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GLOBAL IGBP CHANGE

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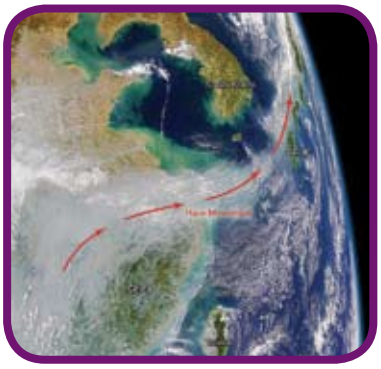
IGAC Science Plan and Implementation Strategy published



As the International Global Atmospheric Chemistry (IGAC) project now enters its second phase they have recently finalised their Science Plan and Implementation Strategy. The complete document can be downloaded from the IGAC and the IGBP websites. The photo from the cover shows haze from desert dust and pollution from China on their way out over the Pacific.

Centrefold

Back to the future: ESF launches EUROCORES

The European Science Foundation (ESF) has set up the European Collaborative Research Programmes (EUROCORES) to enable researchers in different European countries to develop cooperation and scientific synergy in areas where a European scale and scope are required. This article presents three of the programmes covering environmental change issues such as climate, biodiversity and marine coring.

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New IGBP website

Pin Board

IGBP NL Survey

IGBP asks all readers to fill in the survey, which comes as an insert in this Newsletter. It will help us to better to enhance content and layout for next year.

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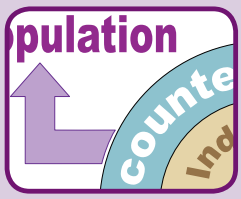

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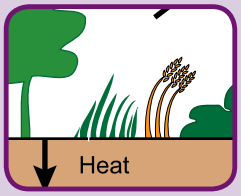

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Guest Editorial

Atmospheric composition change: a global challenge for science and society

Changes in atmospheric composition directly affect many aspects of life, driving climate changes, affecting air quality and influencing atmospheric inputs (such as of nitrogen) to ecosystems. In turn, these changes affect the fundamental necessities for human existence: health, food production, biodiversity and water supplies. Over the past century humanity has greatly altered the chemical composition of the atmosphere through growing industrial and transport activities and through increasingly intensive agricultural practices. Many air pollutants are known to be detrimental to human health and ecosystems, and radiatively active trace gases and particles emitted in the atmosphere as a result of human activity appear to be responsible for much of the observed climate change of the 20th century, particularly the warming of the last few decades. The overall objective of IGBP's International Global Atmospheric Chemistry Project (IGAC) is to understand the role of atmospheric chemistry in the Earth System and to determine the effects of changing regional emissions and depositions, long-range transport, and chemical transformations on air quality and atmospheric composition, as described in the recently released IGAC Science Plan and Implementation Strategy.

This report presents a new set of science foci and implementation strategies for IGAC, based on what was learned during IGAC's first phase (~1990–2003). Whereas air quality is by necessity a local problem, it is now clear that issues such as intercontinental transport and transformation of chemically active species, and the interactions between atmospheric chemistry and climate, must be addressed in order to better understand atmospheric chemical composition and to provide guidance to the public and policy-making communities. This requires connecting local-scale studies to regional-to-global scale impacts, as well as assessing the affects of regional to global scale phenomena at specific locales.

Atmospheric chemistry research, seen in an Earth System perspective, necessitates an interdisciplinary collaboration among scientists in chemistry, physics, biology, and other applied sciences. Because of the global nature of the problem, and in particular in the context of the growing emissions from developing countries, there is also a need for collaboration between scientists in countries around the globe. It has also become apparent that changes associated with the evolution of technology and population have an influence on emissions. Emissions, coupled with long range transport, can influence atmospheric chemical composition and climate, and make the issues global in nature. In addition, since the Earth System approach includes the human dimension, this approach tends to blur the barrier between natural sciences and

social sciences (economy, sociology, history, law…). Much remains to be done in bridging these disciplinary and geographic boundaries, and this is a challenge that IGAC can help the atmospheric chemistry community engage in over the coming years.

While much of the science addressed within IGAC evolves from curiosity-driven questions, many research issues in atmospheric chemistry are policy-driven because of the connection to human health, air pollution and climate change. The strategic role of atmospheric research in the development of environmental regulations and clean technologies is now widely recognised. In this context, research data and scientific results need to be easily accessible to support judicious policy decisions. The dissemination of accurate information to the public will help ensure that new knowledge leads to changes in public attitude, policy and legislation. IGAC strives to help facilitate this important connection.

Implementing a global strategy to address the issue of atmospheric composition change and the effects and feedbacks within the Earth System requires accurate measurements of the atmospheric properties of interest at a range of scales. It also requires the use of models, which allow for optimal planning of measurement strategies and for calculation of regional to global scale processes and impacts. On the observational side, high performance instrumentation and a range of ground-, airborne- and space-based platforms on which to deploy them are needed. Continuity of measurements is also vital for understanding and quantifying the natural variability of the atmosphere, a prerequisite for the reliable detection of changes and their attribution to natural or anthropogenic causes. IGAC's role is to assist in the optimisation of measurements, promoting activities to improve the representation of atmospheric chemistry processes in models, and to facilitate the appropriate coupling of measurements and models for the optimization of each.

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Some words from the editor…

"The sailor does not ask for fair wind – he learns how to sail"

I am the new Science Editor at the IGBP Secretariat and I have a very inspiring task ahead of me. Our office employs nine people from six different countries! After a quick look at the Newsletter subscription list, which includes more than 10,200 scientists, journalists, politicians, policy makers, teachers, company leaders and ordinary people interested in Global Change Science, it is easy to get humble. You are many readers with different needs and expectations from this Newsletter.

Scientists (at least some of them) often work to understand **reality**, but when communicating these results, we must consider **people's perceptions of reality!**

In other words, get to know your audience, or you'll lose them!

We must differentiate between our target audiences – what do each of you expect from the IGBP Newsletter? Even the most experienced policy maker may not always understand technical scientific language, and a journalist may not have time to read heavy, peer reviewed articles. But all of you skilled scientists of course want to read about frontline science. These are our communications challenges!

In our attempt to meet these challenges, we would like to hear your thoughts on how well the Newsletter is meeting your information needs, and what we can do to improve it. Please take a few minutes to answer our online reader survey at (http://www.igbp.net/NLsurvey/), or complete the survey inserted with this Newsletter and fax it to us by 1 December.

Then, after having read your feedback, we might better learn how to sail this boat and make it a pleasant voyage for our readers!

Erik Huss
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IGBP Brazilian Regional Support Office

IGBP's regional support offices are being established to help the Programme achieve the scientific goals laid out in the recently released IGBP Science Plan and Implementation Strategy.

The first regional office opened in Brazil in late July 2006. With the purpose of increasing the capillarity and synergism of the IGBP and ESSP efforts throughout South America and other regions of the developing world, the regional office is located within, and supported by, the Brazilian Institute for Space Research (INPE). The Brazilian Government and INPE are supporting the IGBP Brazilian regional office by hiring personnel and setting up the necessary infrastructure for the office. Two local science officers, Myanna Lahsen and Jean Pierre Ometto, work with the IGBP Chair, Carlos Nobre, on issues related to the social and natural sciences.

For the first time since its foundation in 1987, IGBP has appointed a scientist from a developing country as Chair for the 2006–2008 period. This choice emphasises Brazil's role as a leading country in tropical environment science research and the global importance of programs like the Large Scale Biosphere-Atmosphere Experiment in Amazonia, an international scientific effort led by Brazil and coordinated by Nobre.

The IGBP Office in Brazil will work to facilitate regional actions and as a support platform for the IGBP Secretariat in Stockholm. Its activities include, among other things:

- coordinating the implementation of IGBP or ESSP field experiments in the region (e.g. the Integrated Regional Studies experiment) and spurring the development of new initiatives in cooperation with policy makers, NGOs, universities and the general public;
- providing overall support to IGBP activities in the region, including communications and outreach, science series, newsletters, books, and helping to maintain the IGBP publications/products database;
- acting as a contact point for the Institutional Network and engaging with other IGBP activities elsewhere in collaboration with the IGBP Secretariat.

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IGBP Chair Carlos Nobre surrounded by local science officers Jean Pierre Ometto and Myanna Lahsen, in front of the new IGBP Brazilian Regional Support Office, situated in the campus of the Brazilian Institute for Space Research (INPE), São José dos Campos, which is located between São Paulo and Rio de Janeiro.

Integrating Process Studies and Modelling of Marine Zooplankton

B. deYoung, R. Harris, F. Carlotti,
D. Mackas and J.-C. Poggiale

Understanding the dynamics of the coupling between spatial pattern and zooplankton in the ocean may now be within our reach given the growing capabilities of physical circulation models, and expanding data on biological and physical processes in the ocean. With new sampling and observational systems, the need for and challenges of modelling these data grow. The complete representation of the life history dynamics of marine zooplankton, which can be quite complex, poses challenges to our observational capabilities and the development of process understanding and numerical representation in spatially explicit ocean ecosystem models.

How much detail is required to properly represent each species and how many species are required to explain ecosystem function? There is of course no single answer to such questions. There has, however, been a growing discussion of differing approaches for the representation of zooplankton life history dynamics within biological models [3,4].

Ecosystem models are both a fundamental tool of marine science and at the cutting edge of research. As sophisticated and as useful as these models are, concern is often raised regarding their representational fidelity, both for individual processes and for overall ecosystem function [5,1]. Many constraints limit our ability to improve the match between our observations and understanding of marine biological processes and their numerical representation.

A group of scientists gathered recently at the French International Centre for Mathematical Meetings (CIRM) in Marseille to consider new approaches for better integration of zooplankton process studies and numerical models of marine ecosystems. The goal of the meeting was to discuss the relation between process studies, and the representation of these processes, and zooplankton in general, in numerical models. The focus was on marine zooplankton because of their pivotal role in pelagic ecosystems both in trophic food webs and in biogeochemical fluxes [2]. Our present models of pelagic system dynamics are often limited to basic trophic-level interactions in ecosystem models (e.g. N, P, Z models) and zooplankton processes. Moving beyond such simplified representations presents a major challenge because of the complexity of species life history and interactions between species (Figure 1).

A previous meeting to discuss priorities in marine zooplankton research [9] addressed three key issues: (i) significance of zooplankton hot spots, (ii) information on individual species, and (iii) zooplankton and biogeochemical cycles. Many of these issues remain of key importance, perhaps suggest-

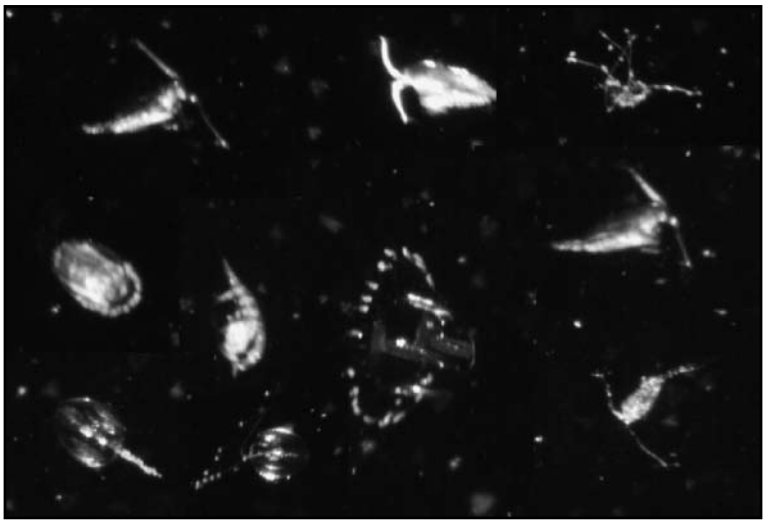

Figure 1. A collage of images of plankton from coastal waters, including copepods and gelatinous zooplankton. The images were taken using a moored Video Plankton Recorder (VPR) deployed in coastal waters of Newfoundland (see http://bbo.physics.mun.ca).

ing that these meetings, while useful at addressing issues of interest, do not always lead to their resolution. Rather than look backwards to previous discussions, in Marseille we discussed key processes, such as trophic and metabolic rates, encounter rates, behaviour and mortality that are central to marine zooplankton but for which progress is required to develop improved mathematical representation. Further advances will require new techniques (from molecular biology to new video microscopy), new observational tools and advances in computer technology and modelling techniques. Such developments should include new strategies for linking model concepts and data acquisition.

