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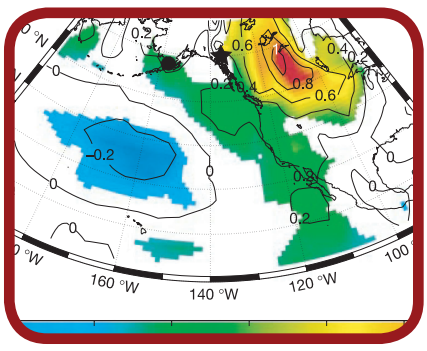
Global change, ecosystem shifts and society

This edition of the Global Change NewsLetter begins with a fascinating account by Sandra Lavorel of the recent wildfires that burned through Canberra, Australia, and how global change played a critical role. The following article by Duzheng Ye et al. also addresses the effect of climate change on ecosystem regimes, based on data that indicates a northward shift of climate zones in China. Rolando Garcia and Ricardo Garcia Herrera then give us a look at changing climate patterns through their interesting and thorough analysis of data recorded in logbooks between 1565 and 1850. In the final science feature, Keith Alverson et al. challenge the status quo of creating sustainable resource management policies at the global and regional levels, stating the need for more policies created by local officials to address local, regional and global sustainability issues.



from page 2

President Lagos addresses SC-IGBP

Not only did the Chilean President, Ricardo Lagos Escobar, extend an unprecedented invitation to the SC-IGBP to hold their annual meeting in his country, but his thoughtful welcoming speech set the tone for a successful three-day meeting and following symposium.

Centrefold

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Global change, fire, society and the planet

by S. Lavorel

Fires are an intrinsic part of the dynamics of the Earth System. Fire regimes result from the interaction between biophysical factors and human land use, with varying weights across biomes and through time. Their impacts range across all scales from local to global, can be highly nonlinear, potentially affect all compartments of the Earth System, and can have large feedbacks to ecosystem goods and services and the human systems that depend on them [1]. Fire research therefore requires an integrated approach that brings together human scientists, terrestrial ecologists and atmospheric scientists from across different IGBP projects in order to tackle the complexity of interactions that are involved.

The wildfires on the 18th of January, 2003, will remain engraved in the landscape and memories of Canberra, the Australian capital city, for decades if not longer. This disaster provides an examplary illustration of how fires are so critically at the interface between society and the Earth System. Particular fire events require context and triggers. The long-term context in Canberra is a landscape dominated by fire-prone vegetation, which is believed to be the product of millenia of co-evolution between a seasonally dry and warm climate, regular though unpredictable drought spells, aboriginal culure, and a few highly successful plant genera (e.g. *Eucalyptus*, *Acacia* and several members of the Proteaceae). Fire return intervals vary from short (20 years) in dry sclerophyllous forest to medium (over 100 years) in wet sclerophyllous forest, which are arranged in the landscape as a mosaic determined largely by topography.

"The Canberra wildfire disaster provides an examplary illustration of how fires are so critically at the interface between society and the Earth System."

Prior to the last century of management dominated by European practices, the mountain ranges surrounding Canberra were managed by Aboriginal fire stick farming practices, whereby fire was used to encourage grass growth – and possibly that of other bush food, attract hunted species, and facilitate travel. According to popular record, the transition between these management regimes caused a change in forest structure, with a larger accumulation of fuel in the understory in the form of fire-prone shrubs and litter, that replaced the expansive grass cover. Under the current conditions, ignitions largely by lightning result in fires usually of medium intensity, after which the fuel builds back up to pre-fire levels within 5-10 years.

In combination with this fire-stressed environment, the region is subject to strong variations in annual rainfall, largely associated with fluctuations in the El Niño Southern Oscillation index, with high ENSO years resulting in droughts of varying magnitude. Although 2002 was forecast worldwide as a moderate El Niño event, southeastern Australia experienced its third worst drought recorded in the last century (Figure 1ac). The temperatures in inland New South Wales during that period were over 1° C warmer than average, even after taking long-term temperature increase into account.

Analysis of the current drought indicated that this event was well beyond what would have been expected based on the strength of that particular El Niño event. The analysis showed a decoupling of the previously tight linkage between the strength of an ENSO event and the severity of drought, thus suggesting that

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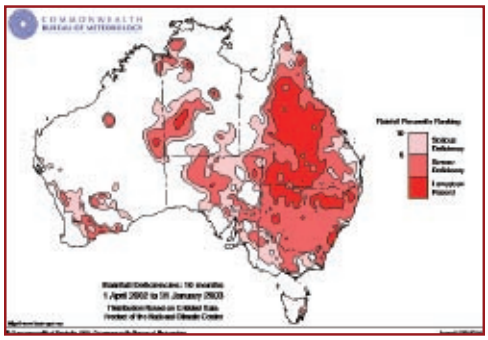

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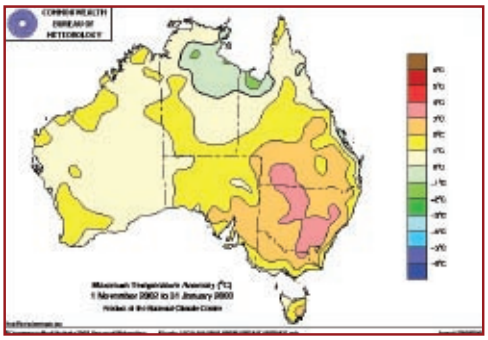

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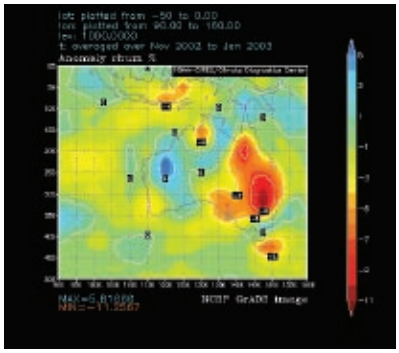

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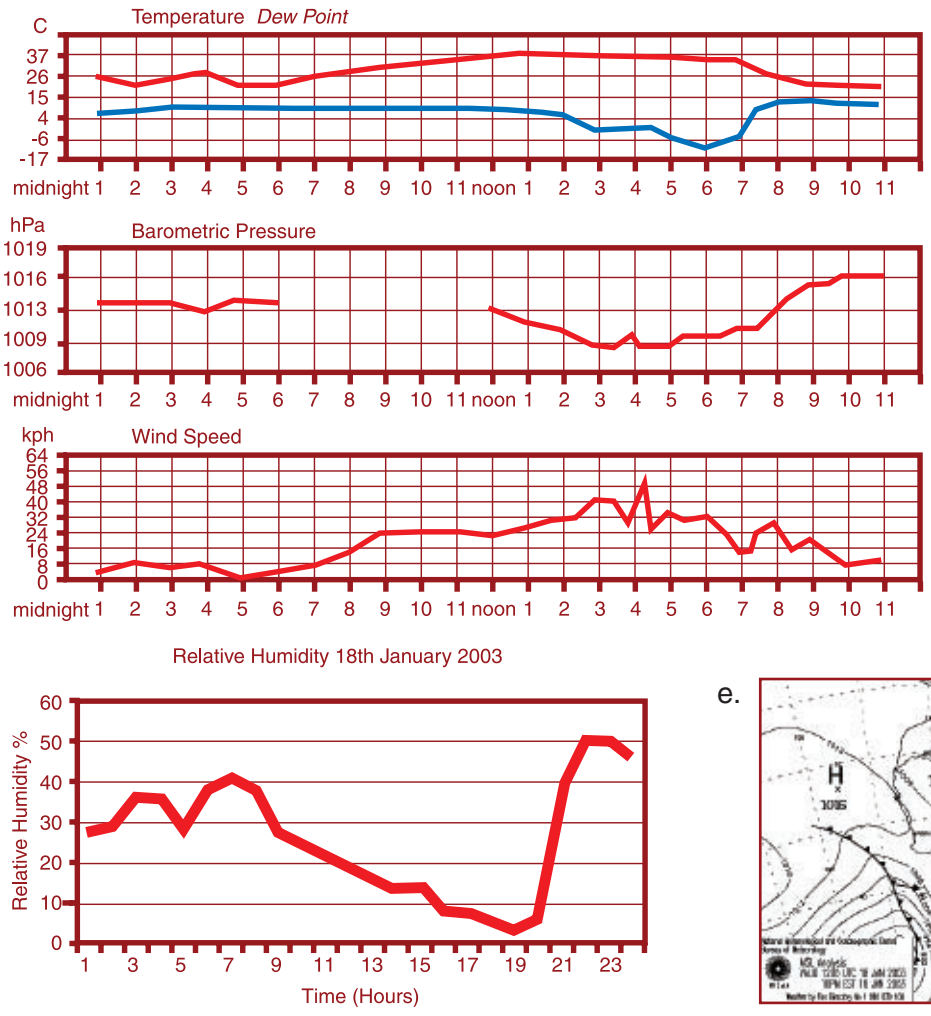

Relative Humidity 18th January 2003

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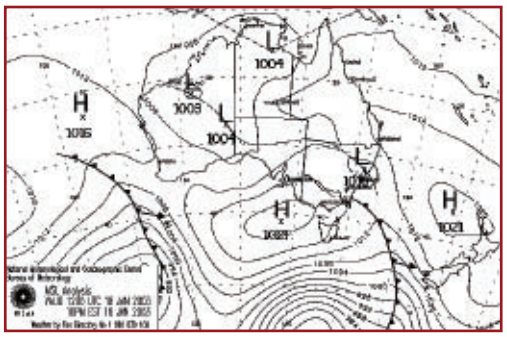

Figure 1. Meteorological data for the 2002/3 drought in southeastern Australia and 18 January 2003 in Canberra. (a) Rainfall deficits (expressed as percentiles from the mean) for the period from April 2002 to January 2003; (b) maximum temperature anomalies for the period from November 2002 to January 2003 in Australia.) (c) anomalies for relative air humidity at 700 hPa (corresponding to 2000m a.s.i) for the period Nov. 2002-Jan. 2003. (d) Weather data- temperature, barometric pressure wind speed and air relative humidity- in Canberra on 18 January, 2003. (e) Weather map showing high and low pressure zones on the afternoon of 18 January.

