all European citizens. The ministers also agreed that the unique nature of the space sector requires the development of an appropriate industrial policy and public authorities close attention.

German Minister for Education and Research Edelgard Bulmahn, current chair of the ESA council at ministerial level, said: "This meeting was a great step forward for Europe's ambitions in space. Europe must federate its space efforts in order to better exploit the potential of space technologies for the well-being of its citizens. The European Space Programme will significantly strengthen Europe's role in this area of great economic and political importance".

Dutch Minister for Economic Affairs Laurens-Jan Brinkhorst, current chair of the EU Competitiveness Council said: "Today was a memorable day for European cooperation in Space. With the first EU-ESA Space Council Europe made a major step in the direction of a strong and coherent European Space Programme. Space technologies and applications will help Europe to reach its common goals in the field of i.e. competitiveness, environment and security. I am confident that our joint efforts will contribute to a strong and independent position for Europe in the global arena".

Commissioner for Enterprise and Industry Guenter Verheugen said: "Today's first Space Council may not yet be a giant step for mankind. But the fact that we are drawing up a joint European Space Policy is a huge leap forward. Space is an area where the added value of a joint and coherent policy on the European level is very clear. The industrial dimension of space is key to increasing the competitiveness of European industry".

ESA Director General Jean-Jacques Dordain said: "The European Space Agency has long-standing experience of providing Europe's citizens with space-based solutions meeting their requirements. We are prepared to take up the new challenges that the future European space programme will ask us to accomplish".

The European space programme, to be defined in concept by the end of 2005, will constitute a common, inclusive and flexible platform encompassing all activities and measures to be undertaken by the EC, ESA and other stakeholders (e.g. national organisations) in order to achieve the objectives set in the overall European space policy.

To this end, a second "Space Council" meeting is planned for Spring 2005 to define general governance principles, identify priorities as well as the roles and responsibilities of all stakeholders and establish industrial policy principles.

Jointly chaired by Mrs Edelgard Bulmahn, German Minister for Education and Research and current chair of the ESA Council at ministerial level, and by Mr Laurens-Jan Brinkhorst, Dutch Minister for Economic Affairs and current chair of the EU Competitiveness Council, the meeting was also attended by Mr Guenter Verheugen, European Commission Vice President, in charge of enterprise, industry competitiveness and space matters and by Mr Jean-Jacques Dordain, ESA Director General representing the European Space Agency.

Background:

The Space Council was established in order to coordinate and facilitate cooperative activities between the European Community and ESA through their Framework Agreement, which was adopted in 2003 and entered into force in May this year.

The EC-ESA Framework Agreement has two main aims. The first is the coherent and progressive development of an overall European Space Policy, which will specifically seek to link demand for services and applications using space systems in support of EU policies with the supply through ESA of space systems and infrastructures necessary to meet that demand. ESA is acting de facto EU implementing agency.

The second aim of the Agreement is to establish a common basis and appropriate practical arrangements for efficient and mutually beneficial cooperation between ESA and the European Community, fully respecting the institutional and operational frameworks of each institution, to facilitate the setting up of joint initiatives and to provide a stable framework for EC-ESA cooperation to benefit all European citizens.

Over the last three years, the EU and ESA have worked together to outline a European Space Policy that identifies and prioritises objectives for space. The European Space Programme –expected to be endorsed by a Space Council session at the end of 2005– will constitute a common platform including all activities and measures to be undertaken by the EC, ESA and other stakeholders in order to achieve the objectives set by the European Space Policy.

The European Space Programme will be drawn up in light of the overall recommendations set out in the White Paper on Space, an action plan adopted by the European Commission in November 2003 for implementing an enlarged European Space Policy. Drafted in cooperation with ESA, the White Paper includes proposals for joint EC-ESA initiatives and takes the Framework Agreement as its basis for implementation.

ESA Press Release No 62-2004

First European Space Policy Institute Director

Dr Serge Plattard, has become the first Secretary General of the European Space Policy Institute, founded by ESA and ASA (Austrian Space Agency) in November 2003 and located in Vienna (Austria).

Paris, 7 September 2004.- Dr Serge Plattard, has become the first Secretary General of the European Space Policy Institute, founded by ESA and ASA (Austrian Space Agency) in November 2003 and located in Vienna (Austria).

He was appointed, for a three-year term, in August by the ESPI General Assembly and took up his duties on 1 September. Further ESPI officers will be elected at a General Assembly to be held later this month.

Dr Plattard joined CNES (Centre National d'Etudes Spatiales) in 1998 as Director of International Relations. He has also been Counsellor for Science and Technology at the French Embassy in Washington DC, Head of the French Scientific and Technological Mission to the United States, Permanent Representative of the French Universities, Counsellor for Science and Technology at the French Embassy in Tokyo, French Delegate on the Board of ESO (European Southern Observatory), and Director for Scientific and Technological Cooperation, responsible for industrialised countries, at the French Ministry of Foreign Affairs.

He is a life member of the American Physical Society and a founding member of Euroscience (European Association for the Promotion of Science and Technology). He is the author of several publications, has been Assistant Professor at the University d'Orsay and University Paris-Dauphine and, since 1999, lecturer on technology management and industrial innovation at the Ecole Supérieure des Sciences Economiques et Commerciales, Cergy-Pontoise.

ESPI will identify and develop research themes relevant to European space policy, which will be used to initiate, support and promote political and societal debate fostering public awareness of the importance of space-based infrastructures and services.

The tasks of the Institute are multidisciplinary in nature while linked to space policy, thereby federating know-how, skills and knowledge to conduct comprehensive and independent policy research for the benefit of space operators in Europe. A team of 8 to 12 policy analysts and scientists is to be set up to undertake studies and publish reports.

Membership of the Institute is open to any national space administration, intergovernmental research organisation, university, institute or any other national or international, governmental or non-governmental entity or natural or legal person that has a particular interest in participating in ESPI activities.

ESA Press Release No 50-2004

Online visualization and analysis of SeaWiFS data and end of SeaWiFS contract

The GES DISC Online Visualization and ANalysis Infrastructure (Giovanni) was recently released to the public for the utilization of SeaWiFS 9-km resolution monthly data products, while on 23rd of December the contract of NASA with Orbimage expires.

The GES DISC Online Visualization and ANalysis Infrastructure (Giovanni) was recently released to the public for the utilization of SeaWiFS 9-km resolution monthly data products. Giovanni enables researchers to perform basic data visualizations and analyses without the need to download any data first! Giovanni can display data as area plots, time plots, Hovmoller diagrams, and month-by-month animations.

The Ocean Color Time-Series Project (REASoN CAN, Dr. Watson Gregg, PI) currently employs Giovanni for the visualization and analysis of SeaWiFS ocean color data, with five data products available. In the future, data sets that will be available for analysis include MODIS Aqua data and merged (multiple mission) data products that are being created by the Ocean Color Time-Series Project.

The URL for Giovanni is:

http://reason.gsfc.nasa.gov/Giovanni/

A users' forum for Giovanni can be found at:

http://daac.gsfc.nasa.gov/forum/index.php

where you can also provide your comments, criticisms, and suggestions there.

It was with deep regret that NASA recently announced that they were unable to reach a mutually acceptable arrangement with ORBIMAGE that would have allowed NASA to continue to acquire SeaWiFS data beyond the current contract, which expires on 23 December 2004. Consequently, any ocean-colour researchers who wish to continue using SeaWiFS data beyond that date must contact ORBIMAGE directly to arrange for continued access to the data.

Over the past seven years, SeaWiFS has provided an uninterrupted stream of global, internally consistent, climate-quality, ocean-colour data, with an unprecedented availability rate of over 98%. SeaWiFS is regarded as the benchmark against which all ocean-colour missions are compared, so it will be sorely missed by the entire ocean-colour community. The efficient and friendly team at NASA Goddard Space Flight Center should be acknowledged for their tirelessly efforts over the years in

providing such high quality ocean-colour data to the user community, as well as providing years of SeaDAS software support and updates.

ORBIMAGE expects OrbView-2 to continue providing service for at least another 3 to 5 years.

ALL the SeaWiFS data (level-1,2 and 3) that NASA has collected, processed and archived from September 1997 through 23 December 2004 under the terms of the previous and current contracts between NASA and ORBIMAGE will still be available for use by the ocean color community under the same terms as have applied since 1997, along with the MODIS ocean products that the Goddard Space Flight Center group is currently producing.

The terms and conditions that ORBIMAGE has outlined for access to SeaWiFS data collected AFTER 23 December 2004 can be found here:

http://www.orbimage.com/seastar/SeaWiFS/OV2ResearchUseEligibility.pdf

Sources: NASA and IOCCG

Impact of reactive bromine chemistry in the troposphere

Global model results imply that potentially significant strong sinks for O3 and DMS have so far been ignored in many studies of the chemistry of the troposphere.

Recently several field campaigns and satellite observations have found strong indications for the presence of bromine oxide (BrO) in the free troposphere. Using a global atmospheric chemistry transport model the authors show that BrO mixing ratios of a few tenths to 2 pmol mol-1 lead to a reduction in the zonal mean O3 mixing ratio of up to 18% in widespread areas and regionally up to 40% compared to a model run without bromine chemistry. A lower limit approach for the marine boundary layer, that does not explicitly include the release of halogens from sea salt aerosol, shows that for dimethyl sulfide (DMS) the effect is even larger, with up to 60% reduction of its tropospheric column. This is accompanied by dramatic changes in DMS oxidation pathways, reducing its cooling effect on climate. In addition there are changes in the HO2:OH ratio that also affect NOx and PAN. These results imply that potentially significant strong sinks for O3 and DMS have so far been ignored in many studies of the chemistry of the troposphere.