Models as exploratory tools

In the past, too much modelling effort has been directed towards fitting limited data. While model verification is important, too often the tests are incomplete and the model dynamics remain unexplored. We encourage a greater use of models as exploratory tools of process dynamics. Such an approach would require careful incorporation of process representation in the models and detailed and explicit testing of model dynamics.

How much individual behaviour can be scaled towards the development of functional response 'rules'? Feeding, a key determinant of growth and behaviour, takes place as an individual encounter between predator and prey. Can these individual interactions be generalized to develop 'rules' for application to models in which 'bulk' behaviour rather than individual dynamics are considered? Can laboratory studies on food quality and selectivity be tested and extended in field situations to determine their appropriate empirical representation in numerical models?

Such controlled laboratory studies provide an ideal environment to explore the interactions between food, food quality, selectivity, development, vulnerability and mortality. In the field, however, it is very difficult to follow individuals, or a group of organisms exposed to the same environmental conditions. The results of laboratory studies need to be integrated and matched with fieldwork or properly included in numerical models. Laboratory studies must be designed to measure similar state variables, carbon or nitrogen, as those that are observed in the ocean or those that are used in numerical models. One desirable goal would be to find a consistent marker for food quality, which is more important than is presently considered in most ecological models.

Mortality unknown

The three key characteristics that underlie population dynamics, behaviour and ecology of any species are development and growth, mortality, and reproductive success. We probably know the least about mortality of marine organisms, not only what the mortality rate is but how to parameterise the process. While these three general topics served as a broad framework for the meeting it was necessary to consider more specific processes to help to focus the discussions. Five key processes that determine zooplankton population structure and dynamics were discussed: feeding, metabolism and growth, mortality, predator-prey interactions, and habitat. In groups, we worked to address a few general questions related to each of these five topics:

- When developing a zooplankton community, population or individual model, what are the processes that are necessary and sufficient?
- What resolution of data is required for key variables, parameters or processes?
- Can we use theoretical approaches to guide our development of model design or the estimation of variables or parameters?
- How well integrated are experimental and modelling approaches?

How can we develop stronger links between those designing and conducting observational programs and modellers? The coupling of data and ecosystem models is particularly important because such models are not built from a canonical set of equations and so the potential for significant error arising from poor model structure is significant. Models are also powerful tools for exploring process dynamics and patterns. Observational programs can benefit from modelling; both at the design and interpretation stages of the work, and clearly models require data from observational programs, for their setup and design, and for testing. In designing models, it is important that one carefully describes the problem, in essence the goals of the model so that the models can be fit-to-purpose. There is a balance between model payoff and complexity, typically dome-shaped, with payoff increasing with complexity up to some turning point. Like all specialists, modellers appreciate sophistication and so there is a natural tendency for model complexity to increase even in the absence of any clear justification. On the other hand, data provided from observational programs are not always adequate or appropriate for defining or constraining model architecture.

Patchiness

Patchiness, identified as hot spots in a previous review [9], remains a central issue. Zooplankton, and their predators and prey, are not uniformly distributed in the ocean. What influences the observed spatial patterns of these three key groups? Can we determine empirical relations with habitat, the spatial structure of the marine environment, such that we could then explicitly model the varied spatial structural dynamics of each group? There are now observational tools, both acoustic and optical, that are providing new data on spatial patterns of plankton. Coupled with the improved skill of physical models to represent small-scale spatial structure, there is an opportunity to determine the relation between the 'grain' scale of the environment and that of the organisms.

The idea of "environmental grain", first suggested by Levins [8], was identified as a useful concept for explaining and raising new questions about zooplankton spatial pattern and habitat. This theory allows for the interpretation of differing strategies that organisms might use in response to environmental structure. If environmental variability is "fine-grained", an organism experiences environmental variability in approximately random order and in proportion to the probability density of each environmental "condition" within the environmental continuum. Levins' theory says that the best adaptive response by the organism is either to be a generalist, or to specialise on the "condition" or patch type that is most widespread (and therefore most frequently encountered) within the total environment. In contrast, if the environment is "coarse-grained" each individual can or must remain for prolonged periods of time in a habitat that spans only part of the range of environmental conditions (in the extreme, an individual may spend its entire life within a single environmental patch). Over time it therefore integrates a selective subset of environmental conditions; its experience is very far from a non-selective overall average. According to the theory, the optimal exploitation strategy is for the individual to specialize on the conditions prevailing within the patch or (perhaps more commonly) to find and reside within a patch that matches its specializations. For zooplankton, the difference between coarse and fine-grained spatial structure is largely determined by how well the individual can control its location in the face of strong fluid advection and mixing (mobility vs. passive drift). As this capability changes with life stage, improved understanding of zooplankton behaviour during the complete life cycle is required, including behavioural studies at spatial and temporal scales still challenging for observationalists.

The framework of individual based ecology [6] suggests that

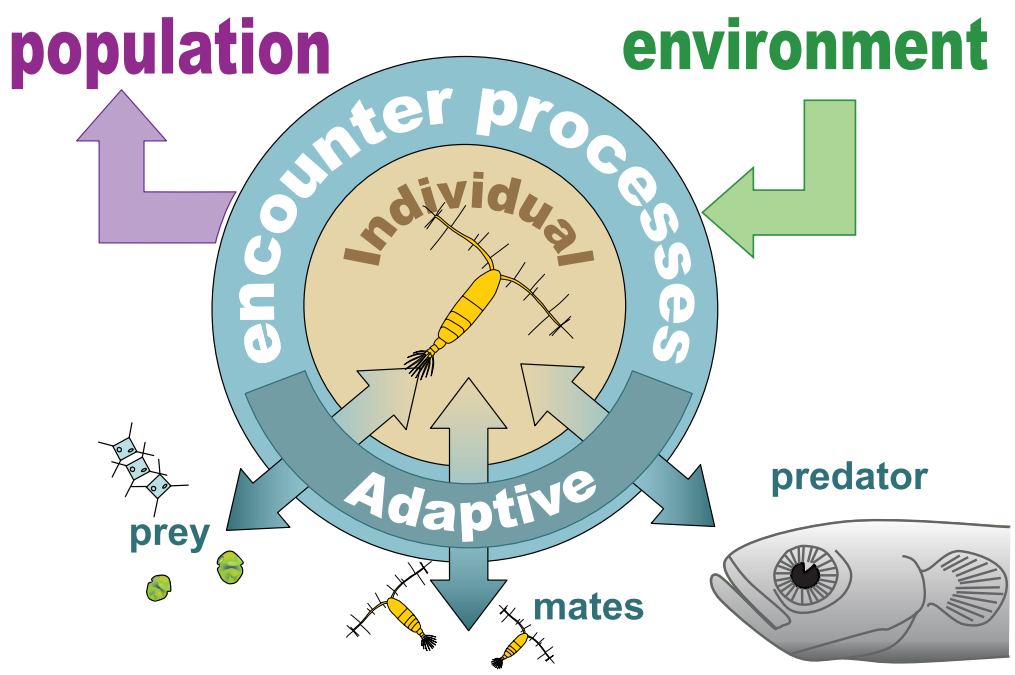

Figure 2. Conceptual framework of individual based ecology. An individual interacts with its environment (predators, prey, and mates in particular) through encounter processes that are in part regulated by adaptive behaviours. Individual based zooplankton ecology seeks to find the fundamental rules by which zooplankton interact and optimise their behaviour and to predict population level patterns as emergent properties.

individual based models, rich in mechanistic detail, describing how individuals interact with each other and the environment, offer significant potential for integrating physical oceanography and behavioural ecology. The individual based model lies at the juncture of three elements: physical models of the environment, models of encounter rate, and the representation of behaviour as an adaptive trait (Figure 2).

Bioenergetic relationships for marine zooplankton from both theoretical and experimental research can be set within a consistent framework such as the Dynamic Energy Budget (DEB) theory [7], starting from the individual level, via the population to the ecosystem level. This framework imposes constraints, both on theoretical developments, and on experimental design. Mass and energy balances, stoichiometric constraints and surface area-volume interactions, play an important role here, and require a holistic integration to resolve ecosystem structure and functioning. The step from individuals to population dynamics can be made within the framework of physiologically-structured population dynamics, although the number of parameters and variables should be limited, such that the physical and biological interpretation of the parameters, and the link with the underlying processes, are preserved.

Improved collaboration

With the growing concern about environmental change (e.g., climate, weather patterns, acidification, fishing, algal blooms) there is an urgent need to improve our ability to forecast the key characteristics and dynamics of the marine environment for different possible scenarios of human impact and natural and anthropogenic climate variability. The Global Ocean Ecosystem Dynamics (GLOBEC) project is addressing this challenge through its programme of research on the structure and functioning of marine ecosystems. Model development requires appropriate attention to both the ecosystem process and the computational concerns. For the next generation of models to be effective, we will need to improve the dialogue between modellers, experimentalists and data synthesizers [5] in order to determine the scientific priorities and then undertake the key research needed. Modellers need to be clear about which measurements they lack and to use models more as tools to explore ecosystem structure and function, while experimentalists with insight into marine organisms and systems must help in the design and development of these new models. Working together more, experimentalists and modellers should be open to testing their assumptions and approaches. Such ongoing dialogue and collaboration between experimentalists and modellers is particularly needed if, for example, Plankton Functional Types, which represent species groupings, are to be successfully incorporated into models (e.g., [1]).

If you are interested in obtaining a draft paper, please contact one of the five organisers of the Marseille meeting.

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JULES: a new community land surface model

E. Blyth, M. Best, P. Cox, R. Essery, O. Boucher, R. Harding, C. Prentice, P.L. Vidale and I. Woodward.

British modellers have recently presented a new land surface model that simulates how soil and vegetation respond to climatic parameters, i.e. atmospheric changes in temperature, humidity, wind, sunshine and precipitation. The model predicts soil temperature and moisture.

The land surface scheme used in the current climate model of the UK Met Office, called the Met Office Surface Exchange Scheme (MOSES), combines a complex energy and water balance with a dynamic vegetation model, Top-down Representation of Interactive Foliage and Flora Including Dynamics (TRIFFID). Many such models exist but very few have been coupled directly to a climate model and this combination makes MOSES a very powerful tool in our quest to understand the Earth System.

Given the upsurge of interest in current and forcasted global environmental problems due to global environmental change, there is a growing need for such holistic models. There is also a growing need for the models to be checked against observations – both ground-based data and distributed Earth Observation (EO) data sets. In fact, there is a growing need for even more processes to be included in assessments of the future global environment.