Figure 2.
Images from Canberra's darkest day.

a. The fire front approaches the edge of the city through parkland

b. The fire storm enters the suburbs

c. By mid afternoon Canberra was shrouded in heavy smoke and the sky lit by the glow of raging fire

d. Extensive areas of surrounding parkland were burned with sevire consequences for animal populations

e. Over 500 houses were burned to the ground

f. The Mt Stromlo observatory of the Australian National University was destroyed.

global change has become a major driver in this drought (D. Karoly, unpublished results). As a result of this drought, forests and grasslands were exceptionally dry, with aboveground productivity already reduced throughout the spring (D. Barrett, unpublished results).

In this context, the fire season in New South Wales started two months earlier than average. Beginning in October, multiple fires burned throughout the state, with some of them encroaching into suburban areas of Sydney in mid-November. During the first weeks of January lightning strikes triggered several fires in the Brindabella, Namadgi and Kosciusko ranges, which lie to the west and southwest of Canberra. In particular, three fires burned for ten days in the city's catchments, but were kept smoldering away from the city by easterly winds. However, late on January 17th, the meteorological conditions switched to what the fire services viewed as their worst case scenario. The positioning of atmospheric pressure fields over the region resulted in a switch to strong northwesterly winds, very low humidity, and high temperatures, a situation typically associated with extreme fires in southeastern Australia. In Canberra on the 18th January, the temperature was already 30°C by 9 a.m., with 30 km/hr winds. By early afternoon conditions reached their worst, with 38°C, 2% air relative humidity and 70-80 km/hr NW winds (Figure 1d-e). Within a few hours the fires merged into a 35 km continuous front that swept rapidly towards the city through national parks, forest reserves, pine plantations and grasslands.

Well beyond any means of fire control, this situation illustrated how, under extreme weather conditions, landscape heterogeneity becomes irrelevant to fire spread. One part of the fire front swept through the Urriara and Mt Stromlo *Pinus radiata* plantation with intensities estimated at 50,000 kW/m^2, and hence turned into a fire storm when it reached the adjacent suburbs. Within two hours the fire claimed four lives and over 500 houses, while severely damaging many other homes. The fires destroyed or damaged large amounts of infrastructure, including the main sewage processing station, with the total damage exceeding a quarter billion Australian dollars in value (Figure 2). During this single day over 100,000 ha of forest burned. The situation remained critical for over a week ; many more hectares of forest burned, in a near continuous front south of Canberra that ranged over 300 km and remained active for four more weeks (Figure 3).

There are many ecological consequences of such an extreme event and they are likely to extend into the long-term. The fires were extremely intense, leading to soil combustion in many areas, and leaving only a few unburned or lightly burned patches. This event can only be compared in scale to the 1939 fires, which was the previous starting date of vegetation succession in large sections of the

southeastern Australian forests. The paucity of fire records for Australia do not make it possible at this point to estimate whether these two events that occured just over 60 years apart represent exceptionally short returns on a low frequency cycle. It is also not yet possible to compare their intensity levels, though such comparisons should be conducted based on forestry records for the 1939 event and a combination of satellite and ground data in the months to come. In large and intensely burned patches, the usual mechanisms of secondary succession, such as resprouting, soil and canopy seed banks, and seed colonisation from nearby sources may be of little relevance for recovery from these fires. Researchers need to use landscape model simulations in order to explore the consequences of these extreme fires for landscape vegetation dynamics.

Weather conditions and in particular, significant rainfall, in the coming weeks and months will play a critical role in the reconstitution of plant communities. Plausible hypotheses range from slow recovery to the diverse vegetation that previously characterised the region to potential switches towards more fire-prone drier forest or even heath- or grasslands in some localities. The fires also decimated animal populations; whether or not the few and interspersed remnants have the capacity to recolonise is unknown. Emission of large amounts of smoke, CO_2 and various gases that travel Southwestwards towards New Zealand and beyond (Figure 4) also ensued as a result of the fires. Estimations of the magnitude of these emissions will need to be calculated in order to assess the contribution that such an extreme fire event can make to budgets of greenhouse and other gases. As pointed out by Peter Hobbs in Global Change Newsletter 52, such an event challenges the capacity of the research community to respond to an exceptional natural experiment and take advantage of the fire event in order to improve our understanding of atmospheric chemistry and long-range transport of gases and particles, in addition to vegetation and animal population dynamics [2].

> "Within a few hours the fires merged into a 35 km continuous front that swept rapidly towards the city through national parks, forest reserves, pine plantations and grasslands. "

Last, but not least, human response to this disaster will play a key role in determining the future dynamics of the region. While public debate is raging about culprits and solutions, the real questions are: How will institutions, such as national parks, and primary industries, adapt their management? Can such an extreme event cause people to reconsider their life style in a fire-prone environment? Should Australian landscapes be rethought in the context of possibly more frequent events like this one?

Challenges for fire research in IGBP

These questions examplify some of the challenges that global change research needs to address: What was the conjunction of biophysical and human conditions that triggered this disaster? Which thresholds were exceeded? How close is the system to these thresholds under its average conditions? Will such catastrophic events become more frequent as global change continues and possibly intensifies? How can policy and management respond to this challenge? What will a future global map of fire regimes look like, and what will be the consequences for the Earth System? Which are the most vulnerable regions to changes in fire regimes? To address such questions an integrated approach across different IGBP projects is required, one that brings together human scientists, terrestrial ecologists and atmospheric scientists to tackle the

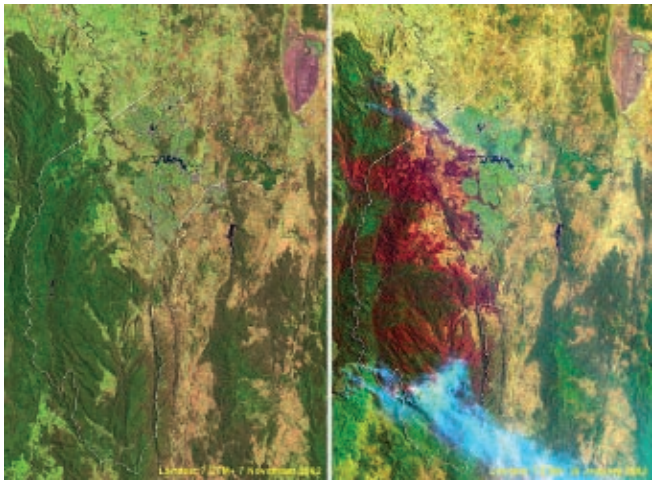

Figure 3. Satellite images obtained from LANDSAT (7 ETM) show the Australian Capital Territory and the Australian Alps before (7 Nov 2002) and after (26 Jan 2003) the fires. Red areas indicate the region burned by fire. Canberra appears in light green and is in the top right corner of the Australian Capital Territory (outlined in white).

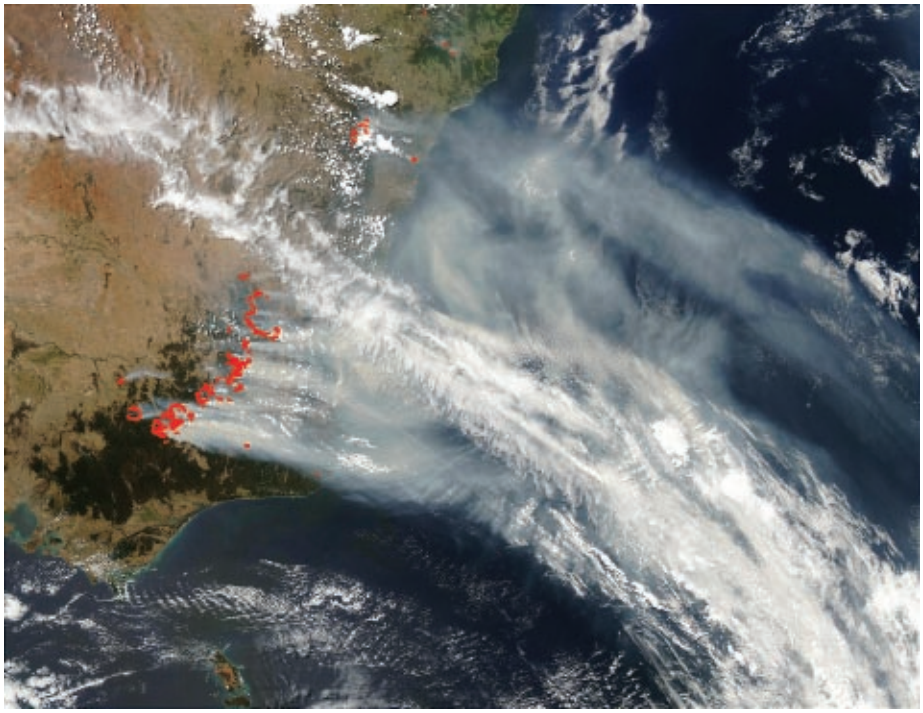

Figure 4. This image of southeastern Australian on the 19th January shows active fires (higlighted in red) and the smoke plumes streaming Southwestwards across the Tasman Sea.

complexity of interactions that are involved. The first seeds of such an effort have started to sprout over the last two years.