Available on-line at
http://www.copernicus.org/EGU/acp/acp/4/2481/acp-4-2481.pdf

R. von Glasow, R. von Kuhlmann, M. G. Lawrence, U. Platt, P. J. Crutzen, Impact of reactive bromine chemistry in the troposphere, Atmos. Chem. Phys., 4, 2481-2497, 2004.

Noctilucent clouds and the mesospheric water vapour: the past decade

Indications that since 1996, a significant reduction of annually averaged upper mesospheric water vapour has occurred at low, mid, and high latitudes

The topic of this paper is the sensitivity of the brightness of noctilucent clouds (NLC) on the ambient water vapour mixing ratio f(H2O). Firstly, state-of-the-art models of NLC layer formation are used to predict NLC brightness changes in response to changes in the 80km mixing ratio f(H2O) for the two cases of ground-based 532nm lidar observations at 69° N and for hemispheric satellite SBUV observations at 252nm wavelength. A re-evaluation is included of the sensitivity of NLC brightness to changes in solar Lyman á flux. Secondly, observations of episodic changes in f(H2O) and those in NLC brightness, the former being available since 1992, the latter since 1979, are reviewed. A new series of observations of f(H2O), performed in the Arctic summer at the ALOMAR observatory is added. The episodic change exhibited by the Arctic summer means of f(H2O) turns out to be quite different from all those derived from annual means of f(H2O). The latter indicate that since 1996 a significant reduction of annually averaged upper mesospheric water vapour has occurred at low, mid, and high latitudes. These decreases of f(H2O) have been observed over the same time period in which a slow increase of SBUV NLC albedo has occurred. From this scenario and additional arguments the authors conclude that the cause for the observed long-term increase in NLC albedo remains to be identified.

Available on-line at
http://www.copernicus.org/EGU/acp/acp/4/2449/acp-4-2449.pdf

U. von Zahn, G. Baumgarten, U. Berger, J. Fiedler, P. Hartogh, Noctilucent clouds and the mesospheric water vapour: the past decade, Atmos. Chem. Phys., 4, 2449-2464, 2004.

Obituary

Roland Wollast (1932 – 2004)

Roland Wollast died on July 28 in the Academic Hospital of Brussels (Belgium) at the age of 72, of complications arising from bypass heart surgery. Although his health had been somehow delicate for some time, he was still very active until the last minutes preceding his admission to the hospital, reviewing a paper of his close colleague and friend Fred Mackenzie, commenting on a Ph.D. manuscript and finalizing his last contribution over estuarine dynamics. His sudden death has been a great shock for all his relatives, friends and colleagues.

Roland Wollast, a world leader in the field of regional and global biogeochemistry, died on July 28 in the Academic Hospital of Brussels (Belgium) at the age of 72, of complications arising from bypass heart surgery. Although his health had been somehow delicate for some time, he was still very active until the last minutes preceding his admission to the hospital, reviewing a paper of his close colleague and friend Fred Mackenzie, commenting on a Ph.D. manuscript and finalizing his last contribution over estuarine dynamics(*). His sudden death has been a great shock for all his relatives, friends and colleagues.

Roland had been a professor at the Université Libre de Bruxelles (ULB) for more than 30 years. He gave courses on the “Chemistry of solids” at the beginning of his career and then taught “Thermodynamics and kinetics applied to geology”, “Geochemistry of freshwaters” and “Chemical oceanography”. He spent his entire career at ULB, after receiving a B.S. in Chemistry in 1956 and his Ph.D. in 1960 at the same institution. He founded the Water Treatment and Pollution Laboratory (Faculty of Applied Sciences) and the Chemical Oceanography Laboratory (Faculty of Sciences) at ULB and was the Head of both research units until his retirement. Roland also taught at other Belgian universities. He was furthermore appointed courtesy professor at the University of South Florida and visiting professor at the University of Hawaii.

The strong involvement of Roland in the field of geochemistry started in the 60’s, under the influence of Bob Garrels, a Senior Post-doctoral Fellow at the ULB at the time. Roland translated Bob’s and Charles Christ’s book on “Solutions, Minerals and Equilibria” into French in 1966. His first co-authored paper with Bob on the diffusion coefficient of silica in seawater, published in Nature in 1971, was one of the outcome of his frequent stay in Bermuda, where he worked on various aspects of mineral-water interactions and seawater chemistry.

As a specialist of solid phase chemistry, Roland was also involved during the early 70’s in a number of experimental programs and field investigations dealing with the physico-chemical behaviour of sediments in the Scheldt estuary and the Southern North Sea. His initial focus on the dynamics of suspended solids was rapidly broadened to a complete range of environmental topics, covering the principal biogeochemical processes affecting nutrients and heavy metals in freshwater, estuarine and marine systems. Roland’s work in coastal oceanography led him to take a leading role in the European marine research community. This role reached its pinnacle in the 90’s, when Roland not only coordinated, but also truly guided the “Ocean Margin EXchange (OMEX)” project funded by the E.U. from 1993 to 2000 and involving more than 40 laboratories.

Roland Wollast may also be considered as one of the world leader in studies of the global cycles of carbon and associated elements, including the human impacts on global changes. Roland was among the few pioneer scientists who pointed out the importance of the coastal ocean in the global carbon cycle and thus in the climate change perspective. His recent article on the evaluation and comparison of the global carbon and nitrogen cycle in the coastal zone and in the open ocean is thought to be one of the best review papers on the subject.

Besides his dedication to teaching and research activities, Roland Wollast was truly a scientist in the city. His responsibility towards the society was one of his main concerns. Many from all horizons of the civil society will testify to his life-long commitment to the cause of justice and dignity. All those with whom Roland shared his knowledge and political fights will remember him with gratitude and affection.

Lei Chou
Michèle Loijens
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Université Libre de Bruxelles
Laboratory of Chemical Oceanography and Water Geochemistry

(*): We have also to acknowledge his thorough review of the 8th Volume of Treatise in Geochemistry: Biogeochemistry, which was published in the last issue of The Eggs (www.the-eggs.org/bookreviews.php?id=26) -Ed.

Ancient Chinese Drilling

Salt Drilling in Ancient China and other Stories

by O. Kuhn

Through a little research I discovered the existence of a museum dedicated to Sichuan's ancient brine/ salt/ gas industry. Called The Salt Museum, it is located in Zigong City, named after two of its famous salt wells, about three hours drive south of the provincial capital Chengdu. I resigned myself to the fact that it was highly unlikely I'd be close to China in the near future, let alone Zigong. Then earlier this year, out of the blue, a business-related trip to Chengdu materialized, and I was determined to make the trip to The Salt Museum while over there. It all worked out, and this article is the result. My aim is to provide interested readers with an understanding of the fascinating achievements of these people hundreds of years ago. As with my previous article this is not a scholarly analysis, but rather an amateur's efforts to share his enthusiasm, and provide entertaining and stimulating reading.

Some time ago the RECORDER published an article of mine (March 2002, The Odyssey of Oil). That article took a look at some ancient oil industries from around the world, and drew parallels between those ancient industries and our modern oil industry. Readers of that article would have detected in the theme an axe that I like to grind. I find that human cultures have a tendency to exaggerate their own achievements, be it in the fields of arts, science, business or technology, and downplay, denigrate or downright dismiss those of other cultures. As a teenager I remember feeling outraged at Erich von Daniken's ludicrous conclusion that only the assistance of some superior extraterrestrial beings could explain the glorious achievements of now extinct cultures around the world. As a member of our Euro-North American western culture, I feel we're particularly guilty of relegating other cultures' achievements to also-ran status.

Subsequent to writing that article I happened to read an excellent book with the title Salt: A World History, written by Mark Kurlansky. I highly recommend it to anyone with an interest in history and human affairs, along with Kurlansky's other books, Cod: A Biography of the Fish that Changed the World, and The Basque History of the World. The three books' themes are interrelated in a most entertaining way. But to get back to Salt, in one chapter an ancient salt producing industry involving sophisticated drilling techniques and co-production of brine and natural gas in China's Sichuan province, far pre-dating western efforts, is detailed. I was tremendously interested by this, and immediately felt that this topic would make a great follow up to my first one, in that it involved hydrocarbon exploitation, and better still, was ideal nourishment for the bee I have in my bonnet - it involved another culture, from long ago, whose exploits and achievements are frequently overlooked by our own.

Through a little research I discovered the existence of a museum dedicated to Sichuan's ancient brine/ salt/ gas industry. Called The Salt Museum, it is located in Zigong City, named after two of its famous salt wells, about three hours drive south of the provincial capital Chengdu (Figure 1). I resigned myself to the fact that it was highly unlikely I'd be close to China in the near future, let alone Zigong. Then earlier this year, out of the blue, a business-related trip to Chengdu materialized, and I was determined to make the trip to The Salt Museum while over there. It all worked out, and this article is the result. My aim is to provide interested readers with an understanding of the fascinating achievements of these people hundreds of years ago. As with my previous article this is not a scholarly analysis, but rather an amateur's efforts to share his enthusiasm, and provide entertaining and stimulating reading.

Figure 1. Map of China, showing Sichuan Province, its capital city Chengdu, and Zigong City.

When a break in our work responsibilities allowed it, I and my Geo-X colleagues, Bo Li and Andrew Royle, set off to Zigong, with our generous and gracious hosts from the Sichuan Geophysical Company (S.G.C.), Gang Lin and Zhirong Li.