To answer this need, a new land surface model is being launched as a community tool. This is a joint initiative by the Natural Environment Research Council (NERC) through the Centre for Ecology and Hydrology (CEH), Climate and Land-Surface Systems Interaction Centre (CLASSIC), Quantifying and Understanding the Earth System (QUEST) and the Met Office. This will enable a much larger 'community' of land surface experts to contribute their knowledge and data to the model. Its new name (to mark this new role) is **JULES: Joint UK Land Environment Simulator**. In its present form, the programming of JULES is identical to MOSES and TRIFFID (as documented in technical report

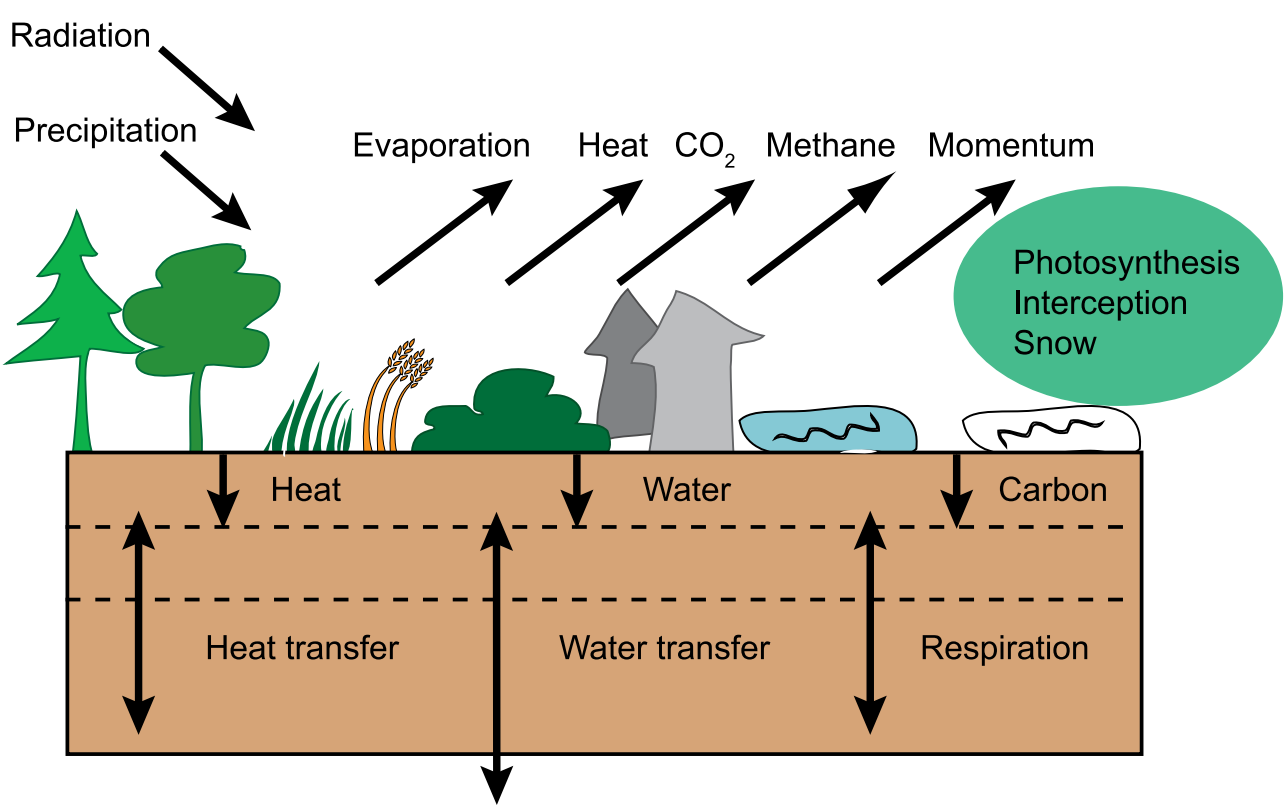

Figure 1. Schematic diagram of the new Land Surface Model, JULES.

numbers 24 and 30 which are stored on the Met Office website: http://www.metoffice.com/research/hadleycentre/pubs), but new software has been written to allow the model to be run separately from the Met Office atmospheric model.

What does the model do?

In its present form, the model simulates how soil and vegetation respond to atmospheric changes in temperature, humidity, wind, sunshine and precipitation. The model predicts soil temperature and moisture (which is subdivided into four layers down to 3 m) at time steps of 30 minutes or one hour. The soil temperature and moisture (along with the near-surface meteorology) then affect plant transpiration, soil evaporation, plant growth and soil respiration. The fluxes from the surface of heat, water vapour and carbon (in the form of carbon dioxide and methane) as a result of these changes are then calculated. Figure 1 gives a schematic diagram of how the model functions; for instance, for every grid, the land cover is represented as a combination of nine different surface types (from different vegetation biomes through to urban, water and ice) while the soil is assumed to be horizontally uniform.

There are many processes that go towards making the calculations summarised above: photosynthesis, soil hydraulics, snow melt, radiation processes, energy balance calculations, plant phenology to name just a few. Some of these processes are well understood and based on physically-based equations, while some are based on observed processes at small scales and a scaling-up assumption has been made. Others have parameters that have been calibrated from experiments either in laboratories or from field sites around the world. It is likely that many of the processes could be improved with reference to the many new datasets becoming available.

Future uses of the model

We expect the model to be used for off-line local and global studies of land surface processes, fluxes of pollutants through the soil system, climate impact studies, crop modelling, river flows and many others. In addition, a major new use is that JULES is the terrestrial module of the new QUEST Earth System model and will be used in the later versions of the Hadley Centre Earth System model (Figure 2). A new

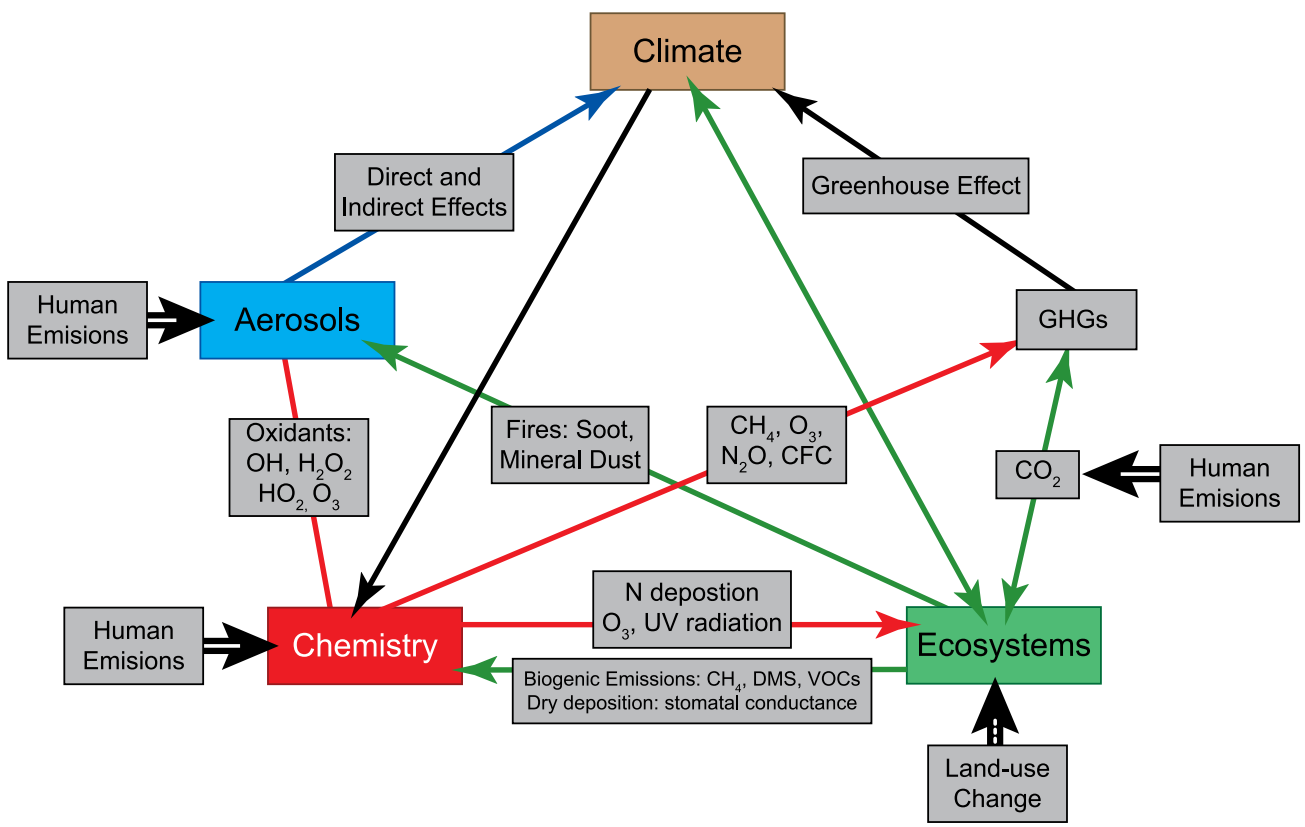

Figure 2. A schematic of the Earth System Model being developed both within the NERC QUEST programme and the Hadley Centre, both in the UK.

holistic approach to land surface modelling is required to include many more processes apart from the traditional water, carbon and energy. Stores and fluxes of new chemicals and particulates will be required such as nitrogen, ozone, Volatile Organic Compounds (VOCs), and aerosols. Processes to represent these fluxes and stores will need to be included in the JULES system so that their interaction in the Earth System can be included. In addition, a new generation Dynamic Vegetation Model, which represents growth and vegetation competition for space, is being developed. This is crucial to capture the future carbon balance of the planet.

Driving the model with observed data

It is now possible to drive the model from observed data as long as the requisite variables (temperature, humidity, wind speed, downward long and short wave radiation and precipitation) are available at a sub-diurnal time resolution. It is therefore possible to test the model performance in comparison to any data that is available, such as surface fluxes of water, heat or carbon, soil moisture and temperatures, snow cover, etc. We have also developed interfaces to allow the model to be run regionally and globally with data sets such as the Global Soil Wetness Project, Phase II (GSWPII).

Internal parameters and calibration

The modelling system has been set up to enable easy changes of any of the parameters that control the process modelling, although default parameters for standard soils and vegetation types are available. The ease with which the internal parameters can be changed means that calibration routines can be added to the system to identify optimal parameter sets. No official calibration system has yet been included in the JULES system, although this is an aspiration.

Model improvement and version control

There are many projects that aim to improve the process representation within JULES (and other land surface models). The JULES system includes an outreach and coordination programme that aims to communicate aspects of the JULES model to existing and new users, to discuss possible improvements to the model and ultimately to introduce improvements in the model itself. A series of six monthly workshops will be held to discuss the model. Participants will be invited to demonstrate any improvements they have made in a particular process. The website will be used to update the community on what improvements are being included in the official JULES models.

Once every 18 months, selected changes will be accepted into the official JULES modelling package. The updates will be coded and tested in the Met Office unified model. Some changes may only be used in the off-line version.

Availability

It is the philosophy of JULES that it should be available to the whole science community. There is a website which describes the model and where a licence to run JULES can be downloaded: http://www.jchmr.org.uk/jules

The latest version of JULES will be sent to anyone who completes the form. There is no budget for model support, so it is advisable for users to be reasonably experienced at running computer models.