Following the Amsterdam Open Science Conference, scientists from GCTE, LUCC and IGAC developed a conceptual framework for the study of regional vulnerability to fire [1]. This framework links the drivers of regional fire dynamics, fire-atmosphere-climate feedbacks, and fire-ecosystem services-human systems feedbacks. The framework recently produced its first global map of fire regimes [3].

A recent IGBP-GAIM -TRACES (TRace gases and Aerosols in the ClimatE System) workshop in Isle-sur-la-Sorgue, France (22-26 October 2002) brought together 38 ecologists, palaeoecologists, climatologists, vegetation modellers, atmospheric chemistry and aerosol modellers, and remote sensing experts to discuss the role of fire within the Earth System, with the specific aim of developing priorities for improved simulation of fire within Earth System models. The meeting emphasised the biological, physical and chemical dimensions of fire and identified priorities for data synthesis and collection in order to advance global vegetation modelling and estimates of emissions [4].

These efforts will continue through the recently born Fire Fast Track Initiative (FTI) of IGBP. The objectives of the Fire FTI are: 1) to synthesise quantitative knowledge gained across IGBP projects and related research on impacts of changes in fire regimes worldwide on a range of ecosystem services; and 2) to assemble global and regional data for fire-model development and testing. Over the course of two years the Fire FTI will produce global maps of fire regimes over different time slices from the past to the present. These maps will contribute to the Earth System Atlas project of GAIM, with the objective of complementing FTI's historical maps with GAIM's maps of projected future fire regimes.

The second activity of the Fire FTI will be to compile parameters required for the calculation of emissions from plants and soils when burned by varying fire intensities. This information is necessary in order to generate estimates of future emissions from fire events. Finally, in line with the first objective stated above, a synthesis of impacts of changes in fire regimes worldwide on a range of ecosystem services will be conducted. The intent is to involve a broad range of scientists across the IGBP and other ESSP projects; the complexity of fire regimes and their impacts require a multidisciplinary approach, involving scientists from across the spectrum of global change research.

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The northward shift of climatic belts in China during the last 50 years

by Duzheng Ye, Wenjie Dong, Yundi Jiang

Climate change is a vital global environmental issue and it continues to attract more and more attention from governments and the general public all over the world [1,2]. China is no exception; Chinese scientists have conducted many studies on global change and its impact on regional climate in China [3]. Due to the many potential impacts of global change, both known and unknown, it is important to improve and expand the study of regional climate change in China in order to respond and adapt to the impact of global change [4, 5, 6, 7, 8].

One known result of climate change is the lengthening of the plant growing season [9]. China is also experiencing a lengthening of the growing season. Additionally, research has revealed that in China the climate zones are shifting northwards. Presented here is data that supports the conclusion that climate zones are shifting, and that the shift is altering the crop growing seasons.

In this study, China is divided into east and west along the 105th meridian. China is also divided into seven climatic zones that are differentiated regionally based on the total number of days in a year that have an average temperature of 10°C or above. Based on this definition and an evaluation of the temperature records, we conclude that some climatic zones in China have shifted northward during the last 50 years. When comparing the data, significant changes in eastern China between 1950 and 2000 in the northern subtropical belt and the warm extratropical belt become apparent (Figure 1). The major changes occurred in the northern portion whereas the south experienced little or no change. Additionally, climate zones in western China experienced insignificant changes.

For the northern subtropical belt, the northward shifting of the upper boundary over the past 50 years is as large as 3.7 degrees of latitude along the meridian of 116°E. The southern boundary however, experienced only a small oscillation north and south of its mean position (Figure 1a). For the warm extratropical belt, the northward shifting is also significant, moving as much as 3-4 degrees north, within the meridional band 120°E-125°E. The warm extratropical belt's southern boundary also shifted northward to some extent (Figure 1b).

The northward shift of climatic zones is responsible for altering the climate seasons and

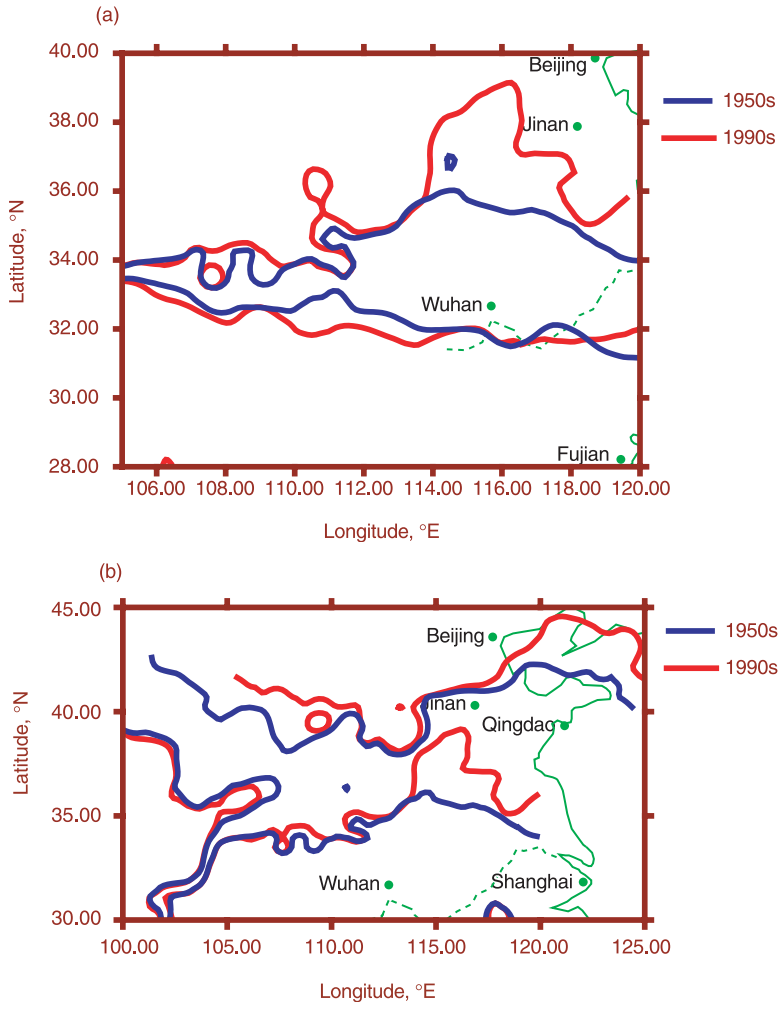

Figure 1. The decadal shifting of the northern and southern boundaries for (a) the northern subtropical belt and (b) the warm extratropical belt.

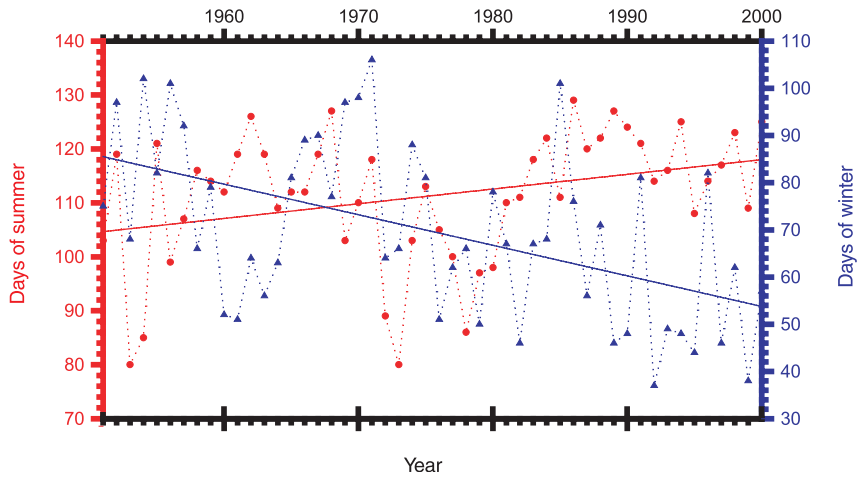

Figure 2. The inter-annual change of the start, end and length of summer (temperature 21°C) and winter (temperature -1°C) from 1951 to 2000 in Beijing. The dotted lines represent the inter-annual change of the season, and the solid lines represent the linear change of the season over the last 50 years. Compared to 1951, the summer in 2000 began 5 days earlier and lasted approximately 12 days longer. The duration of Beijing winters decreased linearly by approximately 33 days.

the corresponding agricultural growing season. Traditionally, the period from June to August is defined as the summer season, whereas December to February is defined as the winter season. However, for the purpose of agricultural assessment, the definition of the summer and winter seasons is based on surface air temperature, which plays a dominant role in crop growth and maturity. According to records of air surface temperature in Beijing, Hailaer, and Lanzhou, general trends indicate that the summers are lengthening by starting earlier and ending later, and winters are shortening, by starting later and ending earlier (Figure 2).