To drive through rural Sichuan is interesting, as one gets a sense of the intensity of human development in one of China's richest regions. The heavily populated portion of Sichuan is a large basin, flanked by the Himalayan Plateau to the west, the Long Men Mountains to the north, and the Hua Ying Mountains to the south. The Yangtze River flows along the southern edge of the basin, and numerous tributaries drain south through the rich agricultural lands and into the Yangtze. With its rich, well watered soil, and mild climate, Sichuan is one of China's most productive farming regions. Since ancient times, Sichuan has been called "heaven country" within China. The most common crops include wheat, canola, rice, cotton, barley, corn, yams, tobacco, fruits and vegetables. On higher, less fertile ground, huge areas are devoted to the cultivation of mulberry bushes (Figure 2), which feed one of the world's oldest and biggest silk producing industries.

Figure 2. A common springtime chore in Sichuan - a farmer grafts new shoots onto established mulberry bush roots.

Naturally, with such attractive conditions for human habitation, Sichuan has been occupied by humans since the early dawn of our existence. The countryside has been worked by the human hand for so long, that it is hard to spot a single wild area in the basin proper. Even steep hillsides are terraced for farming, and ancient family tombs hewn into rock cliff outcrops can be spotted frequently from the highway. The contrast between the luxury cars speeding along the modern 6-lane highways, and the ancient terraces, tombs and irrigation systems is startling, but one can easily imagine one long continuous evolution of human technology here, from thousands and thousands of years ago, to the present. Many of China's ancient technical accomplishments came from this region, including sophisticated irrigation techniques, and what I am particularly interested in, their drilling technology.

My reaction on arriving in Zigong was typical for a westerner first visiting China - yet another city of, what - half a million, one, two million people? - that I had never heard of, with big boulevards, high buildings, people everywhere, construction cranes sprouting willy-nilly. The scale of development in modern China is simply staggering.

After a visit to Zigong's Dinosaur Museum, on par with our Tyrell Museum in Drumheller, and the requisite banquet of incredibly delicious Sichuan food, we arrived at the Salt Museum. The museum is housed in the former Shanxi Guildhall, built in 1736 - 1752 AD by salt merchants from Shanxi Province to the north (Figure 3). The museum and the building housing it easily exceeded my expectations, as this is truly a world class exhibition. The fact that this historical building and the museum itself are still in existence today can be largely be attributed to patriarchal leader Mr. Deng, Xiaoping, who proposed and promoted this museum in the 1950s.

Figure 3. A street view of the Salt Museum, built in the mid-1700s as the Shanxi Salt Merchants Guildhall.

The earliest evidence of wells in China, in Zhejiang Province, comes from the era when humans were first turning to agriculture in this region, some 7,000 years ago. Approximately 5,000 years ago Chinese coastal people were boiling sea water to produce salt. As high density human settlement penetrated further and further inland and increasingly relied on farming, salt, critical to human survival as a vital food supplement and preservative, became a valuable commodity. The first recorded salt well in China was dug in Sichuan Province, around 2,250 years ago. This was the first time water well technology was applied successfully to the exploitation of salt, and marked the beginning of Sichuan's salt drilling industry. From that point on, wells in Sichuan have penetrated the earth to tap into brine aquifers, essentially ground water with a salinity of over 50g/l. The water is then evaporated using a heat source, leaving the salt behind.

At some point around 2,000 years ago the leap from hand and shovel dug wells to percussively drilled ones was made

Figure 4. A modern recreation of drilling technique from the North Song Dynasty (960-1127 AD).

(Figure 4). By the beginning of the 3rd century AD, wells were being drilled up to 140m deep. The drilling technique used can still be seen in China today, when rural farmers drill water wells. The drill bit is made of iron, the pipe bamboo. The rig is constructed from bamboo; one or more men stands on a wooden plank lever, much like a seesaw, and this lifts up the drill stem a metre or so. The pipe is allowed to drop, and the drill bit crashes down into the rock, pulverizing it. Inch by inch, month by month, the drilling slowly progresses. It has been speculated that percussive drilling was derived from the pounding of rice into rice flour. When I read of this technique in Salt, I imagined a fairly crude technology. I had no idea how sophisticated these drilling methods became, to the point where these people really had developed most of the tools and techniques

Figure 5. A series of diagrams showing the steps taken to repair a well bore cave in. The first four steps establish the top and bottom depths of the caved in zone; in the fifth step straw is inserted ~ 1m below the zone, where it expands as it soaks up water and plugs the hole; in step six a material is tamped down above the straw to plug the hole more securely; in step seven repair cement (tong oil + lime) is forced into the cave in zone; finally in step 8 a guided bit drills down through the centre of the repaired zone to reopen the well bore.

one might see on a modern drilling rig, albeit on a smaller scale and without the benefits of modern machining methods.

At regular intervals in the drilling, the crushed rock and mud at the bottom of the hole needed to be removed. The drill stem would be pulled from the hole using a large wheel, somewhat similar in appearance to that on a modern flexible cable down

Figure 6. A museum guide demonstrates a lost tool retrieval technique to Bo Li with the use of a scale model.

hole tool truck. A length of hollow bamboo with a leather foot valve would then be lowered to the bottom of the hole. When the tube was lifted, the weight of the mud inside would keep the valve closed, and the contents could be brought to the surface. Drilling would then recommence.

The drilling method on its own is impressive, especially when considering that the rest of the world had nothing comparable in the earlier centuries. But even more impressive are all the techniques the Sichuan drillers developed to overcome

Figure 7. A variety of down hole tools on display at the Salt Museum. Upper left are tools designed to repair the surface of the well bore wall, by scraping off salt build up, reestablishing the correct diameter, etc. Bottom and middle left are lost tool retrieval tools. The rest are drill bits and miscellaneous tools.

common drilling problems - cave ins, lost tools, deviated wells, and so on (Figures 5 & 6). A huge variety of tools and techniques evolved to handle well repair issues (Figure 7). Many different drill bits were also developed, with different sizes, shapes and compositions, to deal with the different rock types encountered, and the many different drilling requirements. For example, opening the hole at the wellhead required a large heavy bit (3m long, 150-250 Kg) called the “Fish Tail” (Figure 8); the “Silver Ingot” drilled the well bore rapidly, but roughly; the “Horseshoe” bit drilled slowly, but achieved round, smooth, high quality well bores. Hollow logs were used in the near surface as casing.

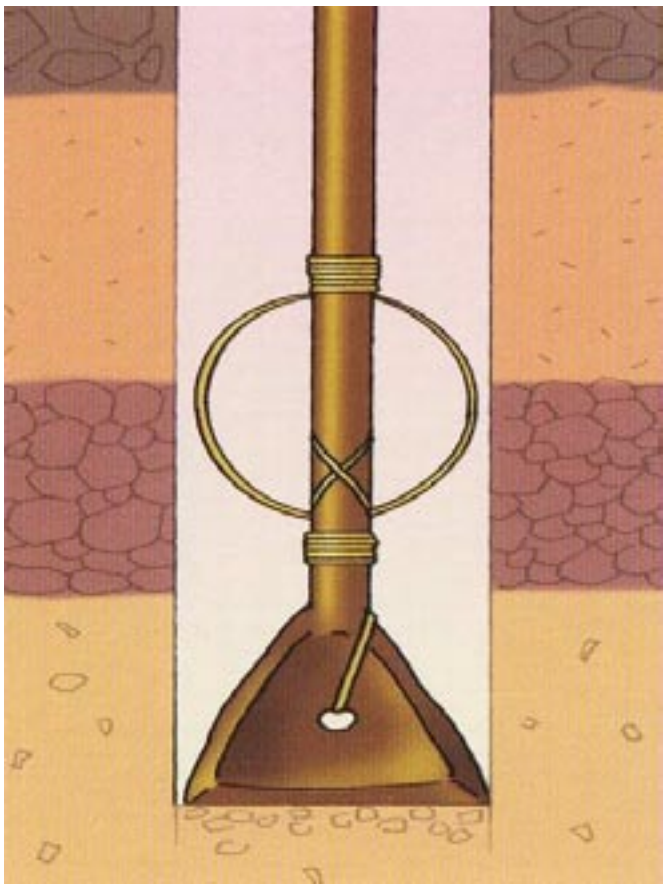

Figure 8. Diagram showing the the “Fish Tail” drill bit, a long and heavy bit used to create the initial large diameter hole at the wellhead.

A major breakthrough was achieved around 1050 AD, allowing deeper wells, when solid bamboo pipe was replaced by thin, light, flexible bamboo “cable” (Figure 9). This dramatically lowered the weight that needed to be lifted from the surface, a weight that increased with the depth being drilled. By the 1700s Sichuan wells were typically in the range of 300 - 400m deep, and in 1835 the Shenghai Well was the first well in the world to exceed 1,000 metres of depth. In comparison, the deepest wells in the U.S. at that time were about 500m deep. The Sichuan salt producing industry was centred around Zigong, and early photographs show hundreds of producing derricks (“heaven carts”; Figure 10), salt stove operations, and the Fuxi River jammed with salt trading boats (Figure 11). Brine and natural gas were transported through 100s of kilometres of bamboo pipeline (Figure 12).

The fuel used initially in the evaporation process was of course wood. Sources of wood became scarce due to the scale of the salt production industry. Some energy saving techniques were used during evaporation: spreading the brine on tree branches under the sun to increase the salt concentration before boiling, and putting several boiling pans on the same chimney path to use residual heat. There are instances of oil and gas production and use in China going back as far as 61 BC, but it appears as if the salt and hydrocarbon industries

Figure 9. Museum model of flexible down hole bamboo cable and the wheel from which it would be deployed. Deeper wells used a large cylinder with a vertical axis and driven by oxen to deploy cable.