A meeting was held to launch JULES in 2–3 October 2006 at the Centre for Global Atmospheric Modelling (CGAM) in Reading, UK. Details of the workshop will be available on the website.

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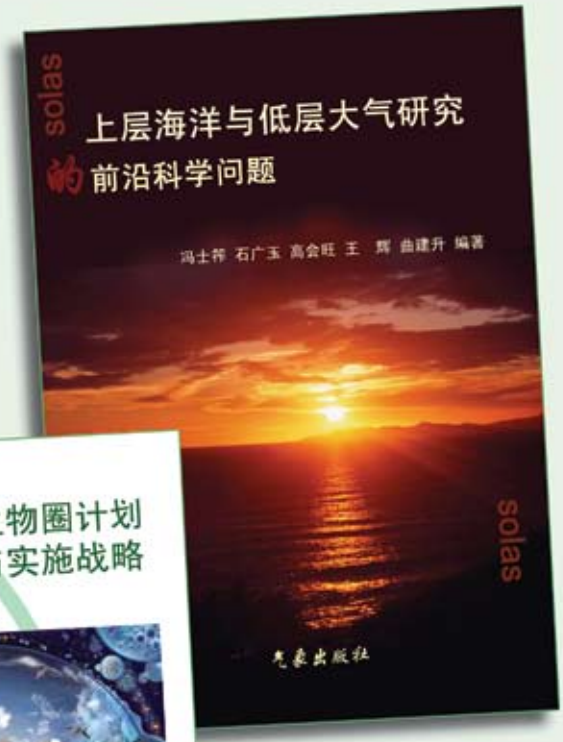
Three new translations of IGBP Science Plans

Three new IGBP Reports – the IGBP Science Plan and Implementation Strategy (IGBP Report 55), the iLEAPS Science Plan and Implementation Strategy (IGBP Report 54) and the SOLAS Science Plan and Implementation Strategy (IGBP Report 50), were translated into Chinese this October. Their Chinese versions will be presented at the ESSP Open Science Conference in Beijing, 9–12 November 2006. The secretariat of the Chinese National Committee for IGBP (CNC-IGBP), the Chinese National Scientific Foundation Committee (NSFC), and the Chinese Academy of Sciences (CAS) funded these efforts. The organiser is the Chinese Information Center for Global Environmental Change (CICGECS, http:// www.globalchange.ac.cn), a department of Lanzhou Library of the National Scientific Library of CAS.

Other Science Plans (e.g., IGAC, IMBER and LOICZ) are also being translated and are expected to be printed in the middle of 2007. These Chinese versions of IGBP Series Reports will increase the understanding of IGBP science and promote related studies in China.

Draft front cover of the Chinese translation of the iLEAPS Science Plan and Implementation Strategy.



Draft front cover of the Chinese translation of the SOLAS Science Plan and Implementation Strategy.

Draft front cover of the Chinese translation of the IGBP Science Plan and Implementation Strategy.

Meeting Announcement

UNDERSTANDING LAND-OCEAN-ATMOSPHERE INTERACTIONS IN THE CLIMATE SYSTEM: THE ROLE OF EARTH OBSERVATION FROM SPACE

Increasingly, Earth Observation is providing critical global data that both inform the development of coupled ocean-climate models and are used in data assimilation. This meeting explores land-atmosphere and ocean-atmosphere interactions and the role that Earth Observation is playing in improving our understanding of the complex feedbacks involved. An important aim is to foster greater links between the terrestrial and oceanographic research communities. Three themes are to be addressed: Variability in Time, Variability in Space, and Climate and the Biosphere.

GLOBAL IGBP CHANGE

The meeting is organised by the NERC Earth Observation Centres CLASSIC, CASIX and ESSC* on behalf of the IGBP UK National Committee.

The meeting is to be held at the Royal Society, Carlton House Terrace, London between 10:00 to 16:40 on 14 February 2007.

The list of speakers is provided below and the full list of presentations and registration forms can be found at: http://classic.nerc.ac.uk/IGBP

The meeting is open to all, but pre-registration is essential – closing date: Friday 12 January 2007.

Speakers:

Peter Liss	UEA (former IGBP Chair)
Carlos Nobre	CPTEC/INPE, Brazil (IGBP Chair)
Sietse Los	University of Swansea and CLASSIC
Herlé Mercier	IFREMER, Brest, France
Chris Taylor	CEH, CLASSIC
Jim Yoder	Woods Hole Oceanographic Institute, USA
Brian Huntley	University of Durham, CLASSIC
with Jon Bennie	University of Durham, CLASSIC
Peter Challenor	NOC, CASIX
with Paul Monks	University of Leicester, CASIX
Rosa M Barciela-Fernandez	Met Office, CASIX
Berrien Moore	University of New Hampshire (former Chair IGBP)

***CLASSIC** = Climate and Land-Atmosphere Interactions Centre

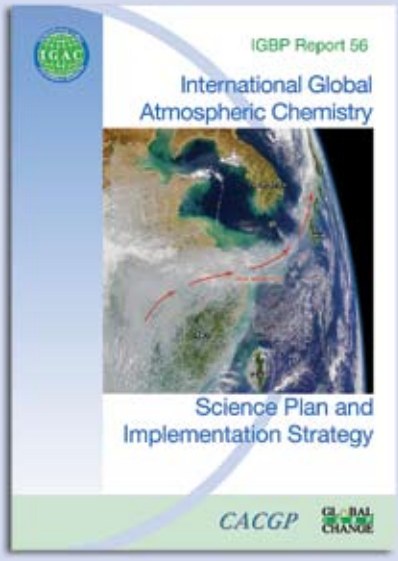
CASIX = Centre for Observation of Air-Sea Interactions and Fluxes

ESSC = Environmental Systems Science Centre

Convenors:
John Gash (CEH, CLASSIC)
Graham Weedon (University of Swansea, CLASSIC)

International Global Atmospheric

Science Plan and Implementation Strategy



Since its start in 1988, IGAC has conducted frontline research on atmospheric chemistry, coupling human influences on climate change and on air quality, on both regional and global scales. IGAC has now initiated its second phase, which includes more cross-boundary research with IGBP projects like iLEAPS (Land-Atmosphere Interface) and SOLAS (Ocean-Atmosphere Interface), as well as with research programmes and projects like WCRP (Global Climate), SPARC (Stratospheric Processes) and GEWEX (Energy and Water).

The recently published IGAC Science Plan and Implementation Strategy (SPIS) was presented at the IGAC's 9th Open Science Conference (OSC) in South Africa 17–23 September 2006, and lays out the scientific objectives and key research issues of the atmospheric chemistry project of IGBP as both IGAC and IGBP enter their second phases. It also lays out a framework for addressing these objectives and issues, recognising the need for collaboration with partner programmes and projects. The scientific focus of the Science Plan emerged from the first decade of IGAC research, much of which was conducted in the context of focussed, intensive measurement campaigns.

The scope of IGAC in its next phase includes both regional characterisation and the extension into issues that cross more expansive boundaries in space, time and discipline. While local and regional-scale atmospheric chemical composition still will be a primary focus, it is now clear that issues such as intercontinental transport and transformation of chemically active species and the interactions between atmospheric chemistry and climate must also be addressed to better understand atmospheric chemical composition and to provide guidance to the public and policy-making communities. Atmospheric chemistry must also be viewed within an Earth System context, and as such IGAC will increasingly collaborate with partner projects in the implementation of the Science Plan.

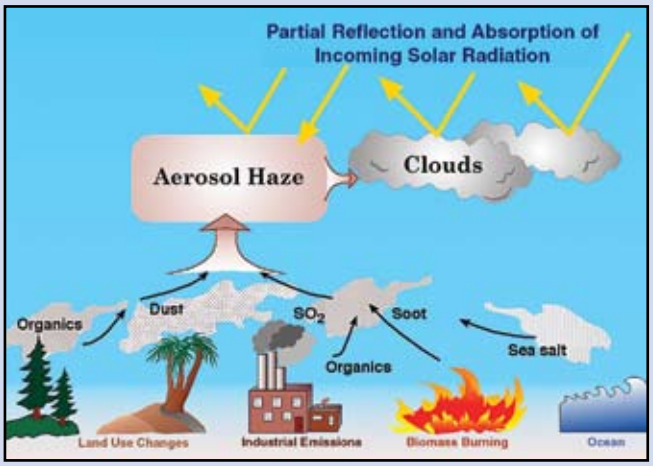


Figure 1. Radiative forcing by tropospheric aerosols: aerosols absorb and scatter solar radiation, and act as cloud condensation nuclei thereby determining cloud properties in the lower atmosphere. From IGAC SPIS (2006).

Altering atmospheric composition

Since the early Earth's history the atmosphere is both a part of, and a product of, the biosphere. Its natural composition is chemically unstable: if plants had not evolved, there would be at least a thousand times less oxygen, and a hundred times more carbon dioxide in the air. Conditions would then be unsuitable for nearly all other present-day forms of life. Earth's biological processes are also responsible for other greenhouse gases, such as methane, nitrous oxide and ammonia, which play an important role in global climate control and also affect the thickness of the Earth's protective ozone layer.

Over the past century humanity has greatly altered the chemical composition of the atmosphere. Worldwide emissions from growing industrial and transport activities and increasingly intensive agricultural practices have resulted in higher atmospheric concentrations of photochemical oxidants, acidic gases, aerosols and some toxic chemical species. Many of these air pollutants are known to be detrimental to human health and ecosystems.

Chemistry

IGAC examines the atmospheric chemistry issues facing society to understand the role of atmospheric chemistry in the Earth System and to determine the effects of changing regional emissions and depositions, long-range transport and chemical transformations on air quality and climate. IGAC research will help to inform decisions on issues ranging from urban air quality to transboundary air pollution to global climate.

The objective of IGAC is:

to understand the role of atmospheric chemistry in the Earth System and to determine the effects of changing regional emissions and depositions, long-range transport and chemical transformations on air quality.

The research agenda of IGAC for the coming decade consists of two broad research themes.

Theme 1:
The Role of Atmospheric Chemistry in Amplifying/Damping Climate Change

During the past decade the atmospheric chemistry research community has identified and quantified the distributions of a number of radiatively active substances. However, in most cases the level of scientific understanding in the calculated radiative forcing of these substances is still extremely low. A major topic of IGAC is to reduce the uncertainties in the calculated radiative forcing of the climate system (Figure 1). This theme focusses on four research issues: (i) ozone and its effect on climate change; (ii) aerosol distributions, properties and direct radiative effects on climate; (iii) effects of aerosols on clouds, precipitation and regional hydrological cycles; and (iv) effects of gas and aerosol emissions/depositions on spatial patterns of climate forcing.

Theme 2:
Effects of Emissions/Depositions, Transport and Chemical Transformations on Air Quality and Tropospheric Composition

IGAC will study intercontinental transport, the chemical transformation of short-lived components, and their effects on regional climate and air quality thousands of kilometres downwind of sources (Figure 2). Research to address these issues is being organised into three foci: (i) export, transport and transformation of oxidants, aerosols and aerosol precursors; (ii) impacts of intercontinental transport on surface air quality; and (iii) anthropogenic impacts on the cleansing capacity of the atmosphere.

Figure 2. Research in the early 2000s showed that even short-lived substances (such as aerosols and ozone) can be transported between continents. For example, in early April 2001 strong winds swept across the Taklimakan Desert (western China), the Gobi Desert (eastern Mongolia) and industrial regions of eastern Asia, lifting dust and pollutants into the troposphere. This dust/pollution cloud travelled across the Pacific Ocean and reached the west coast of USA after just a few days. From IGAC SPIS (2006).