Equally important as the onset of summer season is the number of days with temperature greater than or equal to the crop-specific base temperature, as the growing season of the crop changes with changes in the accumulated temperature. In each of the three regions studied, the accumulated temperature equal to or above the base temperature of 10 °C has increased over the last 50 years, by 440 °C in Beijing and 300 °C in Lanzhou (Figure 3). The combined effect of an earlier onset of summer season and an increase in accumulated temperatures is to alter maturation dates for crops grown in the regions.

Under climate conditions prevalent in the 1950s, soybeans grown in Beijing began maturing around September 23 and wheat began maturing around July 22. Soybeans (base temperature 15 °C) grown in Beijing begin maturing once the accumulated temperature reaches 3300 °C, whereas wheat (base temperature 0 °C) begins maturing at 2200 °C. Due to changing climate conditions, soybeans and wheat grown in Beijing began maturing 12-13 days earlier in 2000 than in 1951 (Figure 4). Similar trends were also recorded for the Hailaer region. As a result of temperatures rising above the base temperature sooner in the year, the necessary accumulated temperature for crops is reached earlier in the season. The potential impacts of these changes require further investigation.

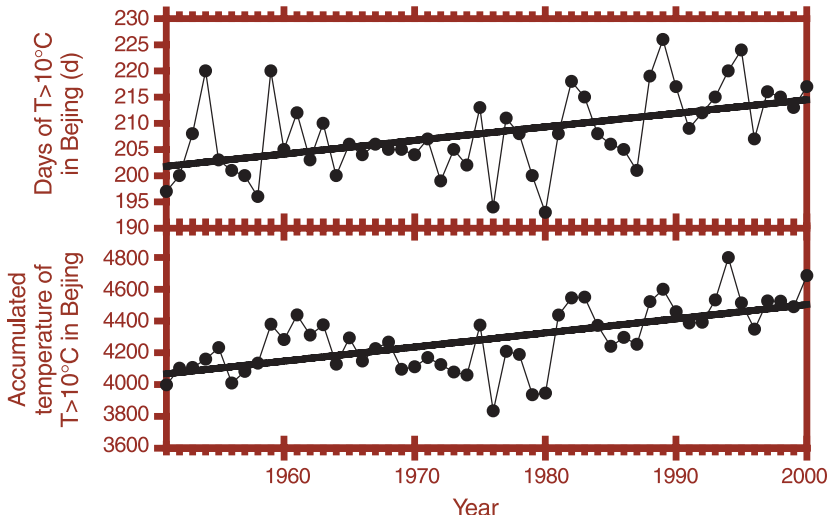

Figure 3. The annual variations of the accumulated temperature and the total number of days with temperature 10°C for Beijing in the last 50 years. The dotted lines represent the inter-annual change and the solid line represents the linear change of the accumulated temperature in the last 50 years. The total number of days with temperature 10°C in Beijing has increased linearly by 17 days during the last 50 years, and the accumulated temperature (temperature 10°C) has increased linearly by 440°C from 1951 to 2000.

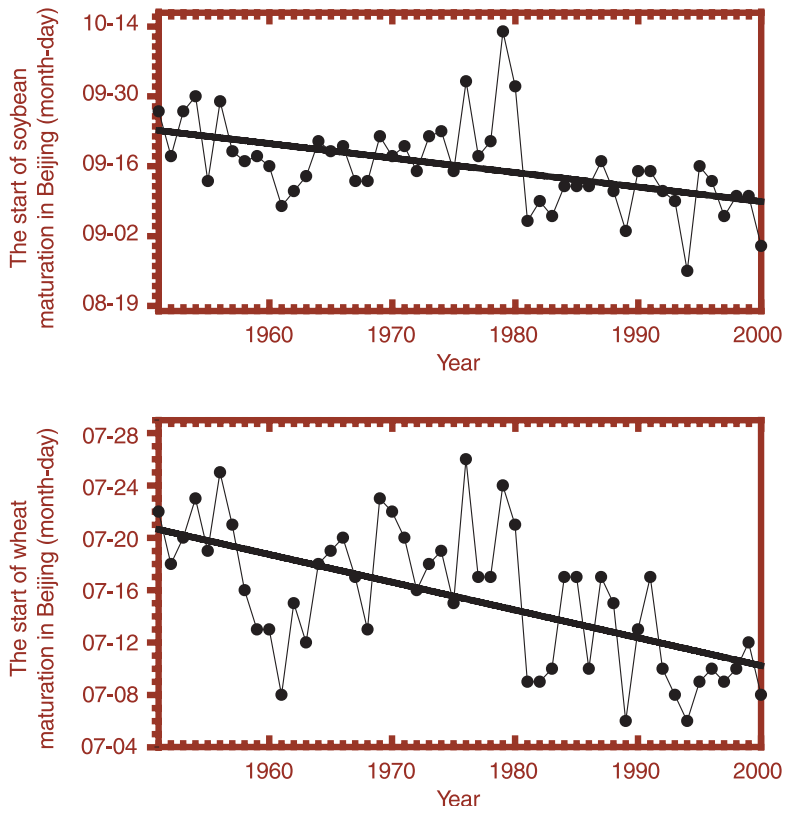

Figure 4. The beginning of the maturing season for soybean and wheat in Beijing recorded between 1951 and 2000. During the last 50 years, the start of wheat maturation in Beijing advanced 12 days from 6 August in the early 1950s to 25 July in the late 1990s. Soybeans are now maturing 13 days earlier than in 1950.

Conclusion

The climatic zones in China have migrated to varying extents from 1951 to 2000. The northward shift of the climatic belts is more obvious in the north than in the south. The former region has a northward shift of 3-4 degrees latitude, whereas in the south, there is almost no change. The seasons have also changed in the regions studied. In general, the summer is longer and the winter is shorter compared to 50 years ago. Consequently, the traditional growing season of crops has changed. In the future, analogous studies will be applied to other regions in China. In addition, future work will focus on how industry and agriculture must adjust to the changing environment. The consequences of global change pose a series of uncertainties that we must confront now in order to be better prepared for continuing changes in the future.

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Sailing ship records as proxies of climate variability over the world's oceans

by R. R. Garcia and R. Garcia Herrera

The study of climate requires a characterization of the mean state and variability of the atmosphere and ocean over long time scales. Over the last 50-75 years, it has been possible to define the global climate by means of systematic observations made over large geographical areas; more recent data even include global observations made from satellite platforms. On the other hand, instrumental records are sparser in the early 20th century, and not generally available before the late 1800s. It is clear then, that characterization of the climate in the modern sense is not possible beyond the last 100 years or so. Nevertheless, non-instrumental records exist that provide reliably dated measures of climate variability on annual and even daily time scales over large portions of the world's oceans.

These data are derived, one way or another, from the sailing ships of the European maritime powers in the 16th through 19th centuries. The relevant information is often contained in logbooks, the more recent of which (from the 18th and 19th centuries) provide records of actual meteorological variables, such as wind speed and direction. The earlier voyages, in the 17th and even 16th centuries, are seldom represented by complete logbooks but, as we shall see, they can provide proxies from which surprisingly specific inferences about climate variability can be made.

In this feature we discuss two examples that illustrate the potential of sailing ships' records for the reconstruction of oceanic climate. The first is furnished by the voyages of the Manila galleons, the ships that plied the route between Acapulco, Mexico, and the Philippine Islands for nearly the entire colonial period of Mexico's history. The second example is the Climatological Database for the World's Oceans (CLIWOC), a work in progress that demonstrates how the massive amount of information recorded in the logbooks of European ships in the 18th and 19th century can be used to construct a climatological database for the Atlantic, Indian, and part of the Pacific oceans.

The Manila galleons

From 1565 through 1815 the Spanish colonies of Mexico and the Philippines maintained a trade route between Acapulco and Manila that, in most years, saw at least one trans-Pacific round-trip between these ports. A thorough description of the Manila trade is given by Schurz [1]. Although the Acapulco-Manila voyages lasted some 250 years, complete logbooks for what was essentially a commercial, civilian enterprise are few and far between. On the other hand, there exists a rather complete documentation on the dates when the galleons departed from Acapulco and arrived at the Strait of San Bernardino, the gateway to the Philippine Islands and Manila. After suitable tests for uniformity and internal consistency these data can be used to describe secular changes in voyage duration from 1590 to 1750 [2].