Figure 10. A photo of Zigong early in the 20th century showing many of the derricks used to drill and produce brine and gas wells. Some of these “Heaven Carts” were over 100m tall!

were separate for a long time. Fortuitously, at some point in the 16th century, techniques to harness the natural gas encountered during drilling for brine were developed, and this allowed natural gas to be burned beneath the big salt pans. It was the coexistence of brine and gas that pushed Zigong's salt production into the industrial scale. Once wells were able to reach down to 700-800m, they were able to produce both brine and gas from the Jialingjiang group Triassic formations. Annual salt production in Zigong in the 1850s was about 150,000 tons. The Chinese population was about 0.45 billion at that time. The salt industry was a huge economic driver, and many large cities in Sichuan were established, and flourished, because of the lucrative salt trade.

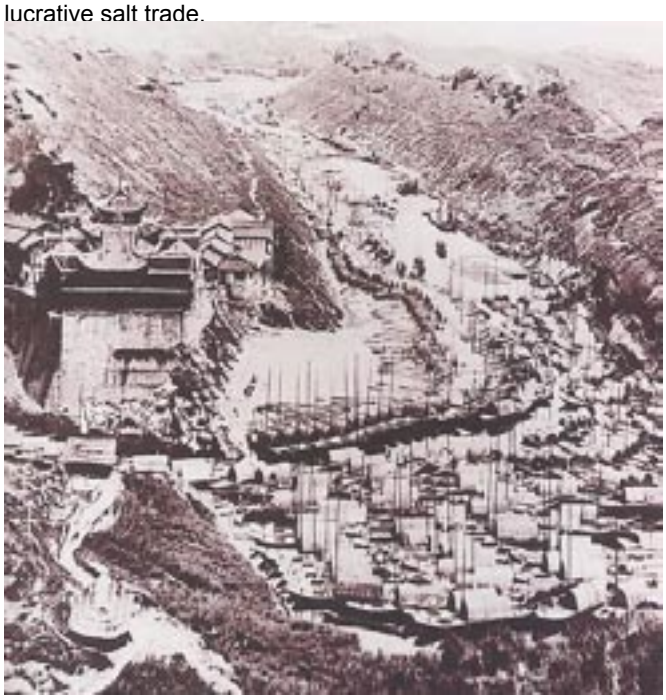

Figure 11. Early 20th century scene. Zigong City, with hundrends of salt transpot boats on Fuxi River.

A key technological advance was the introduction of the "Kang Pen" drum at the end of the 18th century (Figure 13). This drum sat on top of the wellhead, and the pressure within the drum was controlled such that gas and brine could simultaneously be produced, and efficiently separated. One bamboo pipe line would take away the brine, and others the gas. The 2,000 year plus Sichuan salt industry has drilled approximately 130,000 brine and gas wells, and 10% of those were in the immediate Zigong area. Zigong has a cumulative gas production over this period of over 30 billion cubic metres. The area continues to be a major salt producer, and many of the historical wells are still in production.

Figure 12. Gravity driven bamboo pipelines. Note water-lifting system on right.

One minor detail I found interesting. When I had first read of bamboo pipelines, I wondered how the barriers separating the segments within the bamboo were dealt with. Did they drill holes through these compartment walls with long augur bits to create pipe? My curiosity was satisfied by one of the displays depicting the process of turning bamboo into pipe. Each length of bamboo was cut in half, down its length. The segment walls were removed, and the insides of the bamboo further hollowed out to create a smooth inside surface of constant interior diameter. The two sections were then put back together and bonded with a glue made from a mixture of lime and tree seed oil. It was further bound together with twine inset into grooves in the outside surface of the bamboo, to prevent fraying, especially for when used down hole where friction with the holes rock walls would scrape against the exterior surface of the bamboo pipe as it was repeatedly lifted and lowered during drilling and production operations. Similar glue and twine techniques were used to link and splice pipe line sections together end-to-end in an airtight fashion. As recently as the 1950s there was still over 95km of bamboo pipeline in operation in the Zigong area.

Figure 13. An ancient sketch originally from "The Annals of Salt Law of Sichuan Province ". A "Kang Pen" drum is seen in the centre foreground, with gas pipes directly feeding the salt stoves on the right. At the top, brine from a remote well is being carried in buckets by men, who feed it into a bamboo pipeline that runs down to the stoves. One of the carriers is being paid at top left, and it appears that a blow out is depicted on a new well being drilled in the left foreground; maybe the men operating the drill rig have run away, as tragically happened at a Chongqing, Sichuan sour gas well, late 2003.

Being earth scientists, Andrew, Bo and I were naturally curious about the geology of the region, and the knowledge the ancient drillers had of the subsurface. Did they practice geology, or geophysics, in some form? Did they draw diagrams of the sub-surface and choose new drilling locations based on geological models? This is one area the museum displays do not touch on. However, it is known that well locations were chosen based on the distribution of existing gas and brine wells, and on a variety of surface clues. Brine and gas seeps were obvious indicators of a good location. The salt drillers looked for a salt "frosting" on the surface rocks, or the smell of brine. Yellow brine wells (high in ferric chloride) were usually drilled into yellow sandstone outcrops, while black brine wells (containing hydrogen sulfide) were drilled into cracked sandstones with a

black crust. Brine-only wells were usually drilled on hillsides, while gas producing wells were usually drilled on hilltops, suggesting that the topography reflected the underlying geological structures. However, surface clues would not have revealed much about targets down towards 1000m depth, so we're left speculate on whether geological skills advanced along with the drilling technology.

My brief visit to Sichuan left me intrigued, fascinated, and eager to learn more about China's ancient technical accomplishments. I can highly recommend the region as a place to visit, not only for its interesting historical sites, but also for its natural beauty (most of Sichuan is mountainous and unpopulated, especially the west, with bamboo forests, and panda bears), its rich culture with many interesting ethnic minorities, its delicious food, great shopping, and its wonderful, friendly people. However, the highlight of my trip was the visit to the Salt Museum, and I hope I have passed on my enthusiasm about this topic to readers. I purchased an excellent book at the museum, Drilling and Gas Recovery Technology in Ancient China, and I will gladly lend it to anyone interested - just give me a call!

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2. *Salt: A World History,* Mark Kurlansky. Penguin USA, 2003.

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Impacts of climate change on European hydrological regimes and water resources

Aspects of global change and water management

by M.A. Mimikou

This paper originates from a major EU funded research program "The Impact of Climate Change on Hydrological Regimes and Water Resources in Europe", (EV5V-CT93-0293 and EV5V-CT94-0114). The overall aim of this project was to assess the potential impact of climate change due to global warming on hydrological characteristics and water resources in Europe. The study worked on a hierarchical basis, considering the European Scale, the regional scale (the Rhine Basin) and the catchment scale through case studies in a number of catchments in different climate and landscape regions in Europe, and used a consistent set of climate change scenarios. These scenarios were derived from the output of global climate simulation models. An assessment of the variability in hydrological behaviour over time provided a context for the estimation of future changes. The project involved 18 institutions in 11 European Countries. The project explored the effects of uncertainty on the estimated effects of climate change, and also considered the implications of climate change for the management of water resources. Increased demand management will make an important contribution by reducing stresses on water resources, but the major implication of uncertain climate change is that it will be necessary to adopt an adaptive approach to water management, based on the consideration of a range of scenarios for climate and other uncertain future changes.

Introduction

This paper originates from a major EU funded research program "The Impact of Climate Change on Hydrological Regimes and Water Resources in Europe", (EV5V-CT93-0293 and EV5V-CT94-0114). The overall aim of this project was to assess the potential impact of climate change due to global warming on hydrological characteristics and water resources in Europe. The study worked on a hierarchical basis, considering the European Scale, the regional scale (the Rhine Basin) and the catchment scale through case studies in a number of catchments in different climate and landscape regions in Europe, and used a consistent set of climate change scenarios. These scenarios were derived from the output of global climate simulation models. An assessment of the variability in hydrological behaviour over time provided a context for the estimation of future changes. The project involved 18 institutions in 11 European Countries.

The project explored the effects of uncertainty on the estimated effects of climate change, and also considered the implications of climate change for the management of water resources. Increased demand management will make an important contribution by reducing stresses on water resources, but the major implication of uncertain climate change is that it will be necessary to adopt an adaptive approach to water management, based on the consideration of a range of scenarios for climate and other uncertain future changes.

The broad aims of the project are to examine the implications of climate change for hydrological regimes and water resources in Europe, and to provide a scientific background for the development of policy (EU report, 1997). The specific objectives of the project are:

• To identify the potential impacts of climate change on annual water resource availability, river flow regimes and the frequency of droughts at the European Scale, at a spatial resolution of 0.5deg×0.5deg.

• To review the characteristics of variability in runoff regime over time, to characterise the vulnerability of European water Resources.

• To identify the potential impacts of climate change on river flow regimes, at a high spatial resolution, throughout the Rhine basin.

• To examine possible changes in the effects of climate change at regional and catchment scales for selected water use systems across Europe.

• To develop procedures for adapting reservoir management to changing conditions.

• To compare the effects of climate change with past variability and future effects of non climatic change.