Implementation of IGAC research will be conducted through "Tasks" (specific scientific questions), "Workshops" (focussed issues identified by the IGAC SSC) and focussed "Initiatives" (important issues that require synthesis and integration across disciplines). IGAC operations will be coordinated by the International Project Office in Seattle, USA, and in collaboration with regional offices in China-Taipei and Bologna, Italy. Communication and outreach activities (website, newsletters, OSC's, etc.) will be further developed as IGAC enhances cross-boundary global change research collaboration with other regional and global projects in the future.

You can download a PDF-version of the IGAC SPIS from the IGAC and the IGBP websites (http://www.igac.noaa.gov or http://www.igbp.net) or request hard copies via e-mail (igac.seattle@noaa.gov) which will be distributed free of charge.

Alternatively, contact the IGAC International Project Office, NOAA-PMEL, 7600 Sand Point Way NE, Seattle, WA 98115, USA.

Last year, global change scientists and several regional and international organisations met from 22–24 September 2005 in Nairobi, Kenya, to plan a pan-African global change research network. As a result of that meeting, a report ('Regional Co-operation on Global Environmental Change Research in Africa') was published and widely distributed among the global change community and partner organisations. The Steering Committee (SC) of the proposed research network has since met in Pretoria, South Africa, 19–21 June 2006. The key issues agreed upon by the SC are highlighted in this article, among them the decision to name the network:

AfricanNESS – Global Change Research in Africa

An inaugural Steering Committee was formed with broad regional and international representation to build upon the results of the Nairobi workshop and charged to evaluate whether some kind of formal system or mechanism would be needed to support global change research cooperation in the region. Subsequently, potential partnerships are being sought, namely with relevant international research programmes, regional bodies (e.g. the New Partnership for African Development, NEPAD, and the ICSU Regional Office for Africa) and development aid funding agencies.

It was agreed that, as a matter of priority, a Science Plan should be developed to address both regional and global issues, and that Africa's science community should drive the emerging agenda. The SC also reviewed the scientific priority themes and the following key research thematic areas are being drafted:

Climate Change and Health

This is a critical but overlooked research area underlying all work on global change issues. Understanding the climate and being able to accurately predict it is critical for Africa. Further strengthening the capacities of institutions and individual researchers in this area is highly desirable.

Future work should focus primarily on diseases related to climate change and water, and these are closely related to welfare issues, as emerging infectious diseases are a widespread threat in Africa, namely:

- how health is affected by a changing economic environment resulting from global change;
- health coping/adaptation capacity to climate disasters, e.g. floods;
- urban sprawl;
- direct and indirect relationships between climate, biodiversity and health;
- re-emerging and new diseases;
- other issues, particularly requiring integration with the Millennium Development Goals (MDGs).

Since the Earth System Science Partnership (ESSP) is developing a Global Environmental Change (GEC) – Human Health project to be launched at the ESSP Open Science Conference (OSC) in Beijing this November, and owing to limited human resource capacity, it was decided that the Science Plan in this section should be developed in line with ESSP's new joint project.

Ecosystems and Sustainable Livelihoods

This theme will address issues related to desertification, land degradation, coastal zones and small islands, biodiversity, agriculture and food security, deforestation, urban migration, population depletion and rural development, wetlands, and ecosystems degradation.

Water and Sustainable Energy

Major research areas related to 'Water and People', and 'Water and Environment' will include topics such as the hydrological cycle, governance, environmental flows, conservation of ecological goods and services, and transboundary water resources.

Understanding broad issues regarding 'Energy Alternatives and Deforestation' will require studies on alternative and renewable energy sources; removal of barriers; tradeoffs (biomass for energy vs. food security); environmental consequences of alternative and renewable energy strategies; consequences of GEC for alternative and renewable energy, and energy and societies (e.g. consumption patterns and lifestyles).

Crosscutting Issues

Research themes under this heading will include: adaptation, governance, education, indigenous knowledge, science policy and society, capacity building (i.e. capacity recognition and development, which need to recognise that there is capacity in Africa), assessment and monitoring.

Vision and Mission

A vision statement will be selected among alternatives such as:

a) Advancing society's capacity to adapt to global change in Africa through engaging the scientific community and other stakeholders.
b) Enhancing the contribution of science to society's capacity to adapt to global change in Africa.
c) Enhancing society's capacity to adapt to global change in Africa through scientific research and stakeholder engagement.

The proposed mission statement of AfricanNESS is 'To promote global change research and capacity enhancement for sustainable development in Africa'.

Objectives

- To develop, prioritise and evolve an African global change research agenda that is both relevant to the continent and contributes to international science and development programmes.
- To mobilise the African scientific community and financial resources to carry out the research agenda.
- To provide better access to information for research on global change.
- To increase participation of African scientists in global change research and in international networks.
- To promote partnership participation and benefit sharing among all stakeholders in Africa and internationally for policy and decisions to respond to global change.
- To facilitate use and sharing of existing capacity in Africa for application of global change research and to identify and fill capacity needs.

Guiding Principles

- adaptation
- indigenous knowledge
- capacity recognition and development
- science policy and society (including policy relevance)
- scientific quality and products
- monitoring and evaluation (including the efficacy of the network, as well as collection and management of long-term data)

Figure 1. Nairobi Workshop participants Mary Scholes (South Africa, IGBP SC vice-chair) and Lou Brown (USA, National Science Foundation) during coffee break.

Figure 2. PASS Director (and author of the present article) Prof. Eric O. Odada (left), Hon. Asman Kamama, Assistant Minister for Environment and Natural Resources, Government of Kenya (right), and Prof. Shem O. Wandiga, Director of Centre for Science and Technology Innovations, Kenya (in the background).

The Science Plan will have in mind other available science plans e.g., ICSU ROA, International Programmes (e.g., ESSP Science Plans) and adapt them to suit the Network research themes, while avoiding duplication. The draft Science Plan, initially aimed for September 2006, will soon be available.

Network Structure, Governance and Partnerships

The Nairobi Workshop did not reach a definite conclusion as to whether the Network should be organised as an intergovernmental body. Participants felt that a new structure should be associated in some way with governments, with regional bodies, with international scientific programmes, and with its counterpart organisations in other regions. It has, however, been suggested that, at least initially, a new structure set up to promote and encourage global change research in Africa might benefit from a much simpler structure which may evolve into a more complex one at a later stage.

On the basis of these discussions, the SC agreed to: identify formal and informal research networks and partnerships; seek endorsement from AU/NEPAD for the Network; keep the structure lean during the formative stages and implement the structure recommended in Nairobi in the long term; have the Pan African START Secretariat to act as an interim secretariat. The website http:// www.africanness.org has been registered and a budget for activities in the interim phase is being proposed.

Forum for Science/Policy Dialogue

The SC considered how to establish connections with policy-makers and other users of global environmental change science (e.g. business, and development agencies), and how to encourage science-policy dialogue. The SC also discussed the planning for the proposed forum for the science-policy workshop.

It was agreed that the SC initiates dialogue with policy makers and engages society with regard to environment issues, and seeks funds to carry the process forward. The SC will present AfricanNESS at regional economic and sectoral summits, ministerial commissions, as well as make a presentation at the ESSP Open Science Conference, 9–12 November 2006, Beijing, China. The Nairobi Workshop Report, Science Plan and Minutes will be translated into French for hosting on the web.

Other Immediate Actions

The SC agreed upon the following actions:

- that a governance structure be developed as soon as possible (by September 2006);
- that an SC representative makes a Network presentation at the IGFA meeting to be held at 1–3 November in Montreal, Canada;
- that an SC representative makes a Network presentation to EU officials;
- that an SC representative makes a Network presentation to the AU, August Pre-Summit Meeting, Addis, Ethiopia.

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In late 2003, the European Science Foundation (ESF) set up the European Collaborative Research Programmes (EUROCORES) to enable researchers in different European countries to develop cooperation and scientific synergy in areas where a European scale and scope are required. The EUROCORES scheme provides a flexible framework that allows national science agencies to join forces to support high quality European research. There are presently 23 EUROCORES Programmes dealing with cutting-edge science in life, earth and environmental sciences, physical and engineering sciences, medical sciences, social sciences, and humanities.

Back to the future! From past climates to future biodiversity: ESF-coordinated EUROCORES Programmes in Geo- and Environmental Sciences for Europe

The EUROCORES Programmes consist of a number of international, multidisciplinary collaborative research projects. Under the guidance of a scientific committee, and with the help of a EUROCORES Programme Coordinator at ESF, the programmes provide planning, logistics, and the integration of science. Each Programme mobilises from 5 to 13 million euros in direct funding from national funding agencies. Extra funding for coordination and networking is allocated by the ESF through these distinctive research initiatives, to build on the national research efforts and contribute to the capacity building, especially in relation to the 15–20 post-doctorate positions and PhD studentships supported nationally within each Programme.

Here we present three recent examples of EUROCORES Programmes linked to the fields of Geosciences and Environmental Sciences (EuroCLIMATE, EuroDIVERSITY, and EuroMARC) that are of the most relevance to the IGBP community.

Climate Programme

The EuroCLIMATE (Climate Variability and the (past, present and future) Carbon Cycle) Programme supports research addressing climate variability and the past, present and future dynamics of the carbon cycle, and their inter-relationships. The future climate and its variability are expected to be largely different from those of the recent past. Paleoclimate studies extending further back in time offer an essential tool for analysing a broader response range of the climate system to internal and external forces. The studies also increase our understanding of the underlying physical, chemical, biological and geological processes. Paleoclimate studies must take into account the high frequency variability, complex non-linear character and memory effect of the climate. The EuroCLIMATE Programme focusses on: i) multi-proxy reconstructions at Holocene and longer time scales from all natural archives available (marine, terrestrial and ice-core) to develop and validate new climate proxies; ii) a common timeframe across archives; iii) the coupled climate and carbon cycle models used for global change scenarios on European and regional scales (Figure 1).

The EuroCLIMATE Programme includes nine international projects, some primarily pursuing methodological advances (PaleoSalt, CASIOPEIA, IsoTrace), others focussing on reconstructing climate-biosphere and climate-carbon cycle interactions (MERF, DecVeg, Tree14, ChallaCEA, DecLakes, RESOLuTION) at various time and spatial scales. EuroCLIMATE is chaired by Jelle Bijma (Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany) and coordinated by Daniela Turk at the European Science Foundation (Strasbourg, France). EuroCLIMATE has achieved great progress since its launch in June 2005 with numerous collaborative field and lab experiments and modelling studies, participation at international conferences and workshops, as well as publications.

Biodiversity Programme

The aim of the EuroDIVERSITY (Challenges of Biodiversity Science) Programme is to support the emergence of an integrated biodiversity science based on the understanding of fundamental ecological and social processes that drive biodiversity changes and their impacts on ecosystem functioning and society. Ecological systems across the globe are being threatened or transformed at unprecedented rates from local to global scales due to the ever-increasing human domination of natural ecosystems. In particular, massive biodiversity changes are currently taking place, and this trend is expected to continue over the coming decades, driven by the increasing extension and globalisation of human affairs. The EuroDIVERSITY Programme meets the research need triggered by the increasing human footprint worldwide with a focus on particular biological systems and on the generation and validation of theories relevant to experimental and empirical data. The EuroDIVERSITY Programme will try to bridge the gaps between the natural and social sciences, between works on terrestrial, freshwater and marine ecosystems, and between work on plants, animals and microorganisms (Figure 2).