Figure 1 shows a plot of voyage duration between Manila and the Strait of San Bernardino. The dots represent the

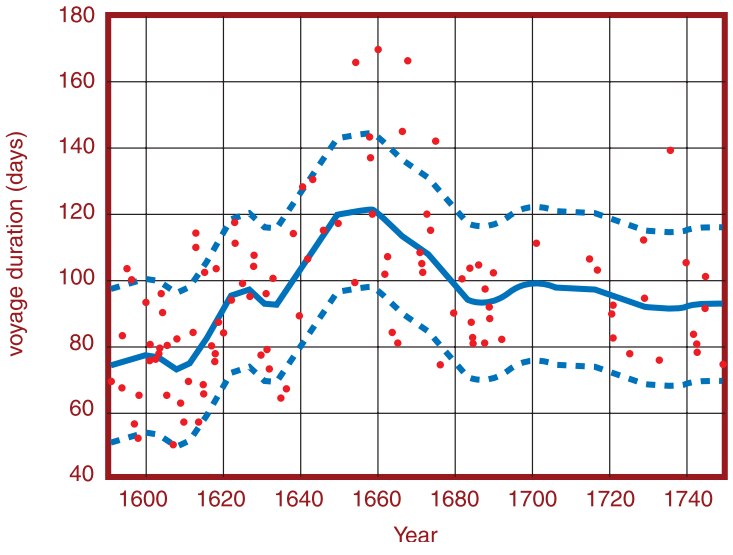

Figure 1. Duration of the voyage between Acapulco and the Strait of San Bernardino, from 1590 to 1750. The solid and dashed continuous curves indicate the 30-year running mean, and the running mean ±1 standard deviation, respectively.

individual voyages, the continuous solid curve is a 30-year running mean, and the dashed curves denote the mean ±1 standard deviation. There is a remarkable increase in voyage duration between the early 1600's (when the voyages lasted 80 days on average) and 1660 (when their duration peaked at 120 days). After 1660, voyage duration again became shorter, dropping to about 90 days by 1690. The difference in voyage duration between 1600 and 1640 is 40 days, considerably larger than the standard deviation of the data. As shown by Garcia et al, [2] it is highly unlikely that this secular change was due to societal or technological factors; instead, it can be interpreted as a reflection of variability in the wind system of the western tropical Pacific that has a counterpart in the modern record.

Because the duration of the Acapulco-Philippines voyage is an integrated measure of the strength of the winds en route, it does not provide direct information on the nature of the winds or their variability. However, one can devise modern analogues to the voyages that make possible detailed inferences. This has been done by using winds from the NCAR/NCEP reanalysis to construct "virtual voyages" between Acapulco and the Strait of San Bernardino (the ambiguity inherent in such reconstructions is considerably reduced by the fact that the route followed by the galleons remained essentially constant during the entire period of the voyages). When virtual voyages were calculated from modern data for the period 1948–1999, it was found that groups of the slowest and fastest voyages were associated with distinct circulation patterns in the western Pacific. These patterns, shown in Figure 2, differ principally in the position of the summer monsoon trough in early boreal summer. Because the ships approached the Philippines in June, an anomalous northward displacement of the monsoon trough resulted in unfavorable (south or southwesterly) winds being encountered on the approach to the Strait of San Bernardino, causing considerable delays in the voyage. On the other hand, a southward displacement of the trough allowed the ships to proceed under the favorable trade wind regime, resulting in much earlier arrival times.

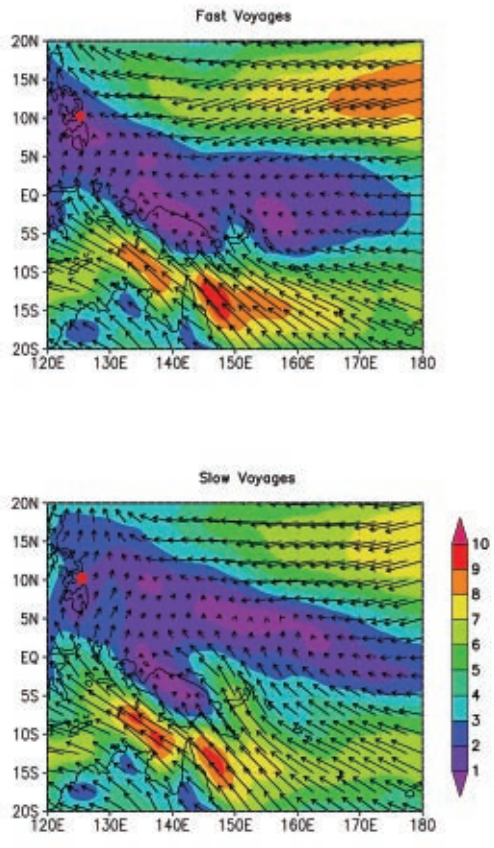

Figure 2.

June wind composites for the 9 slowest and 9 fastest "virtual voyages" between Acapulco and the Philippines. The color coding denotes magnitude in m s^{-1}. The ships approached the Philippine archipelago at 10–15° N; the red dot denotes the location of the Strait of San Bernardino. Fast voyages are made when the southwest monsoon trough is displaced southward, allowing the ships to reach the strait of San Bernardino with the trade winds. When the monsoon trough is displaced northward, winds are unfavorable (southerly or southwesterly), delaying the approach to the Philippines.

"The Manila galleon data are valuable because they provide an unambiguously dated record with nearly annual resolution over a period of 160 years"

Further examination of modern wind data for the 20th century shows that displacements in the position of the monsoon trough, such as those shown in Figure 2, are common, with considerable decadal variability. Thus, it is plausible to interpret the increase in voyage duration experienced by the galleons in the 17th century as being

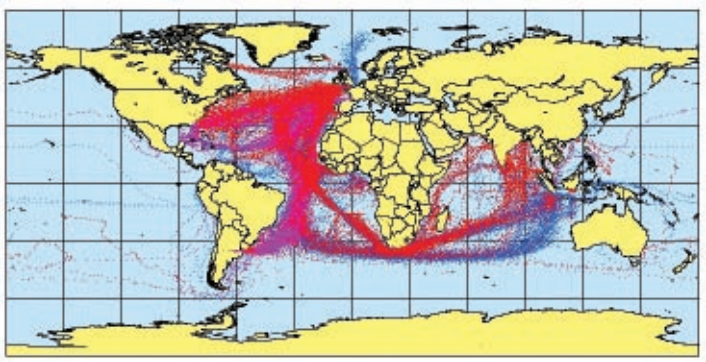

Figure 3. Observational coverage for the period 1750-1850 provided by logbooks from Spanish (purple), Dutch (blue), and British (red) ships.

due to variability in the southwest monsoon similar to (but of even greater amplitude and duration than) that found in the modern record.

The Manila galleon data are valuable because they provide an unambiguously dated record with nearly annual resolution over a period of 160 years. It is a rather special case because the nature of the data (voyage duration) mean that they are not an unambiguous proxy for any climate variable, and thus requires considerable a posteriori knowledge to yield useful information.

The CLIWOC Project

The CLIWOC project [3, 4], on the other hand, deals with information that is much more specific; the great majority of the data are observations of wind speed and direction, precipitation, cloudiness, and ice cover taken from logbooks recorded during the 18th and 19th centuries. These observations, although non-instrumental, usually rely on estimates made according to some well-defined, quasi-objective scale (instrumental temperature and atmospheric pressure records begin to appear in the 19th century, but they are relatively few in number). Most of the data are derived from ships belonging to the navies of Spain, Britain, the Netherlands, and France, although records from non-military voyages are also available (Spanish postal ships, and ships associated with Dutch and British trading companies). CLIWOC is a collaboration of Spanish, British, Dutch, and Argentine research institutions, funded through a European Union grant.

CLIWOC has recently compiled a list of available logbook observations for the period 1750-1850. As shown in Figure 3, the coverage of some oceanic regions is remarkable. Both the North and South Atlantic oceans are densely covered, a reflection of the trade and military connections between Spain and Britain, on the one hand, and their colonies and former colonies in North and South America, on the other. The Indian Ocean is also well sampled, mainly by British and Dutch ships. Only in the Pacific is the coverage sparse, except for coastal regions of the Americas, Oceania and Australia. In the 18th century, most logbooks record observations every two hours; in the 19th century, especially after the general adoption of the marine chronometer, frequent observations of winds were deemed less necessary to establish accurately the ship's position, and logbook entries were made typically three times a day.

> "Perhaps the most significant aspect of CLIWOC is the systematic use of a readily available, high quality, under-utilized source of climate data."

The principal goal of CLIWOC is to produce and make available to the scientific community a daily oceanic database for the Atlantic, Indian and Pacific oceans covering the period 1750–1850. Existing logbooks provide enough data to construct a daily record for each of these oceanic regions. Of particular interest, given the abundance of observations over the North Atlantic, is the possibility of studying the North Atlantic Oscillation, a well-recognized pattern of variability that exerts a strong influence on European climate, from the Arctic to the Mediterranean. Perhaps the most significant aspect of CLIWOC is the systematic use of a readily available, high quality, under-utilized source of climate data. This has not been attempted before in the degree of detail proposed, or over such a large geographic area.