The climate change scenarios constructed by the Climatic Research Unit and the Institute of Hydrology provided the basis for simulations of climate change effects at the European Scale. Under all three scenarios the general tendency is for an increase in annual average runoff in northern Europe, and a decrease in the South, with changes in the thirty year mean run off by the 2050s of over 30% in some areas: this difference is greater than that experienced over similar duration in the past. The greatest sensitivity to change is in the drier parts of southern and eastern Europe. There are local differences between the three scenarios, particularly in Eastern Europe and around the Baltic, and the boundary between the wetter north and drier south varies. Global warming also leads to a substantial reduction in snowfall, and this, results in significant changes in the timing of flows through the year across large parts of central and Eastern Europe. The spring snowmelt peak is reduced or eliminated in these areas, and winter flows are substantially increased. In the very cold parts of Europe a rise in temperature has little effect on snowfall, so the timing of flows does not vary. In maritime areas climate change tends to increase the variability through the year –with higher winter flows and lower flows in summer- but not change the timing on maxima and minima. Increases the winter rainfall across most of Europe will result in increased winter flood risk, and in many areas currently affected by snowmelt, floods will occur in the future in winter following rainfall rather than during early spring. Low flows also become more extreme across most of Europe under each climate change scenario, expect in areas where low winter flows are substantially increase by the reduction in snow cover. Investigations in a number of water resource systems show that under some scenarios yields may fall and risk of failure increase under global warming, but other scenarios suggested reduced risk. In general terms, systems that are currently highly stressed are most sensitive to climate change, and multi objective systems are more sensitive than single objective systems. A number of specific conclusions concerning water resource use are drawn in the study, including reductions in reability of Greek hydropower systems and reduced opportunities for navigation along the River Rhine.

The participating organisations involved in the project were:

• University of Southampton, UK
• Institute of Hydrology, UK
• National Technical University of Athens, Greece
• Ruth- Universität Bochum, Germany
• International Commission for the Hydrology of the Rhine Basin, The Netherlands
• University of Utrecht, The Netherlands
• Rijkswaterstaat, The Netherlands
• Bundesanstalt für Gewässerkunde, Germany
• Royal Meteorogical Institute of Belgium
• ETH Zurich, Switzerland
• National Hydrological and Geological Survey, Switzerland
• Climatic Research Unit, UK
• Institute of Geophysics, Poland
• VITUKI, Hungary
• National Institute of Meteorology and Hydrology, Romania
• TG Masaryk Water Research Institute, Czech Republic
• Institute of Hydrodynamics, Czech Republic
• Ukrainian Centre for Protection of Waters, Ukraine

Climate Change Scenarios and their effect on European hydrological regimes (IPCC, 1996a,b; EU report, 1997)

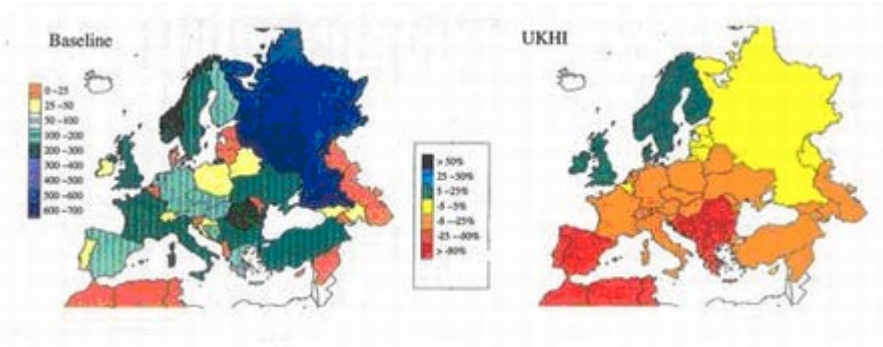

Figure 2: Percentage change in national water resources by the 2050s

Three sets of scenarios have been defined from climate model simulations, representing climatic conditions during the 2050s assuming no additional action is taken to curb the emission of greenhouse gases (Arnell, 1997). The scenarios were based on three climate models (UKTR, UKHI, and XCCC), and were developed through the following stages. For each climate model, interpolate the coarse GCM resolution simulations of monthly mean climate (temperature, precipitation, cloud cover, vapour pressure and wind speed) to a spatial resolution 0.5degx0.5deg. The UKHI and XCCC simulations are equilibrium experiments, so both the control and the perturbed runs were interpolated. The UKHI scenario is an equilibrium climate change experiment performed using an atmospheric GCM coupled to a simple representation of the ocean (Hulme et al. 1994) Equilibrium climate change experiments simulate the climate system twice. First a control level of CO2 concentration (or equivalent, representing the combined forcing of all the greenhouse gases) is specified for the atmosphere and the model is integrated until a stable climate is reached. The simulated climate was integrated for 10 years once equilibrium had been reached. The equivalent CO2 concentration was then doubled and once again the model integrated until the simulated climate had reached equilibrium. The difference of the two climates can then be used as an estimate of the sensitivity of the climate system to a doubling of CO2. The UKTR simulations is a transient experiment, so the mean climate from the end of the simulation run years 66-75 was interpolated, together with the control run climate over the same period. This interpolation is

a very simple form of downscaling from climatic model resolution to the catchment scale. For each climate model, calculate the difference in monthly mean climate between control and change runs, and scale by the climate sensitivity of the model. The climate sensitivity is the change in simulated global mean temperature for an equilibrium doubling of atmospheric carbon dioxide concentrations or for the transient experiment (UKTR) the change in global temperature by the end of the simulation run. This produces spatial patterns showing change in monthly mean climate per degree of global warming. The broad pattern change is similar in each, with increased precipitation in the south, but there are important local and regional differences. There are also important variations through the year. Across most of Western Europe precipitation increases in winter but decreases during summer. Temperature increases tend to be larger in Eastern Europe than further west, and are generally larger than the global average rise of 1.63degC. Potential evaporation increases across most of Europe under each scenario, due to increased temperatures, but in northern and western parts increases in humidity may outweigh the effects of higher temperature and lead to a reduction in potential evaporation. The scenarios used in the project specify only changes in 30-year mean climate. They do not define potential changes in day to day climatic variability or in year to year variability. Under all the three scenarios there is a general increase in runoff in the north up to 25% and a decrease in the South, with the greatest decreases over 25% in the south East (Arnell and King, 1997). Figure 1 shows change in annual precipitation, potential evaporation and runoff by the 2050s under the UKHI scenario. In the UKHI scenario, runoff increases in Northern Russia and Finland, but decreases in central European Russia. Effects of climate change on renewable water resources (EU report, 1997) Water resource stress is defined as pressure on the quantity and the quality of resources. Climate change is likely to affect both water quantity and quality, but this study concentrates on the effect of changes in quantity.

There are basically three types of renewable water resource potentially available to a country.

- The amount of water moving in rivers
- The amount of water that recharges aquifers, and
- Imports of water along the river network from upstream countries.

Unsustainable use of water resources includes mining of groundwater and the overexploitation of lakes. In practice, the water resources available for offstream consumers (municipal, industrial, agricultural) are considerably less than the renewable water resources, because of the competing demands of instream users (navigation and power generation) and most importantly the demands of instream, riverine and wetland ecosystems. Unsustainable use of water resources therefore also includes the excessive use of water such that other users –specifically the environment- suffer. Three scenarios (UKTR, UKHI and XCCC) for national renewable water resources in 2050 were compared based on the three climate simulation models (Arnell & King, 1997). In outline, the study showed that climate change tends to reduce the amount of water available within a country in southern and eastern Europe and increase water availability in the north and the west. Figure 2 shows the change by 2050s in the amount of water resources in each country under the UKHI scenario. Most countries see a reduction in water resources with exceptions in the north and the west of Europe (Arnell & King, 1997).

Effects of climate change in the Aliakmon Basin, Greece

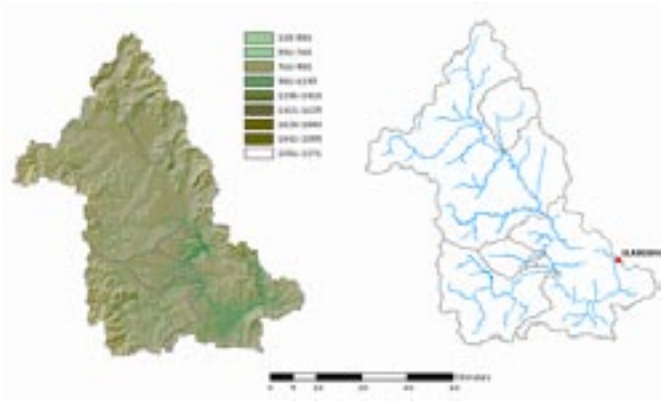

Figure 3: The Study area, the Ilarion Basin

The main objective of the research undertaken by the NTUA is the assessment of the impacts of climate change on water resources and water management works in Greece (catchment scale) and more specifically, NTUA focused on analysing the impacts of climate change on the water cycle of the Aliakmon River basin and the operation of the Polyfito reservoir. The study area is the Ilarion basin of the Aliakmon River in Western Macedonia, whereas the Polyfito reservoir located on the Aliakmon River is used as a case study. The study area is situated between latitudes 30' N and 30' N and longitudes 30' E and 00' E. A representation of the basin can be seen in Figure 3. A reduction of the mean monthly runoff and an increase of the potential evaportranspiration in the study area are observed under climatically changed conditions. The results show an increase of the risk associated with the annual hydroelectric energy production of the Polyfito reservoir. In order to maintain the risk at the design level, storage volume increases are required. These results are in accordance with the results of previous studies referring to the assessment of climate change impacts on the water resources and on the design and operation of reservoirs in central Greece (Mimikou et al, 1991a,b; Mimikou and Baltas, 1997). The results of the simulations under climatically changed conditions can be seen in the following figures. Figure 4 represents the mean monthly runoff for the base run (no climate change) and for UKHI changed conditions. Figure 5 represents the induced changes in mean monthly potential evaportranspiration. From these figures one can see that a significant reduction of the mean monthly runoff and an increase of the evapotranspiration are observed for both scenarios. The Polyfito reservoir is situated on the Aliakmon River, eastern of the Ilarion basin. It is a multipurpose reservoir. Water stored is used for hydropower production, irrigation and water supply of the thermoelectric plant of Ptolemaida. In the near future it is intended to use water from the reservoir for the supply of drinking water for the city of Thessaloniki. It is straightforward that a multipurpose reservoir like the Polyfito should operate with tolerable risk levels concerning water and energy availability. The main conclusion of the current study regarding the current operation of the Polyfito reservoir is that it is highly affected by the climate change scenarios considered. The risk associated with the annual energy production is increased, as in Figure 6. Conclusions Each component of the project has drawn its specific conclusions, relating to the methods adopted and the particular circumstances of its own study location and water management system.