The Programme was launched in April 2006 and includes 10 international, multidisciplinary collaborative research projects, which are expected to initiate or strengthen major collaborative research efforts. The projects deal with four major areas: microbial diversity (COMIX, METHECO, MiCROSYSTEMS); biogeochemistry in ecosystems (BEGIN, BioCycle); landscape and community ecology of biodiversity changes (ASSEMBLE, AGRIPOPES, EcoTRADE); and diversity in freshwater (BIOPOOL, MOLARCH). EuroDIVERSITY is coordinated by Inge Jonckheere at the European Science Foundation and will integrate various European research teams through collaborative fieldwork campaigns throughout Europe, participation at international workshops and conferences, and joint peer-reviewed publications.

Figure 2. Research projects focussing on terrestrial, freshwater and marine biodiversity: more than just animals and plants.

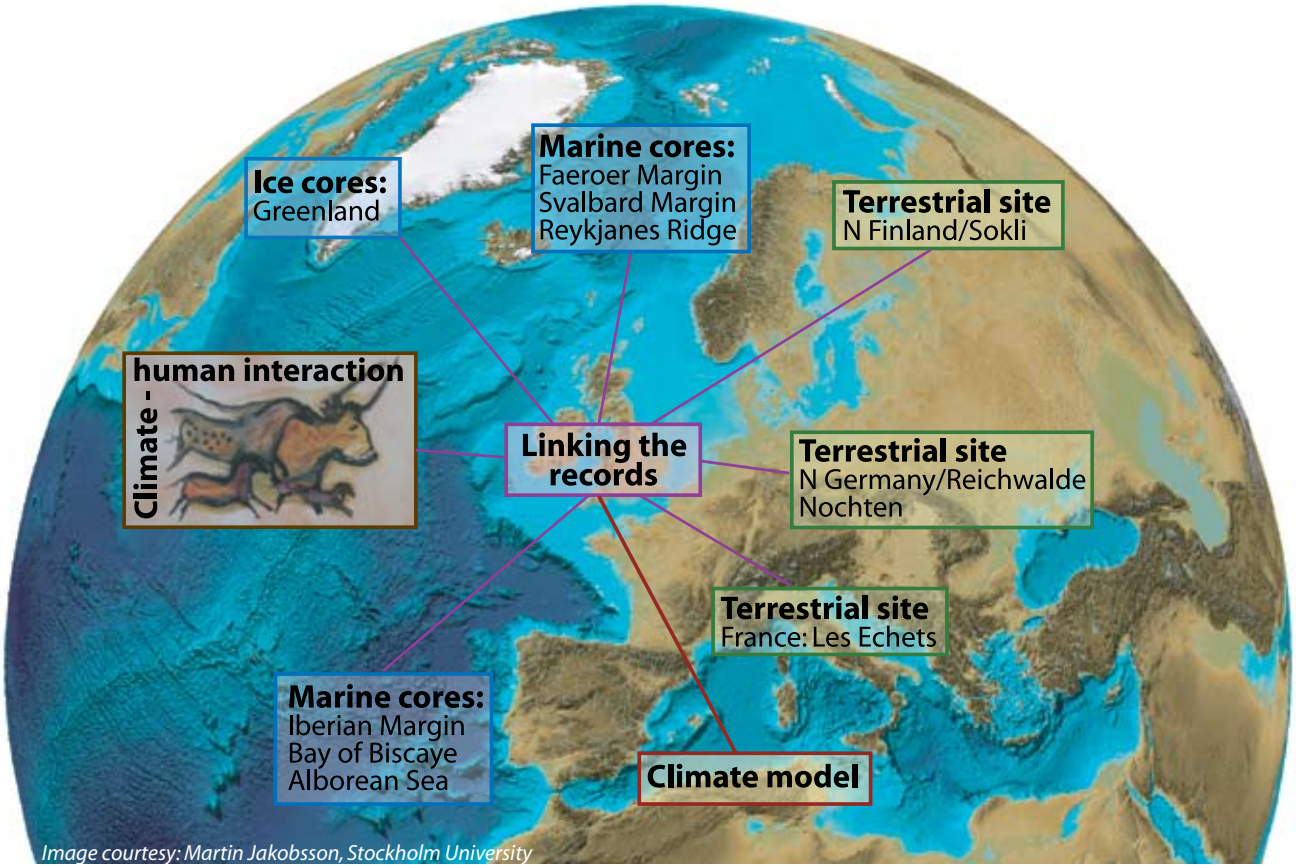

Figure 1. An example of a EuroCLIMATE project addressing a new approach to link high resolution terrestrial, ice core and marine archives to explain rapid climatic and environmental shifts during Oxygen Isotope Stages 2 and 3.

Marine Coring Programme

The EuroMARC (Challenges of Marine Coring Research) Programme focusses mainly on three science themes: i) Environmental change, processes and effects at the Earth's surface; ii) deep biosphere and sub-seafloor ocean; iii) solid Earth cycles and geodynamics. EuroMARC is, apart from its intrinsic scientific value, an important contribution to the European participation in the Integrated Ocean Drilling Program (IODP), whose overarching theme is outlined in the IODP Science Plan, "Earth, Oceans and Life: Scientific investigations of the Earth system using multiple drilling platforms and new technologies". Obtaining key cores from the sub-seafloor is crucial to progress in the marine Earth and environmental sciences since the oceans regulate climate. Deep-sea cores also comprise fundamental geodynamic, geochemical and biological processes and thereby create high-resolution records of the Earth's history (Figure 3, 4).

Over the past 30 years, European researchers have made major scientific discoveries within marine geology such as the movements of plate tectonics and the accretion of the oceanic lithosphere. Innovative scientific advances also include the study of microbial communities (deep biosphere) and the discovery of frozen methane (gas hydrates) below the seafloor; the detection of past extreme and rapid climate variations; high resolution climate perturbations; the establishment of new models for passive margin evolution and alpine geology; the understanding of mechanisms of ocean biogeochemical cycles; and the discovery of large igneous provinces associated with continental break-up at volcanic margins.

European research has demonstrated how sensitive the surface environment is to solid Earth processes; biogeochemical interactions and internal feedbacks between mass and energy fluxes; chemical fluxes; as well as physical states and biological communities.

EuroMARC will further strengthen the European effort to address the above scientific issues. Following the current phase of proposal selection, the EuroMARC projects will start in early 2007, under the coordination of Bernard Avril at the European Science Foundation.

Integrating Activities

A more detailed description of these EUROCORES Programmes as well as other ESF instruments can be found at www.esf.org. In the near future, EuroCLIMATE, EuroDIVERSITY and EuroMARC plan to participate in the Earth System Science Partnership (ESSP) Global Change Open Science Conference in Beijing, China, November 2006; special sessions at the European Geosciences Union (EGU) conference in Vienna, April 2007; and a number of topical workshops, open conferences and co-sponsoring of summer schools. These programmes will develop strong interactions with other major initia-

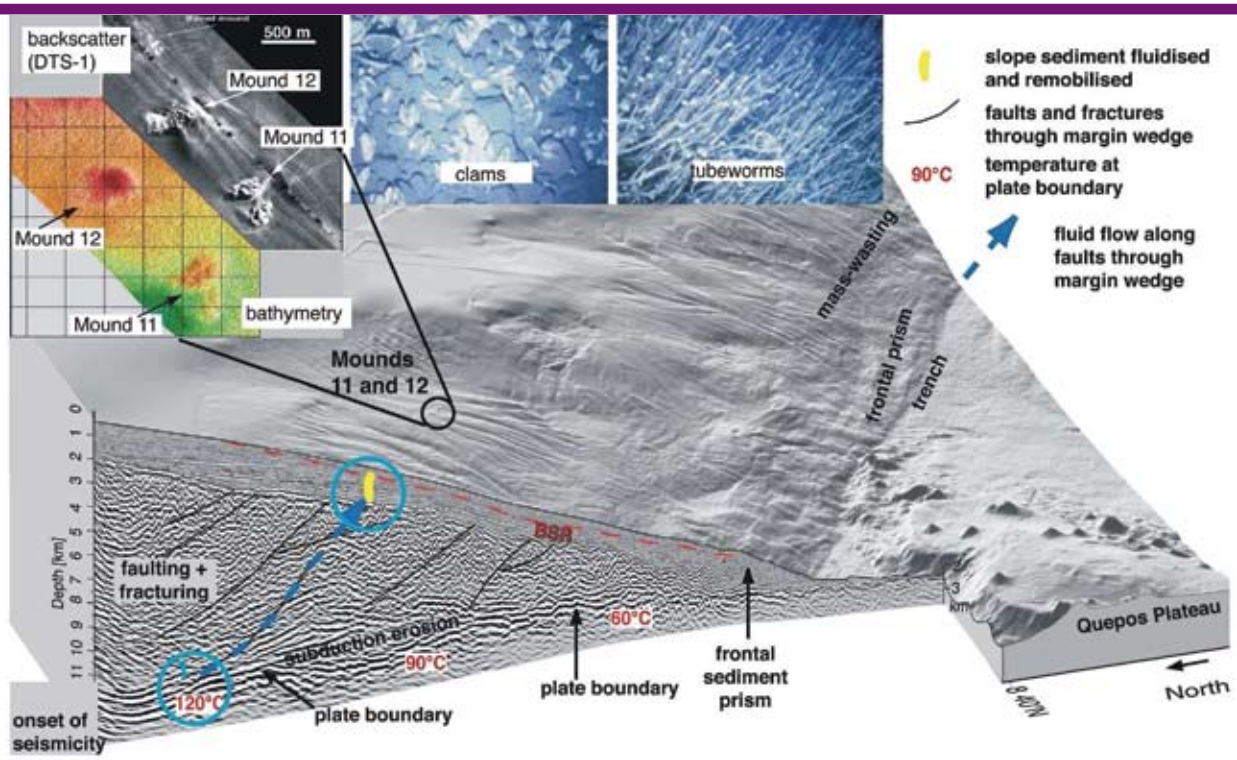

Figure 3. Interrelationship between dewatering at a plate boundary, fluid flow along faults and remobilisation of slope sediment to form mud diapirism. This conceptual view will be further investigated using seismic imaging techniques (from C.R. Ranero and R. von Huene (2000) Subduction erosion along the Middle America convergent margin, Nature 404: 748–752).