The examples discussed above illustrate the mostly

untapped potential of historical marine data for climate reconstructions. The successful interpretation of the length of voyage data from the Manila galleons shows that even indirect climate proxies can be valuable when used in the context of modern observational and theoretical knowledge. The CLIWOC project constitutes a pioneering effort to analyze, catalog and map climate-related data from a very large collection of pre-instrumental but otherwise reliable observations. The next few years will reveal the extent to which the potential inherent in these data can be realized in scientific studies.

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This article is based on a paper by the authors first published by Bulletin of the American Meteorological Society (see [2]). For further information, please refer to this paper.

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Global change and resource sustainability: some fishy thoughts

by K. Alverson, R. Sonnerup, G.W. Kent Moore and G. Holdsworth

The term “sustainability” has been cropping up in IGBP publications rather frequently of late. Since much of the science that underpins IGBP is global, one might take this to be an issue of global sustainability. Talk about ‘the global life support system’ does indeed seem to provide this impression - and in a few cases there may indeed be a global sustainability problem with a global solution. Ozone and greenhouse gases, for example, are globally distributed, globally produced, play key roles in global climate dynamics and are, or should be, globally regulated. For the most part, however, sustainable resource management boils down to regional issues, albeit often with systemic, global repercussions. When we really get down to trying to tie large scale climate variability, ecosystems and human resource usage together in a holistic way, the discussion invariably focuses on local scales. Here we present an example from the North Pacific.

North Pacific climate variability over the past 50 years, the period over which good instrumental records exist, includes a decadal scale oscillatory mode as well as at least one apparent abrupt shift in 1976. Within the broad area from 10°N to 70°N and 160°E to 80°W, over the past 50 years, there is little or no average surface warming, but the averaging masks a distinct dipole pattern of climatic change. Over this time period the regional warming trend over parts of western Canada has been a staggering 1°C/decade, with this warming partly balanced by a concurrent cooling over much of the central North Pacific ocean (Figure 1) [1].

Evidence suggests there have been broad-scale marine ecosystem responses to aspects of this climatic variability, in particular the 1976 shift [2]. Given this apparent coupling of a somewhat predictable climatic variability and large scale ecosystem response, there seems to be a possibility of putting global change science for sustainability

Continued on page 16...

A surely unique IGBP Scientific Co

This year's IGBP Scientific Committee (SC-IGBP) meeting was surely unique. Not only did the government of Chile invite IGBP to hold its annual meeting in Punta Arenas in southern Patagonia, but the Chilean President took the rare step of attending the opening session. In a thoughtful speech President Ricardo Lagos Escobar called on IGBP to make a statement that he could share with the leaders of the G8 countries (a group of eight of the worlds leading industrial nations). By the end of the meeting, the SC-IGBP had produced the Punta Arenas Statement and given a press conference.

After an opening speech by Eric Goles, president of CONICYT (Chile's National Commission of Scientific Research and Technology), Guy Brasseur, Chair of the SC-IGBP, thanked the Chilean president and the president of CONICYT for hosting the meeting. He went on to provide a stimulating outline for IGBP's research agenda in its second phase of development.

"A decade of active research conducted by IGBP in cooperation with its scientific partners, the World Climate Research Programme (WCRP), the International Human Dimension Programme on Global Environmental Change (IHDP) and DIVERSITAS, has led to a growing awareness that global change is real, that it is happening now, and that it is accelerating. The Earth is currently operating in a no-analogue state, outside the range of natural variability exhibited over at least the last half million years. The planet of tomorrow will be very different than the planet of yesterday, and the scientific landscape of the future will be very different than that of the past."

Dr. Brasseur expressed the need for IGBP research to bridge the divide between developed and developing country scientists as well as between disciplines. "The Earth is a complex system with interacting synergies, feedbacks and processes and solving the global environmental problems will require participation from all corners of the international community of scientists."

"In the next phase of IGBP, this community must be ready to employ innovative integration methodologies and organise itself into a global system with transnational infrastructures and embark on a continuing dialogue with stakeholders." Dr. Brasseur concluded his speech by calling on the scientific community to work together with governments and other decision-makers towards the restoration of a healthy planet.

His Excellency, President Lagos, then addressed the IGBP Scientific Committee, giving a personal account of the impact of global change on the Chilean people. "The source is far; yet the danger is near for us here in Chile," said President Lagos, referring to the ozone hole over Antarctica.

The President reiterated Dr. Brasseur's point that global environmental problems require global cooperation. "If global change is an undeniable reality, its impact evokes the consensus of the whole planet to act now realistically and decisively; we cannot accept impassively the degradation of our environment."

The President concluded his welcoming speech with strong words: "It needs courage to begin this action now and we demand this courage, because here in Punta Arenas we suffer the effects of the lack of action by rich countries. I am sure that the deliberations, which we will have in this congress, will allow us to move on more decisively and with a greater force in a proposal, which needs the world to act now."

According to IGBP Executive Director, Will Steffen, the Chilean President's attendance at the meeting is indicative of a growing awareness of IGBP in the policy community. "This is evidence of the prominence of global environmental change as a political issue in every part of the planet. Furthermore, it underscores the need for a high quality knowledge base on which to deal with this issue, and points to the role of IGBP in contributing to this knowledge base".

Immediately following the SC-IGBP meeting, CONICYT and the Chilean Meteorological Service organised an exciting Global Change Symposium, "Towards a Systemic Vision", in Punta Arenas. The papers presented at the Symposium demonstrated the great diversity and quality of multidisciplinary research in Chile. Over thirty oral presentations and posters in both Spanish and English covered topics ranging from palaeoclimate and atmospheric chemistry to the societal impacts of global change. The Symposium also strengthened the research links between Chile and the international scientific community, with a number of presentations given by members of the SC-IGBP. The large number of young scientists presenting research gave a positive indication of the future of global change science in Chile.

The final in the series of three meetings was organised in Mendoza, Argentina (27-28 January 2003)

ommittee meeting

by the Inter-American Institute for Global Change Research - IAI and IGBP to help reinforce collaboration between IGBP and partner organisations dealing with regional global change research. IAI-CRN's (Collaborative Research Network) include 14 projects that IAI fund for 5 years. The projects are now in the second/third year. The meeting was a great success and gathered ca. 50-60 participants, namely: the Principle Investigator each of the 14 CRN projects, 12 SC-IGBP members, the IAI Scientific Advisory Committee, IAI's Directorate Staff and representation from NSF and NOAA.

For full text of the opening speeches at the 18th SC-IGBP meeting, see http://www.igbp.kva.se. For more information on CONICYT and the Global Change Symposium, please see: http://www.conicyt.cl/. Information about the Inter-American Institute for Global Change Research can be found at: http://www.iai.int. PowerPoint presentations from the Mendoza meeting can be found on both IGBP's and IAI's websites.

The Punta Arenas Statement

Punta Arenas, Chile is unique. It is located in one of the most remote regions of the Earth, an environment of outstanding natural beauty where air, water, land, and ice come together. Yet even here, the impacts of industrialisation and other human activities in far distant parts of the planet are felt: for instance, the Antarctic ozone hole repeatedly extends over this region.

The Scientific Committee of the International Geosphere-Biosphere Programme (IGBP), a major international scientific effort focused upon the Earth's changing environment, met in Punta Arenas in January 2003 to launch a new phase of research. This second phase of research will focus upon the Earth as a system and support development of policy options for a more sustainable future.

The past 15 years of IGBP research have shown that Earth's environment is changing beyond the limits of natural variability (cf. Amsterdam Declaration). Global change is real; it is happening now, and, in many ways, it is accelerating. Human activities are clearly the cause. There are growing concerns that these activities may trigger abrupt or irreversible changes to Earth's environment, changes which would make the planet less hospitable to humans and other life.

Global change affects every corner of Earth and every part of its environment – land, sea, atmosphere. The impacts on human societies however, will not be felt equally around the world. Scientific analyses show that many parts of the developing world will suffer disproportionately. Despite the fact that more research is needed, the scientific knowledge base is strong enough to support the call for action now to take pressure off the global environment. Industrialised nations, in partnership with other countries around the world, must take the lead to implement effective strategies that address the challenges of global change.