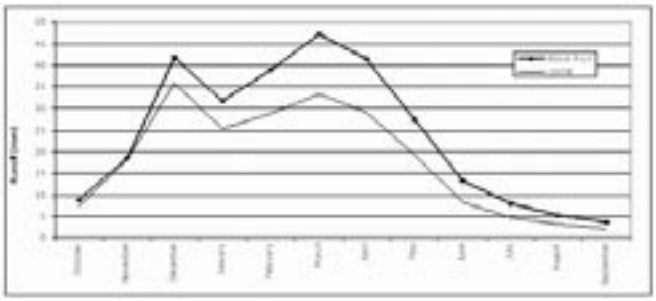

Figure 4: Changes in the mean monthly runoff (terminal year 2050)

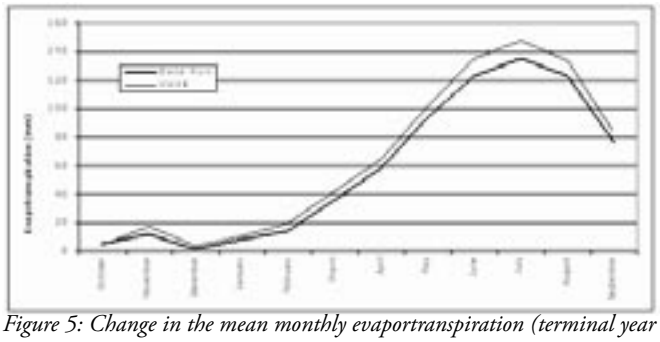

Figure 5: Change in the mean monthly evaportranspiration (terminal year 2050)

There are several important general conclusions that have to be highlighted.

• Under each climate change considered, northern Europe will have increased streamflow, whilst southern Europe will have less.

• The timing of flows through the year will be significantly affected in many regions where hydrological regimes are currently influenced by snowfall and snowmelt. Across much of eastern and upland Europe higher temperatures will mean less snowfall, and therefore less snowmelt in spring : the peak flow season will shift towards winter and the magnitudes of both high and low flows will therefore alter.

• The results from the study catchments and the European Scale simulations show a widespread reduction in low flows, and hence an increase in drought frequency, across much of Europe.

• In most of the study catchments, climate change will lead to an increase in flood frequencies.

• The greater the current stress on a water management system, the more sensitive it is to changes in climatic inputs.

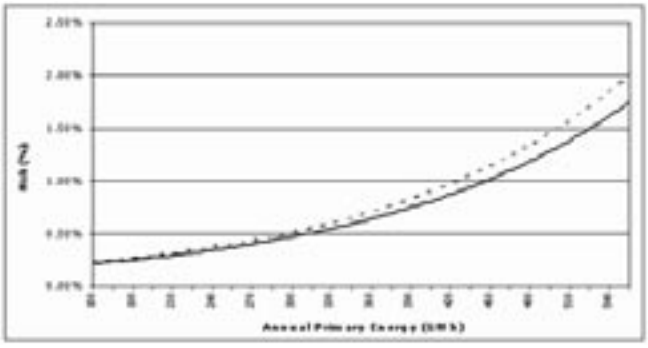

Figure 6: Changes in the annual primary energy production associated with risk for the base run (thick line), UKHI (dashed line).

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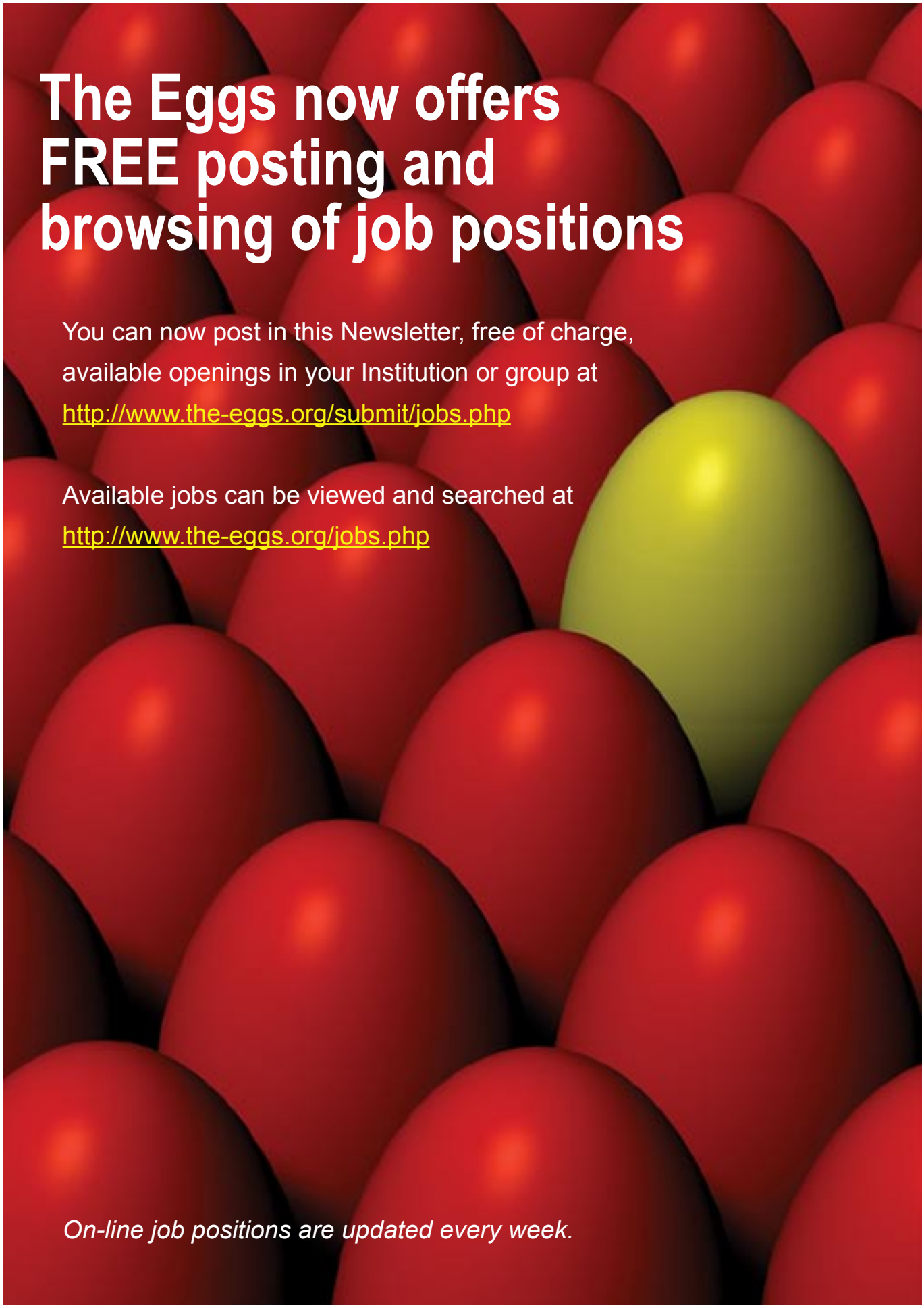

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A useful addition to the literature

Coastal Chalk Cliff Instability

R. N. Mortimore and A. Duperret (eds.)
Published by: Geological Society of London
ISBN: 1862391505
YEAR : 2004
EDITION : 1st
#PAGES : 180
PRICE : 78.00 €

The Geological Society (of London) has published several volumes related to Environmental and Engineering Geology, on various topics including mapping in engineering geology, geophysical methods, land surface evaluation techniques and geohazard evaluation. The latest addition to the collection is a volume on the instability of coastal chalk cliffs. The volume contains eleven papers that address the nature, origin, occurrence, geographical distribution, mechanisms and effects of chalk cliff collapses, and the related issues of where, when and how chalk cliffs erode and the coast retreats. A total of 26 scientists contributed to the volume, most of them from the United Kingdom and France. This is no surprise, because coastal cliffs are abundant on both sides of the English Channel (la Rives Manche), and research on these coastlines has been active for more than four decades.

In the introduction, the two Editors tell the reader that the volume is the result of several years of research on the engineering geology of chalk and related coastal processes, but mostly it summarizes the outcome of the Risk of Cliff Collapse (ROCC) project, a multidisciplinary research project funded by the European Union within the Interreg II programme. The project was initiated by a French and English team, and was aimed at a better understanding of cliff collapse mechanisms in the Upper Normandy and Picardy regions in France, and in East Sussex in the UK.

The book is organized in three sections. In the first section, five papers describe the geological features controlling cliff instability and associated hazards, including a classification of failure types, the quantification of coastal retreat, the analysis of fracture types and patterns at various scales, and a discussion of the physical (geotechnical) properties controlling chalk instability. In the second section, four papers describe the marine processes driving coastal erosion, including the role of wave energy investigated by numerical analysis and flume tests, the analysis of the effects of wave impact-induced pressure into chalk fractures, and the quan-Correspondence to: F. Guzzetti(fausto.guzzetti@irpi.cnr.it) titative evaluation of the durability of flint pebbles through laboratory abrasion experiments. In the last section, two papers describe the assessment of the hazards associated with rapid coastal retreat in Normandy and Picardy, including a quantification of chalk cliff retreat obtained through photogrammetric analysis, and the application of an empirical ten-parameter erosion vulnerability diagram (and index) to determine hazard along the coast of the Baie des Chaleurs, in Quebec (Canada).