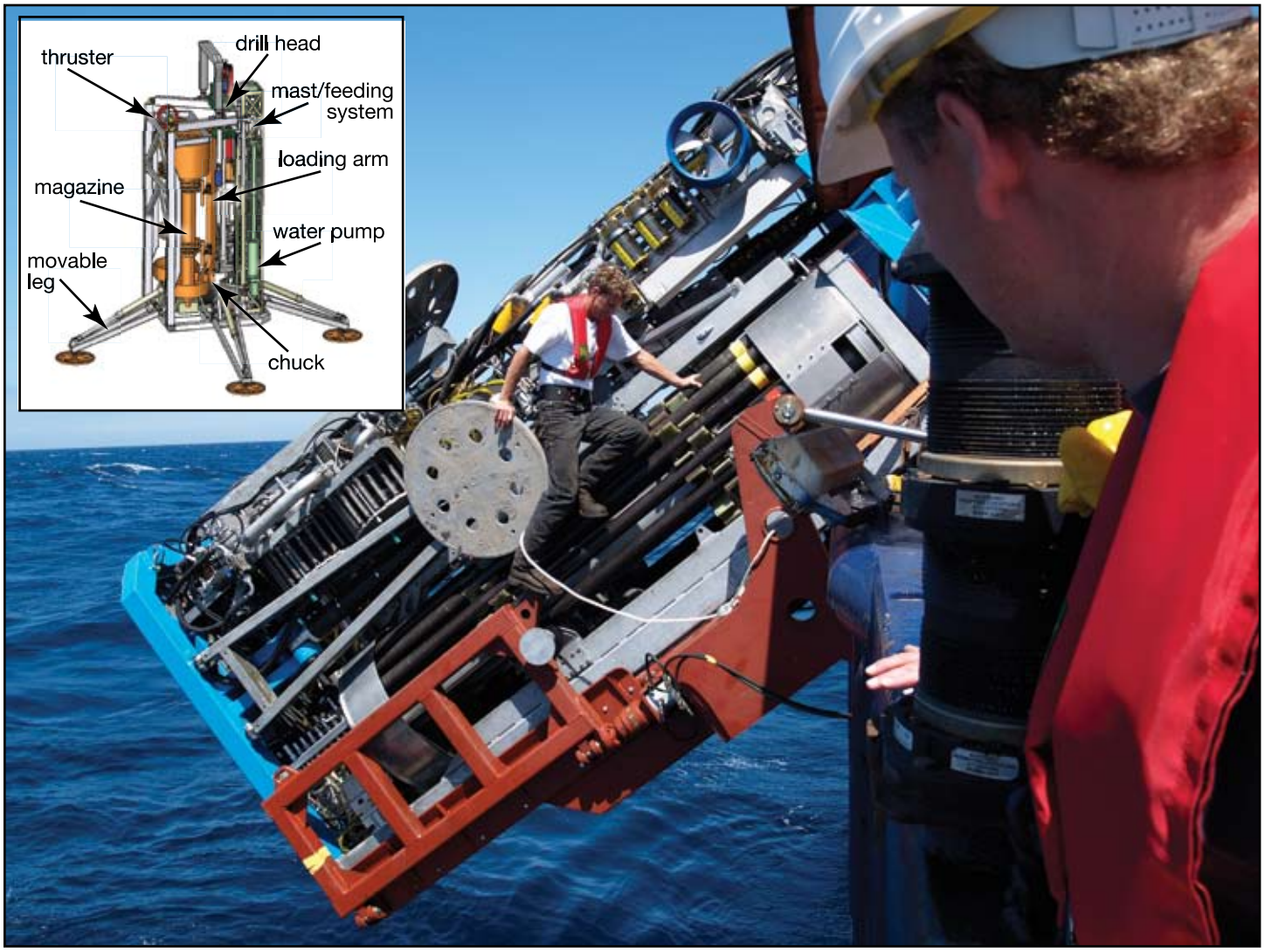

Figure 4. The MeBo ("Meeresboden-Bohrgerät", German for "sea floor drill rig") is a portable seafloor drill rig remotely operated from standard research vessels. This drill rig is capable of sampling soft sediments and hard rocks down to 50 m below the sea floor. It can be operated in water depths down to 2000 m. It has been developed by MARUM/RCOM, Bremen, Germany, thanks to support from the German Ministry of Education and Research, and by the Bremen State Government.

tives and programmes, such as IGBP, WCRP, IHDP and DIVERSITAS. We at ESF are excited about developing synergistic relationships between those communities and we look forward to contribute to the strong, international scientific efforts they represent.

The EUROCORES Programmes are supported by science funding agencies from more than twenty European countries, and by the European Science Foundation (ESF), with support by the European Commission, DG Research (Sixth Framework Programme).

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Facts about ESF

Established in 1974, the European Science Foundation (ESF) is a non-governmental organisation with 78 member organisations (e.g. research councils, academies and other national science performing or funding agencies) from 30 countries. It also maintains close links with other international bodies with interests in scientific research, including the European Commission, the European Heads of Research Councils (EuroHORCS) and the International Council for Science (ICSU).

www.esf.org

Earth System Science Partnership Open Science Conference

An International Meeting of Global Environmental Change Researchers

Some 1,000 international scientists from a variety of natural and social science disciplines will attend an open science conference sponsored by the Earth System Science Partnership (ESSP) to share their assessments of natural and human-driven changes to Earth, with a particular focus on regional consequences.

The ESSP Open Science Conference in Beijing, China (9–12 November 2006) will consist of 4 half day plenaries and 44 parallel sessions with oral and poster presentations.

Global Environmental Change:
Regional Challenges

Beijing, China
9–12 November 2006

Major Conference Topics

- How can food security be improved in the face of global environmental change?
- Can we manage the Earth's finite water resources to meet the planet's growing needs?
- What are the effects to human health of changing environmental conditions?
- Is there a way to make cities and urban regions more carbon friendly?
- What does a changed monsoon climate mean for the social and economic development of Asia?

Selected Speakers

Dahe Qin, China Meteorological Administration; **Gordon McBean,** University of Western Ontario, Canada; **Congbin Fu,** START Regional Center for Temperate East Asia; **Christian Körner,** University of Basel, Switzerland; **Felino Lansignan,** University of the Philippines; **Rik Leemans,** Wageningen University, Netherlands; **Diana Liverman,** University of Oxford, UK; **Tony McMichael,** Australian National University, Australia; **Carlos Nobre,** CPTEC, Brazil; **Michael Raupach,** CSIRO Earth Conservation Centre, Australia; **Meryl Williams,** Future Harvest Alliance Office, Australia; **Oran Young,** University of California, Santa Barbara, USA.

Earth System Science Partnership

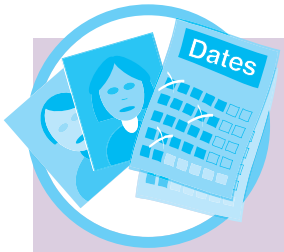
DIVERSITAS an international programme of biodiversity science

GLOBAL CHANGE IGBP

IHDP

WCRP World Climate Research Programme

The complete conference programme can be found at the Conference web site: www.essp.org/essp/ESSP2006/



New Roles and Faces

New International Project Office (IPO) for the Global Land Project (GLP)

The University of Copenhagen in Denmark has committed itself to funding an IPO for a period of three years with staffing of one executive officer, secretarial assistance and incidental costs. The new IPO is chaired by Professor Anette Reenberg. At the new GLP website, http://www.globallandproject.org/, you will find among others the first GLP Newsletter.

GLP's new Chair

Anette Reenberg, has recently been confirmed as the new Chair of IGBP's Global Land Project (GLP). She is a Professor of Landscape and Agricultural Geography at the University of Copenhagen, and she is engaged with a wide range of geographical disciplines, including natural resource management, agricultural systems, and landscape ecology. Her current interests are in the spatial aspects of land use systems dynamics and adaptive capacity and hierarchical approaches to analysis of natural resource management. Collaboration with remote sensing experts plays an important role in the research that primarily takes its empirical point of departure in African/Sahelian examples. Multidisciplinary aspects have been a key interest, materialized in early activities such as a MAB/UNESCO network coordinator for land use and landscape dynamics in Europe.

E-mail: ar@geogr.ku.dk

GLP's new Executive Officer

Tobias Langanke has a background in Geography, and his Master's thesis focussed on Desertification monitoring in northern Namibia. He has worked for almost four years with the Centre for Geoinformatics (University of Salzburg, Austria) on remote sensing based monitoring for European Nature Conservation in the context of the international EU Project SPIN (Spatial Indicators for European Nature Conservation). For the past two years, Tobias has worked with the Centre for Environmental Management (University of Nottingham) on issues of landscape character change. His research interests include landscape character assessment, the interface of remote sensing, GIS and European nature conservation, object-based image analysis, VHSR remote sensing imagery as well as desertification monitoring in sub-Saharan Africa.

E-mail: tla@geogr.ku.dk

GLP's new Administrative Officer

Lars Jørgensen is the administrative officer at the International Project Office. Lars holds a Master's degree in geography and international development studies from Roskilde University (Denmark). His research interests include natural resource management, and diversification of rural livelihoods in Southeast Asia. Lars has conducted field research among the Karen hill-tribe in northern Thailand.

E-mail: lj@geogr.ku.dk

Changes at the IGBP Secretariat

Sri Sahlin joined IGBP in June, 2006 as Administrative Assistant. Sri has a Bachelor's degree in Education (French major) and has completed secretarial/management, public relations and human resources management training. Sri was born in Indonesia, grew up in Ethiopia and has worked in administration since 1984 with various international development agencies, i.e. International Labour Organization, Harvard Institute for International Development, Asian Development Bank and German Development Cooperation (GTZ) in Jakarta. In Canada, Sri worked at the Indonesian Embassy in Ottawa as Private Assistant to the Ambassador. In 2001 she moved to Sweden and worked initially for an environmental consulting firm and then for the International Foundation for Science. Sri loves traveling, meeting people from different cultures and sharing her passion for Indonesia.

E-mail: sri.sahlin@igbp.kva.se

Erik Huss has been appointed as Science Editor at the IGBP Secretariat, replacing Bill Young, who now has left for a new job in Australia.

Erik has a B.Sc. in Geography from Lund and Stockholm Universities, with emphasis on glaciology and climatology, as well as a diploma in journalism from Poppius School of Journalism in Stockholm.

In the 1990:s Erik conducted scientific studies at Tarfala Research Station in the Kebnekaise mountains, focussing on how regional climate gradients affected small valley glaciers. During 1993–94 Erik joined a scientific expedition to Dronning Maud Land in Antarctica, which main purpose was to do glaciological pre-investigations for the EPICA drill site.

Since 2000 Erik has worked with Science Communication for Stockholm University and the Swedish Museum of Natural History. His main task was to manage the Swedish Geology Day, which is a national initiative to enhance knowledge about Earth Sciences for schools, policy makers and the public at around 80 places all over Sweden.

Since 2004 he is part-time scientific editor for a new Swedish dictionary.

Erik is born in Malmö, Sweden, has family in both Norway and France, and is a keen skier, climber and sailor. He is related to the notorious "Vildhussen".

E-mail: erik@igbp.kva.se

A natural urge to write and a strong desire to explore the great outdoors have lead to an interesting communications career for **Mary Ann Williams**, IGBP's new science communicator. Mary Ann joined the Secretariat in August and brings a wealth of international experience to IGBP's communications team.

Throughout her career, Mary Ann has gravitated to positions that combined her interests in the environment and writing. Her first such role involved promoting energy efficiency and environmental conservation in Texas through the state's Energy Extension Service. From there she broadened her scope to an international audience as director of public relations for the International Institute for Applied Systems Analysis, based in Vienna, Austria, where she took full advantage of the proximity to the Alps for hiking and skiing. The next stop on her career itinerary, the Central Asian country of Kazakhstan, provided outdoor escapes into the Tian Shen mountain range as well as communications work with the United States Agency for International Development. A two-year stay in New Zealand offered many a chance not only for hiking the country's scenic trail systems but also communicating about New Zealand's flora and fauna as a consultant for WWF-New Zealand.

Mary Ann looks forward to promoting IGBP's international, interdisciplinary research efforts on global environmental change, as well as exploring Sweden's many walks and waterways.

E-mail: maryann@igbp.kva.se

IGBP and Related Global Change Meetings

A more extensive meetings list is available on the IGBP web site at http://www.igbp.net.