The Scientific Committee of the International Geosphere-Biosphere Programme (IGBP)

Guy P. Brasseur, Chair

Punta Arenas, Chile

23 January 2003

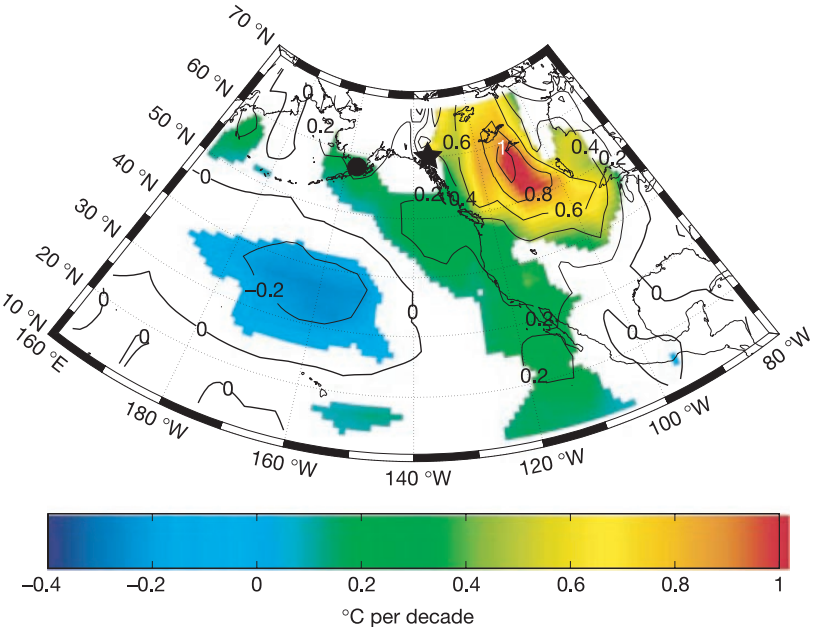

Figure 1. Trend in the winter mean (January-March) surface temperature field from the HADCRUTv dataset during the period 1948-1999. Shading indicates where the trend is significant at the 95% level in the presence of autocorrelated noise [1]. The location of Mt. Logan is indicated by a star and Egegik River, Bristol Bay by a circle.

...continued from page 13.

to use, for example, in managing the multimillion dollar heavily fished North Pacific salmon stocks. Indeed Mantua et al. (1997) have outlined a "climatic regime-driven model of salmon production [that] has broad implications for fishery management. [3]" Here we address this laudable initial attempt from two perspectives not contained in these seminal publications: the perspective of the long term record and the perspective of local fishers.

Taking a Long Term Perspective

One excellent picture of the long term record of North Pacific climate is provided by the snow accumulation record from an ice core taken from Mt. Logan in the Canadian Yukon (Figure 2) [1]. The accumulation of snow at this site has been shown to be correlated with a large scale climatic dipole pattern, the Pacific North America Pattern, one aspect of which is reflected in Figure 1. The ice core record demonstrates that the trend towards higher snow accumulation over the instrumental period visible in Figure 2 actually began around 1850 and has been accelerating markedly in recent decades. Another intriguing paleorecord is provided by nitrogen isotope measurements in Alaskan lake sediments, which provide a robust proxy record of the number of Salmon returning to spawn [4]. Although not shown here for lack of space, these records tend to confirm a positive correlation between salmon returns and Gulf of Alaska

"trying to tie large scale climate variability, ecosystems and human resource usage together in a holistic way, the discussion invariably focuses on local scales"

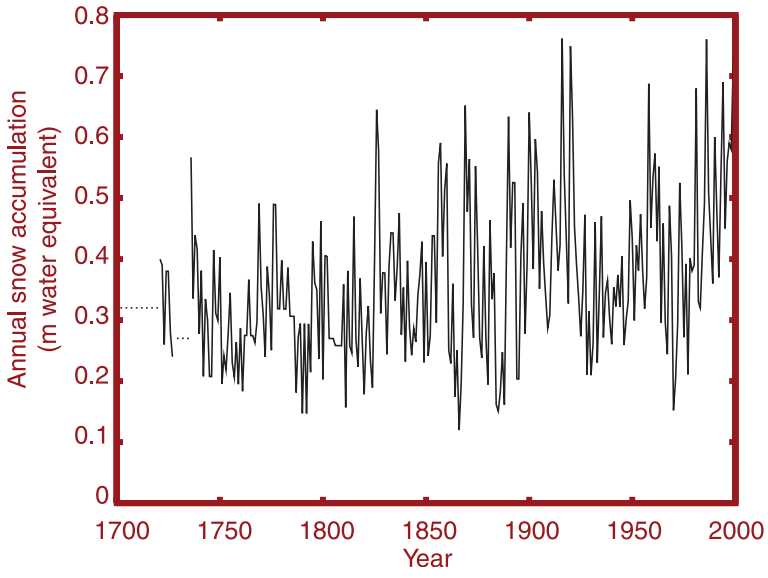

Figure 2. Annual snow accumulation (m water equivalent) on Mount Logan 1700-2000. Data from the pre-1736 era that is not annually resolved is indicated by the dashed lines. [1]

sea surface temperatures as reconstructed from coastal area tree ring indices. Importantly for management considerations however, they also show extended multi-decadal periods for which this correlation breaks down or is even reversed.

Scaling Down to Individual Fishers

Figure 3 shows the correlation between the two year lagged winter Pacific Decadal Oscillation (PDO) index and sockeye salmon production in Bristol Bay. The marked correlation between climate forcing, both on decadal scales and during the rapid shift of the late 1970s is remarkable. However, at times, for example in the early 90s, they are anti-correlated, making a strictly enforced management based on the PDO dangerous. Indeed, after two years of disappointing returns, in 1999 Bristol Bay managers took to heart suggestions, based in part on the developing understanding of the PDO, that sockeye production had relapsed to the lower levels seen during the 1950s-1970s, and thus used pre-1977 data for predicting some rivers' returns. The result was a significant (up to 180%) underprediction of those rivers' sockeye returns. But more important still is the fact that there is no Bristol Bay wide fisheries management and there are no Bristol Bay wide fishers. Both fishing and management occur largely on the river scale.

Figure 4 shows what happens when we compare large scale climatic forcing with salmon production on a specific river, the Egegik, at a single fixed location on that river, and with the annual proceeds from that same location. At the level of the individual fisher, the PDO is not a greatly important variable. The reason Alaskan fishers are not clamoring for thorough PDO index predictions in their decision making process is not ignorance. It is because individual river runs are not highly correlated with the PDO on a year-to-year basis and because price fluctuations are a more vital driver of income anyway. In fact, the price drop in the late 90s, from the point of view of Alaskan fishers, was a far more important and abrupt global teleconnection than the 1976 climate shift.

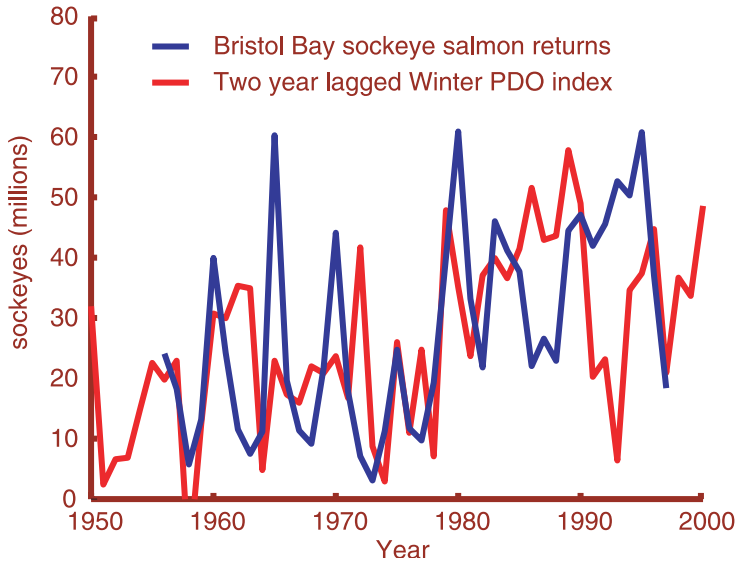

Figure 3. Bristol Bay sockeye salmon return (catch plus estimated spawning numbers) in blue vs winter PDO index lagged two years to coincide with sockeye 'entry year' (in red). The two year lag is meant to account for the fact that sockeye abundances are thought to be most impacted by marine climate variability early in the ocean phases of their life cycles.

Human Dimensions Teleconnections

The price decrease of the 1990s presents an interesting case study. It is in fact a classical 'teleconnection' in that it is entirely due to remote forcing - but one that is inherently within the human dimensions realm: the advent of large scale salmon farming in Chile, Norway, Canada and Scotland and the economic malaise in the once lucrative salmon markets of Japan drove prices down for fishers all over the world.

In conclusion, this little story shows that global changes and local changes can be drastically different and that resource sustainability needs to be addressed from a local level. On the other side of the coin, such local decisionmaking cannot ignore global forcings in either the physical or human dimensions realms.