Although the main driving forces and the triggering mechanisms producing the retreat of high cliffs have long been known, systematic studies quantifying the processes and their effects at various temporal and spatial scales are scarce. With this respect, the volume is a good example of how a multi-disciplinary approach can help investigating complex geological problems. Papers in the book describe analyses carried out at scales ranging from a few centimetres (during laboratory tests on individual rock samples) to tens of kilometres (when investigating the geological causes and geographical distribution of coastal retreat). Techniques used in the multi-disciplinary study include: geological and geomorphological investigations, stratigraphy, analysis of historical information, qualitative interpretation of aerial photographs, quantitative photogrammetry, laboratory tests, and numerical and physical modelling.

The papers published in the book were originally presented at the international conference on “Coastal Rock Slope Instability: Geohazard and Risk Analysis”, held at Les Havre in May 2001. The volume was published less than three years later. Those of us who have edited conference proceedings know that this is a reasonably fast time, which guarantees that the content of the book is up to date. Erosion of chalk cliffs by sea-driven collapse is a serious hazard for local communities along the English Channel, and elsewhere in the World. As someone interested in the hazards posed by natural phenomena, I would have liked to have seen more discussion of the hazards posed by coastal retreat, and the associated risk.

In the tradition of the Geological Society, the volume is well produced and clearly illustrated. “Coastal Chalk Cliff Instability” provides new information and recent discoveries on the engineering geology of chalk cliffs and the hazard posed by their failure. For this reason, it represents a useful addition to the literature.

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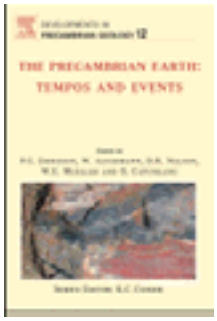
This book review has been published in Natural Hazards and Earth System Sciences (2004) 4: 533 (http://www.copernicus.org/EGU/nhess/).

A monumental volume

The Precambrian Earth: Tempos and Events



P.G. Eriksson, W. Altermann, D.R. Nelson, W.U. Mueller, O. Catuneanu (eds.)
Published by:
ISBN: 0-444-51506-2
YEAR : 2004
EDITION : 1st
#PAGES : 968
PRICE : 175.00 €

This is a monumental volume, in which the editors attempted to cover the most important and interesting events in the early history of the geological (and biological) evolution of the Earth, from its origin at around 4.56 Ga to the end of the Precambrian Era, at 0.54 Ga. Despite spanning a period of over four billion years, the Precambrian is by far less well studied than any of the more recent geological periods. This clearly has to do with the limited rock record that is preserved from there early times. Many important aspects of the history of our planet and events that set the stage for the development of multicellular (and eventually intelligent) life on our planet occurred during the Precambrian. Our understanding of these early events is limited and often controversial. The formation and evolution of the continents is an important topic - did the continents form fast and early, or slow and steady, or in bursts? And how exactly did they form? When and how did the core separate from the mantle? What influence did the formation of the moon have on the evolution of the Earth? What can we learn about the lunar orbit from studying Archean tidal deposits? What role did impacts of large extraterrestrial bodies (asteroids and comet nuclei; much larger than even the catastrophic impact that marked the end of the Cretaceous Era) play in the Archean and Precambrian? Where did our atmosphere come from? What was its composition and how did it is change and evolve, and when? What do we really know about the Earth's earliest biosphere? What are the first fossils? How did life evolve? What can we learn about exobiology from the study of our own Archean fossil record?

These questions, and many others, are dealt with in the present book. In an attempt to cover as many different topics from as many possible viewpoints as possible, the five editors had 77 authors from around the world write 78 chapters that are grouped into 9 main sections. The literature references occupy 151 of the 941 pages of the book, and the very detailed index is 19 pages long. The authors and editors are to be congratulated not only for putting together such a monumental work, but also for their efforts in documenting past research (the length and detail of the reference list is truly impressive). The nine main sections of the book cover the following themes:

1) The early Earth;

2) Generation of continental crust;

3) Tectonism and mantle plumes through time;

4) Precambrian volcanism: An independent variable through time;

5) The evolution of the Precambrian atmosphere: Carbon isotopic evidence from the Australian continent;

6) Evolution of life and Precambrian bio-geology;

7) Sedimentation through time;

8) Sequence stratigraphy and the Precambrian; and

9) Towards a synthesis.

Each of these sections has one or two editors who are responsible for its content, an "Introduction" at the beginning and a "Commentary" at the end, both by the section editor(s), and anywhere from three to ten chapters written by various authors (including the editors). Some of these chapters are long and detailed and cover a broad topic (e.g., "Archean atmosphere, hydrosphere and biosphere" by H. Ohmoto, or ""Earth's earliest biosphere: Status of the hunt" by J.W. Schopf, each on the order of 25 pages long), whereas others are short and cover a rather specific item (e.g., "Microbial mat features in sandstones illustrated" by S. Sarkar et al., 2 pages short, or "Precambrian ophiolites" by J.R. Chiarenzelli and E-M. Moores, 4 pages).

Given a topic as vast as the one this book tries to cover it is clear that some aspects cannot be covered in the same detail as others. It is a matter of choice and taste of the editors, who presumably selected the authors, and the depth in which each subject should be covered. In general the editors succeeded to a large degree to provide an overview of the field. The book cannot serve, in my opinion, as a textbook for any university course, but it will be an excellent reference book, maybe of use in specific seminars on the Precambrian, although I think the uninitiated students, even at graduate level, will be overwhelmed by the detail presented here (which is, nevertheless, a good starting point for further literature searches). Despite the large number of topics and authors, and the attempt to provide a balanced overview, some topics present a rather one-sided view. For example, the chapter on "The early Precambrian stratigraphic record of large extraterrestrial impacts" by B.M. Simonson et al. concentrates only on one aspect of this large and fascinating topic, and does not mention a lot of detailed petrological and geochemical work done by other researchers, some of it posing probably unpleasant questions (and these papers are not referenced either); their summary table of chemical compositions contains some omissions (not taking into account even the work of some of the coauthors of the authors of this chapters). The chapter

by D.H. Abbott and J.T. Hagstrum ("Strategies for finding the record of early Precambrian impact events") is downright odd and does not cover the topic promised in the title - it is mostly a collection of SEM photos of some heavy minerals in some recent deep-sea sediments, of no known impact relevance (or relevance to the Precambrian). Nothing is said about the very real impact record (in terms of impact craters), starting at 2 Ga. The section on the continental crust, I am missing chapters by pioneers of this topic, such as Armstrong or Taylor and McLennan (even the "usual" crustal growth against time figures are absent. In discussing the recently very popular "Snowball Earth" topic (long-lasting, possibly global glaciations) the editors decided to present predominantly the view of those that do not believe in such global glaciations - the other side (arguing for global glaciations) is not represented. The topic of very early fossils (evidence for 3.85 Ga life remnants), on the other hand, is dominated by those who are in favor of the very early fossil interpretations. The rich field of debate regarding alleged geochemical signatures of early life in the oldest rocks on Earth is not exploited.

Again, some of these omissions are due to the fact that even in a book of almost 1,000 pages not everything can be covered, but they are limiting the usefulness of the book as a reference source. The reader is overwhelmed by the detail, and assumes that a review book carefully presents all sides of a topic, but in some of the chapters that I looked at in detail, it is not easy to find both sides of the coin. The book is very well produced and I saw only very few typographical errors; the diagrams are of high quality, well readable, and of uniform style (this is particularly welcome, as I have seen some very expensive encyclopedia containing low quality reproduction of old graphs in a bewildering variety of styles). The size of illustrations is satisfactory, the number and choice of them is also pleasing. There are even a number of color illustration and photos. The price tag might be heavy, but still works out to about 10 cents per page (for the paperback version) - excellent value in today's publishing world. The reader of this book will have to be aware of the unevenness in covering various topics, and some unfortunate omissions, but, in general, I highly recommend this book to anybody who is interested in the Precambrian, and certainly every general science and earth and planetary sciences library should have a copy.

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New web portal on earthquake-disasters in India

http://www.earthquakeinfo.org

I have recently launched new web portal on Earthquake disaster awareness under the guidance of Prof. Ravi Sinha of Civil Engineering Dept.

The contents provided in the portal are solely designed to disseminate technical information (that often remains unavailable to different stakeholders in real time situation) in the simplest possible manner. Such information can be provided in a effective way (multi-lingual) so that even NGOs/ PVOs can take initiatives for further dissemination and goverment and other agencies can make use of it for decision making.

It is part of the outcome of my project which was funded by the WorldBank through Provention Consortium. It would be great to communicate with you regarding the content, style or querries related to the website.

With Warm Regards,

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IIT Bombay Powai Mumbai-400076 INDIA
jaiswal@iitb.ac.in

ISSMGE 5th International Congress on Environmental Geotechnics

ICEG

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5th International Congress on Environmental Geotechnics

CARDIFF, WALES, UK
26TH – 30TH JUNE 2006

DEADLINE FOR ABSTRACTS:
1ST DECEMBER 2004

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CONFERENCE PROGRAMME

The International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE) and the British member society, the British Geotechnical Association (BGA), are pleased to announce that the Fifth International Congress on Environmental Geotechnics will be held between the 26th and 30th June 2006 in Cardiff, Wales, UK, Europe's youngest capital city.