The Humboldt Current System: Climate, ocean dynamics, ecosystem processes, and fisheries

27 November-01 December, Lima, Peru

Contact: Conference secretariat, hcsconference@amauta.rcp.net.pe

GEIA Conference

29 November-01 December, Paris, France

Contact: http://www.accent-network.org

Workshop on Harmonization of Forest and Land Cover Classifications using LCCS for Asia Pacific Region

04-08 December, Dehradun, India

Contact: http://www.fao.org/gtos/meetLCCS5.html

2006 IDGEC Synthesis Conference

06-09 December, Bali, Indonesia

Contact: http://fiesta.bren.ucsb.edu/~idgec/science/synthesis.html

American Geophysical Union (AGU) Fall Meeting

11-15 December, San Francisco, CA, USA

Contact: http://www.agu.org/meetings/fm06/

The 9th Biennial Conference of the International Society for Ecological Economics

15-19 December, New Delhi, India

Contact: http://www.ISEE2006.com

2007

2nd iLEAPS Science Conference

Dates and venue TBA

Contact: ILEAPS IPO, ileaps-ipo@helsinki.fi

International Dialogue on Science and Practice in Sustainable Development: Linking Knowledge with Action

23-27 January, Chiang Mai, Thailand

Contact: http://www.sustdialogue.org

2nd Alexander von Humboldt International Conference: The role of Geophysics in Natural Disaster Prevention

05-09 March, Lima, Peru

Contact: https://www.copernicus.org/site/redsys/classicform.php?form=form_avh07_circu%20lar&site=egu

2007 SOLAS Open Science Meeting

06-09 March, Xiamen, China

Contact: http://www.solas2007.confmanager.com

International Conference on Climatic Changes and their impacts on the coastal zone and River Deltas: Vulnerability, Mitigation and Adaptation?

April, Egypt, Alexandria

Contact: amhkhater@yahoo.com

EGU General Assembly

15-20 April, Vienna, Austria

Contact: http://meetings.copernicus.org/egu2007/

Association of American Geographers

17-21 April, San Francisco, CA, USA

Contact: http://www.aag.org/

5th GKSS School of Environmental Research: Persistent Pollution: Past, Present and Future

09-18 May, Göhrde near Lüneburg, Germany

Contact: http://coast.gkss.de/events/5thschool/

ESF-FWF Conference in Partnership with LFUI: Ocean Controls in Abrupt Climate Change

19-24 May, Obergurgel, Austria

Contact: http://www.esf.org/esf_genericpage.php?section=10&language=0&genericpage=2674&shortcut=1

Conference on the Human Dimensions of Global Environmental Change: Earth System Governance: Theories and Strategies for Sustainability

24-26 May, Amsterdam, Netherlands

Contact: http://www.2007amsterdamconference.org/index.htm

5th Study Conference on BALTEX

04-08 June, Kuressaare, Saaremaa, Estonia

Contact: http://www.baltex-research.eu/conf2007

International Association for Landscape Ecology

08-12 July, Wageningen, Netherlands

Contact: http://www.iale2007.com

17th INQUA Congress

28 July-03 August, Cairns, Australia

Contact: INQUA Secretariat, inqua2007@icms.com.au

6th International NCCR Climate Summer School: Land Surface – Atmosphere Interactions in a Changing Climate

26-31 August, Grindelwald, Switzerland

Contact: http://www.nccr-climate.unibe.ch/summer_school/2007/

3rd Alexander von Humboldt International Conference: East Asian Summer Monsoon, past, present and future

27-31 August, Beijing, China

Contact: Zhongli Ding, Zlding@mail.igcas.ac.cn
André Berger, berger@astr.ucl.ac.be

SOLAS Summer School 2007

22 October-03 November, Corsica, France

Contact: http://www.solas-int.org/

2nd International Conference on Earth System Modelling

27-31 August, Hamburg, Germany

Contact: http://www.mpimet.mpg.de/icesm

Pin Board

The Pin Board is a place for short announcements and letters to the Editor. Announcements may range from major field campaigns, new websites, research centres, collaborative programmes, policy initiatives or political decisions of relevance to global change. Letters to the Editor should not exceed 200 words and should be accompanied by name and contact details.

Science Award to John P. Burrows

IGBP Scientist and IGAC SSC-member Dr. John P. Burrows recently received the Committee on Space Research (COSPAR) William Nordberg Medal commemorating the late William Nordberg and for distinguished contributions to the application of space science in a field covered by COSPAR.

John, originating from UK, is a Professor at the Institute of Environmental Physics and Remote Sensing, University of Bremen since 1992, and his research focusses on the study of the atmospheric physics and chemistry of relevance to atmospheric ozone, air pollution and climate problems. The explanation for the prize includes John's many important discoveries in space physics and extending that knowledge to remote sensing of atmospheric gases from space. Of particular note is his development of the capability to measure chemically and radiatively active gases in the troposphere (e.g. greenhouse gases) and associating their abundance and distribution with emerging global environmental problems. Today he continues to make new discoveries about the interaction of atmospheric chemistry, climate, and the Sun.

IGBP congratulates you, John!

New IGBP Website http://www.igbp.net

The new IGBP website was launched on 21 August. Among other things, the revamped site features the new IGBP visual profile, an enhanced navigation structure, updated content that more clearly reflects IGBP's organisational structure as well as its scientific activities, and a number of improved resources such as searchable databases for contacts, meetings and publications. It also incorporates a more extensive resource section that has been designed to better cater to the needs of IGBP's main target audiences.

WCRP Web News

World Climate Research Programme

The World Climate Research Programme (WCRP) has a brand new website at http://wcrp.wmo.int/, and since March 2006 WCRP publishes regular electronic newsletters as an Ezine at: http://wcrp.wmo.int/Newsletter_index.html Up till now they have published three issues: March, June and September 2006.

Congratulations from IGBP!

Ocean carbon during the International Polar Year (IPY) web site launched

As the IPY approaches, there is a need to compile information about on-going and planned ocean carbon research in the polar areas. Building on information collected during the November International Repeat Hydrography and Carbon workshop, the regular inventories of the International Ocean Carbon Coordination Project (IOCCP), and compiled information from SOLAS and IMBER, IOCCP has developed an initial compilation of on-going or planned field programs for the Arctic and Antarctic regions. Many of these projects are not affiliated with or funded by the IPY programme, and many are multi-disciplinary programmes that deal with a broad range of issues. In partnership with the research programs, the IOCCP will continue to develop this compilation and create a web-site database for this information. Visit the ocean carbon IPY's website at http://www.ioc.unesco.org/ioccp/IPY_carbon.htm

Short Science Highlights

Report Release: Impact of Ocean Acidification on Coral Reefs and other Marine Calcifiers by NSF, NOAA & USGS

This is a report from a workshop held on 18–20 April 2005 whose goals were to summarize existing knowledge on the topic, reach a consensus on what the most pressing scientific issues are and identify future research strategies to address such issues. A variety of evidence indicates that (due to ocean uptake of anthropogenic CO_2) calcification rates will decrease, and carbonate dissolution rates increase, as $CaCO_3$ saturation state decreases. This evidence comes from principles of thermodynamics, the geologic record, and the evolutionary pathways of $CaCO_3$-secreting organisms. Further evidence, from controlled experiments of biocalcification under increased CO_2 conditions, confirms that calcification rates of many organisms decrease with decreasing $CaCO_3$ saturation state. Extrapolation of these results to the real world suggests that calcification rates will decrease up to 60% within the 21st century.

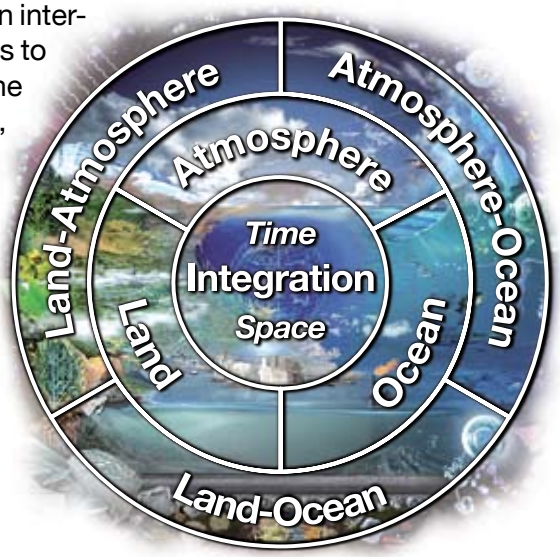
A copy of the report can be downloaded at http://www.ucar.edu/communications/Final_acidification.pdf

Report release: US JGOFS final data report

The final 2 DVD-ROMs of the US JGOFS Final Data Report are available for distribution. These are: Volume 3 – Synthesis and Modeling Project Results, part 2 (published in November 2005) and Volume 4 – Synthesis and Modeling Project Results, part 3 (published in December 2005). Copies may be ordered via e-mail from the US JGOFS Planning and Data Management Office at http://usjgofs.whoi.edu/publications/RequestDataRpt.html

The International Geosphere-Biosphere Programme

IGBP is an international scientific research programme built on interdisciplinarity, networking and integration. The vision of IGBP is to provide scientific knowledge to improve the sustainability of the living Earth. IGBP studies the interactions between biological, chemical and physical processes and human systems, and collaborates with other programmes to develop and impart the understanding necessary to respond to global change. IGBP research is organised around the compartments of the Earth System, the interfaces between these compartments, and integration across these compartments and through time.



IGBP helps to

- develop common international frameworks for collaborative research based on agreed agendas
- form research networks to tackle focused scientific questions and promote standard methods
- guide and facilitate construction of global databases
- undertake model inter-comparisons
- facilitate efficient resource allocation
- undertake analysis, synthesis and integration of broad Earth System themes

IGBP produces

- data, models, research tools
- refereed scientific literature, often as special journal editions, books, or overview and synthesis papers
- syntheses of new understanding on Earth System Science and global sustainability
- policy-relevant information in easily accessible formats

Earth System Science

IGBP works in close collaboration with the International Human Dimensions Programme on Global Environmental Change (IHDP), the World Climate Research Programme (WCRP), and DIVERSITAS, an international programme of biodiversity science. These four international programmes have formed an Earth System Science Partnership. The International Council for Science (ICSU) is the common scientific sponsor of the four international global change programmes.

Participate

IGBP welcomes participation in its activities – especially programme or project open meetings (see meetings list on website). To find out more about IGBP and its research networks and integration activities, or to become involved, visit our website (http://www.igbp.net) or those of our projects, or contact an International Project Office or one of our 78 National Committees.

Contributions

The Global Change NewsLetter primarily publishes articles reporting science undertaken within the extensive IGBP network. However, articles reporting interesting and relevant science undertaken outside the network may also be published. Science Features should balance solid scientific content with appeal to a broad global change research and policy readership. Discussion Forum articles should stimulate debate and so may be more provocative. Articles should be between 800 and 1500 words in length, and be accompanied by two or three figures or photographs. Articles submitted for publication are reviewed before acceptance for publication. Items for the Pin Board may include letters to the Editor, short announcements such as new relevant web sites or collaborative ventures, and meeting or field campaign reports. Pin Board items should not exceed 250 words.

Photographs should be provided as tiff files; minimum of 300 dpi. Other images (graphs, diagrams, maps and logos) should be provided as vector-based .eps files to allow editorial improvements at the IGBP Secretariat. All figures should be original and unpublished, or be accompanied by written permission for re-use from the original publishers.

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