The conference will have as its major theme, Opportunities, Challenges And Responsibilities For Environmental Geotechnics. The conference will feature a number of distinguished guest speakers on selected topics of current interest and contributed papers selected from those submitted to the conference. The official language for the conference will be English.

CALL FOR PAPERS

Papers are invited under the following session themes:

- Remediation
- Barrier design (Nuclear waste disposal)
- Testing and monitoring
- Sustainability
- Fate and transport
- Waste Reuse/Waste Management (Radioactive waste)
- Regulation and Risk Management
- Tailings/Sludge ponds/underwater geoenvironmental issues
- Mine Sites, Tailing Dams, Dredgings and Lagoons
- Integrated management of groundwater and contaminated land

The above are intended to be indicative of themes and are not intended to be exclusive or to discourage the submission of other relevant papers.

ABSTRACTS SHOULD BE SUBMITTED TO THE CONFERENCE SECRETARIAT NO LATER THAN 1ST DECEMBER 2004

(E-SUBMISSIONS WELCOME)

The abstracts should be typewritten on an international A4 format sheet and be no longer than 500 words on 2 A4 pages. The abstract should have the title of the paper, names and affiliations of all authors, mailing address and fax/telephone numbers and email address of the corresponding author and proposed session theme centred at the top of the sheet. Submission of abstracts by electronic means will also be welcomed based upon the same format specified above.

Authors whose abstracts are accepted by the Programme Committee will be requested to prepare full papers which should be received by 30th September 2005, with a view to publishing the proceedings in time for the conference. Further information and instructions for preparation will be sent to authors of accepted abstracts.

THE CONFERENCE

The congress will take place in Cardiff, the capital city of Wales. Cardiff is a compact, lively city with a newly developed bay area, a delightful shopping centre, splendid historic buildings and a wide range of clubs and restaurants. The area is surrounded by beautiful countryside dotted with historic castles and manor houses and there is a wealth of things to see and do. Cardiff is easily accessible from Heathrow and Gatwick airports, and also by rail and road from all parts of the UK. It has its own international airport and trains run regularly from London throughout the day.

The conference is being organised by the Geoenvironmental Research Centre, Cardiff University, supported by the Transport Research Laboratory (TRL) and the Building Research Establishment (BRE).

ACCOMMODATION

A range of accommodation will be available within walking and commuting distance of the Conference.

SOCIAL PROGRAMME

A full social programme, including a formal dinner, will be arranged to complement the conference. It is also intended to host a conference golf tournament at the nearby 2010 Ryder Cup venue of The Celtic Manor resort, Newport. Delegates will be encouraged to bring accompanying guests to these events.

FURTHER INFORMATION AND CONFERENCE BULLETIN

For further information please contact the Conference Secretariat at this address:

Dr David-Huw Owen,

5ICEG Congress Secretariat,

Cardiff School of Engineering,

PO Box 925, Newport Rd, Cardiff,

CF24 0YF. United Kingdom

Tel: +44 (0)29 20876697

Fax: +44 (0)29 20874004

Email: OwenDH@cf.ac.uk

Web: http://www.grc.cf.ac.uk/5iceg/

A Bulletin containing details of the conference programme, registration procedure, and accommodation and other details will be issued in the spring of 2005.

For further details please keep watch on the following website:

www.grc.cf.ac.uk/5iceg/

We look forward to seeing you in Cardiff in 2006

ISSMGE 5th International Congress on Environmental Geotechnics

Please complete and return to:
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- ☐ I would like to submit an abstract and the provisional title of my paper is:

_____

_____

I believe that my paper would best fit into the following session/s:

- ☐ Remediation
- ☐ Sustainability
- ☐ Regulation and Risk Management
- ☐ Mine Sites, Tailing Dams, Dredgings and Lagoons
- ☐ Barrier design (Nuclear waste disposal)
- ☐ Fate and transport
- ☐ Tailings/Sludge ponds/underwater geoenvironmental issues
- ☐ Integrated management of groundwater and contaminated land
- ☐ Testing and monitoring
- ☐ Waste Reuse/Waste Management (Radioactive waste)

NB: Please note that all correspondence will be directed to the name and address above as the corresponding author.

SOLAS SUMMER SCHOOL 2005 - (Course)

29/08/2005 - 10/09/2005 - Institut d'Etudes Scientifiques de Cargèse in Corsica, France

The SOLAS Summer School is a biennial, international event that brings together over 70 students and 20 lecturers for a mix of lectures and practical workshops. It aims to teach the skills and knowledge of the many disciplines needed to understand the nature of ocean-atmosphere interactions. It allows doctoral students and early-career researchers to see how their work fits into the broad canvas of SOLAS, and global change research more generally.

We encourage applications from any doctoral student or early-career scientist interested in SOLAS science and have some funds to support attendance. Please circulate this announcement widely.

Application for the 2005 school is now open. For online application, details of the programme and more information see at the web site of the course.

Organizer:
SOLAS
http://www.uea.ac.uk/env/solas/summerschool/

ISSMGE 5th International Congress on Environmental Geotechnics - (Meeting)

26/06/2006 - 30/06/2006 - Cardiff, Wales, UK

The International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE) and the British member society, the British Geotechnical Association (BGA), are pleased to announce that the Fifth International Congress on Environmental Geotechnics will be held between the 26th and 30th June 2006 in Cardiff, Wales, UK, Europe's youngest capital city.

The conference will have as its major theme, Opportunities, Challenges And Responsibilities For Environmental Geotechnics. The conference will feature a number of distinguished guest speakers on selected topics of current interest and contributed papers selected from those submitted to the conference.

The congress will take place in Cardiff, the capital city of Wales. Cardiff is a compact, lively city with a newly developed bay area, a delightful shopping centre, splendid historic buildings and a wide range of clubs and restaurants.

As a truly global organisation, the ISSMGE provides a focus for professional leadership to more than 75 National Societies and over 17,000 individual members around the world. A large number of conferences are organized under the auspices of the ISSMGE, covering topics such as deep foundations, earthquake engineering, and underground construction.

This Congress, to be held in Cardif Wales in 2006, is the fifth in the prestigious series of International Congress' on Environmental Geotechnics, and follows on from the successes of 4ICEG held in 2002 in Rio de Janeiro, Brazil.

Practising and consulting engineers, owners and construction managers, researchers, public and private contractors, equipment and product suppliers, as well as those involved with engineering works related to environmental protection and remediation, are all very much welcome to attend and present their experiences and developments at the congress.

Organizer:
International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE).
http://www.grc.cf.ac.uk/5iceg/

1st Announcement of the 2006 SCOSTEP - (Meeting)

06/03/2006 - 10/03/2006 - Rio de Janeiro, Brazil

The International Symposium on "Sun, Space Sciences and Climate", promoted by SCOSTEP (Scientific Committee on Solar Terrestrial Physics) hosted by the Brazilian Academy of Sciences, will happen in Rio de Janeiro, Brazil, 6-10 March 2006. The event include the 11th Quadrennial Solar Terestrial Physics symposium, and progresses of CAWSES program (Climate And Weather of the Sun-Earth System), with emphasis on solar influence on climate; space weather: science and applications; atmospheric coupling processes and space climatology. More informations in the event's webpage.

Organizer:
Scientific Committee on Solar Terrestrial Physics
http://www.abc.org.br/scostep2006

EWRA 2005 - (Meeting)

07/09/2005 - 10/09/2005 - Menton, France

Scope of event

Countries of Europe have recently embraced a common strategy for the management of their water resources through the adoption of the EU Water Framework Directive roadmap. It brings a unique opportunity for building a common vision of sustainable usage of water and aquatic ecosystems. This effort is generating a vast set of expertise in river basin management policies, new economic transparency for water use and innovative approaches in public collaboration.

A broad range of presentation subjects, poster sessions and a commercial exhibition will offer a successful forum for water professionals coming from all over Europe and abroad wanting to share experiences in implemented methods, criteria and procedures related to water resources management.

General session highlights

It is the aim of the conference to identify and promote best practices in good water status and demand management, realistic scenarios building, reliable economic analysis of water uses and efficient stakeholders and/or public involvement in decision making. Technical papers addressing the following topics are particularly welcomed:

--National policies and strategies in water resources management

--Water agencies and river basin management organization

--Analysis and monitoring of good water status

--Advances in water resources numerical modelling

--Meeting environmental and water quality challenges

--Water economics: tools and perspective

--Impact scenarios of climatic and socio-economics changes

--Risk assessment in droughts, floods and pollution events

--Integrated water management and decision analysis

--Balancing sustainable water policies with development needs

Each subject will be introduced by distinguished practitioners and scientists who will act as keynote speakers.

Thematic sessions

* Mastering the freshwater quality standards and challenges of the EU WFD legislation (in French). Long range planning issues at national, basin and local level. Organized with AIRH(IAHR) and CNRS.

* International networking in basin management know-how and technology transfer. Sharing experiences between water agencies, science, the industry and the public. Organized with IAHS, INBO and UNESCO Help program.

* Water software tools in practice. Data acquisition and management, GIS, models, planning and decision support systems. Organized with GISIG.

Poster sessions

In order to encourage the debate and exchange of experience between delegates, ample facilities will be available for the display of poster papers with mini-presentations at authors' request.

All submitted papers either oral or posters will be electronically published in the distributed proceedings.

Organizer:

Ecole Nationale Supérieure des Mines de Paris and Office International de l'Eau - International Office for Water

http://www.cig.ensmp.fr/~ewra2005/