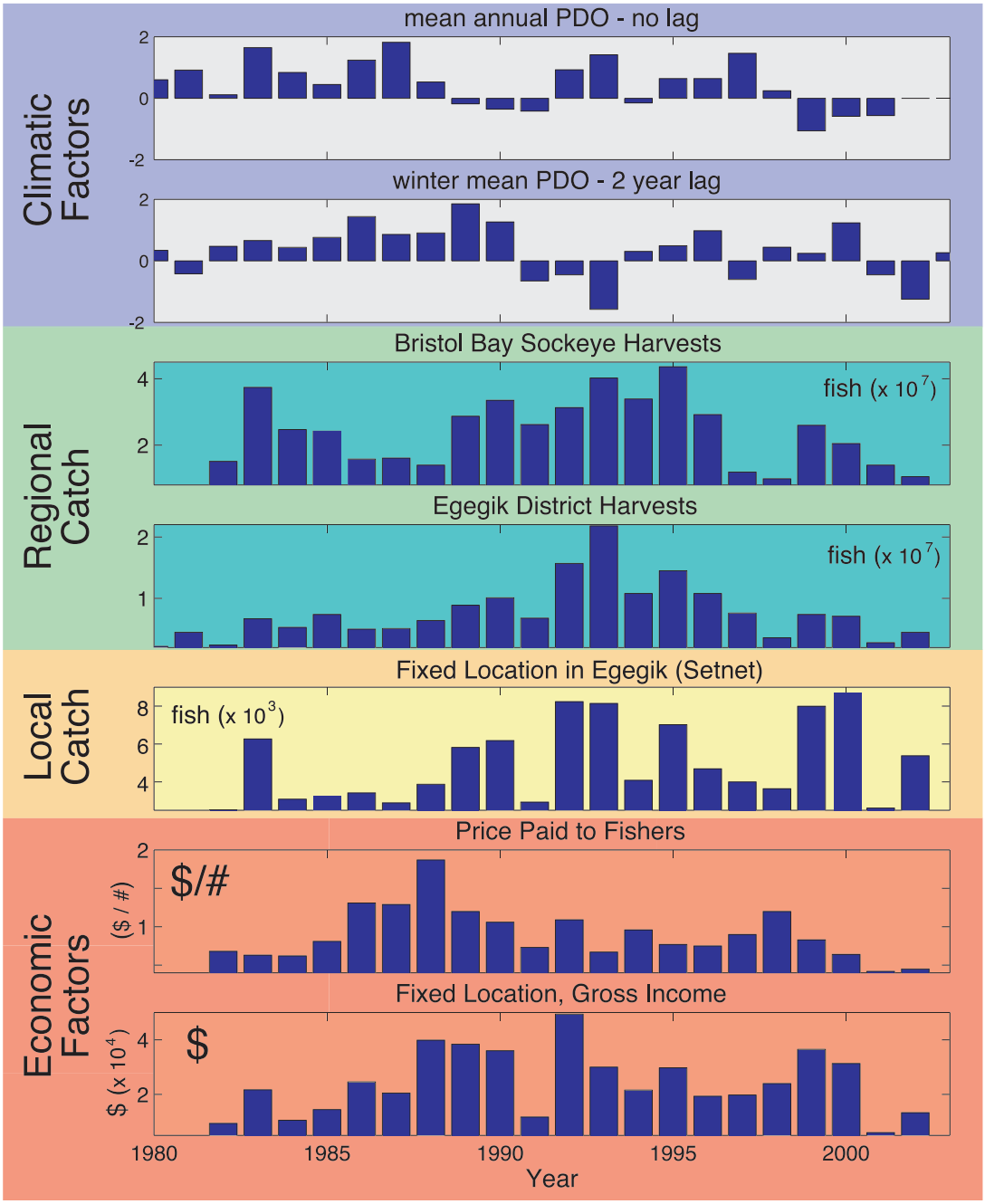

Figure 4.

A twenty year record of gross income from a single fixed location sockeye salmon fishing operation in Egegik Bay, Alaska alongside economic and climatic factors as well as larger scale regional catch numbers.

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People and events

The beginning of 2003 marked the addition of three members to the IGBP Scientific Committee, Dagoberto Arcos, Sandra Lavorel, and Sybil Seitzinger.

Dagoberto Arcos is presently Director of the Fishery Research Institute at Talcahuano, Chile. He completed his graduate work in oceanography at the State University of New York at Stony Brook. Dr. Arcos is the IGBP representative in the new international research project, GECAFS, (Global Environmental Change and Food Systems), which involves a wide range of social, physical and biological scientists, investigating the vulnerability of human food systems to global environmental change. Dr. Arcos has taught at the University of Concepción over the past twenty years and he recently joined the Catholic University academic staff. His main research interests are coastal oceanography and fisheries off central Chile, their changes over time and space, and their relationship to environmental changes. Dr. Arcos has been a member for more than nine years of the National Fisheries Research Council in Chile. He has served as co-chair on the Living Marine Research (LMR) panel of the Global Ocean Observing System (GOOS) and is also a member of the team developing the strategic and implementation plan for Coastal.

Sandra Lavorel is an agronomist by training and specialises in plant community and landscape ecology. Since 1994 she has been a Research Scientist with CNRS in France. Her research interests focus on the dynamics of plant diversity in landscapes, especially in relation to natural and land use disturbances such as grazing and fire. She has worked mainly on temperate and Mediterranean ecosystems, with a special interest in managed grasslands. Dr. Lavorel has just moved to Grenoble to return to her early interest in alpine ecosystems. She has been involved with several international comparative studies of the response of vegetation to disturbance and of landscape models accounting for these processes. Since 1997 she has been coordinating research about global change effects on landscape structure and function as part of the Global Change and Terrestrial Ecosystems (GCTE) project. Over time she has become interested in integrating ecological approaches to land use change research and is a co-chair of the Land Project Transmission Team.

Sybil Seitzinger is the Director of the Rutgers/NOAA Cooperative Marine Education and Research Program, and a visiting professor at Rutgers University in the Institute of Marine and Coastal Sciences. Dr. Seitzinger has served as a scientific expert for UNESCO-Intergovernmental Oceanographic Commission, as well as held many posts in the Academy of Natural Sciences of Philadelphia, including associate and assistant curator and senior scientist. Her research interests encompass coastal and marine ecosystems and how nutrients in these systems effect natural processes. Dr. Seitzinger's current research projects include the study of: contribution of dissolved organic nitrogen to estuarine eutrophication; the effect of human activities and natural resources on nutrient export to the coastal ocean; denitrification in freshwater and coastal marine systems; global modelling of greenhouse gas production from aquatic systems; and cumulative effects of multiple stressors on coastal ecosystems.

Hartwig Kremer is the new Executive Officer of LOICZ, having replaced Chris Crossland on 1 January 2003. Dr.Kremer first joined the LOICZ IPO in 1998, as Deputy Executive Officer, where he focused on the land-based impacts and socio-economic aspects of LOICZ work. He also helped to introduce river catchment studies and the human dimension of coastal change under biophysical and anthropogenic forcing. Dr. Kremer has a PhD in biological oceanography with a focus on fisheries and heavy metal toxicology (Kiel, Hamburg, Juelich, Germany) and he holds a degree as a public advisor for fisheries economy. After working as a science communicator at WWF Wadden Sea, he later developed curricula and workshops targeted at educating executives and decision-makers in developing economies. Dr.Kremer is a member of the Policy Advisory Board of the European Catchment/ Coast Interaction Studies, an advisor to the European Land Ocean Interaction Studies (ELOISE) and a member of the SSC of DINAS Coast, the global assessment of coastal risk and vulnerability to climate change and sea level rise. His emphasis on promoting scientific protocols, strategies and communication mechanisms that balance economic and ecological requirements along the whole water continuum will assist LOICZ in transitioning in its second phase (2003-2012) towards a holistic, process-based common approach.

Bertebos Prize

One of this year's two winners of the Swedish Royal Academy of Agriculture and Forestry's Bertebos Prize is John Porter. Dr. Porter, a member of the Land Project Transition Team and GCTE SSC, received the Bertebos prize for "Internationally well known multidisciplinary research of complex agroecosystems by biological modelling of responses to their environment, especially the impact of climate change on arable and energy crops." The Bertebos Prize was founded in 1997, and is awarded for pioneering research within food, agriculture, animal health and ecology. IGBP congratulates Dr. Porter on his achievements!

Changes in the IGBP Secretariat

IGBP recently bid farewell to Clare Bradshaw, the acting Science Communicator, who has returned to research and is now working at Stockholm University, studying the importance of bioturbation (disturbance caused by sediment-dwelling animals) for radionuclide transport in Baltic Sea sediments. IGBP wish Clare well in her new endeavours. Susannah Eliott has returned to the Secretariat after 10 months maternity leave with her healthy baby girl, Aisha. Susannah will continue in her post as Science Communicator.

Recent changes in the Secretariat have led to the creation of a new post, Science Editor, who will take on the responsibility of editing IGBP products. Currently, Angelina Sanderson is the acting Science Editor. Angelina has been working in the Secretariat for the last year on editing the IGBP synthesis volume, and has transitioned smoothly into her new role in IGBP.

IGBP and Related Global Change Meetings

For a more extensive meetings list please see our web site at www.igbp.kva.se

European Conference on Coastal Zone Research: The ELOISE Approach

24-27 March, Gdansk, Poland

Contacts: Berit Modalen, berit.modalen@nilu.no or http://www.nilu.no/projects/eloise/

START: START/APN: International Workshop on "Global Change, Sustainable Development and Environmental Management in Central Asia"

26-28 March, Tashkent, Uzbekistan (tentative venue)

Contact: Svetlana Nikulina, sanigmi@meteo.uz

IHDP, LOICZ: LOICZ/IHDP Taskgroup Meeting

28-28 March, Gdansk, Poland

Contact: LOICZ IPO, loicz@nioz.nl

Land Transition Team Meeting

31 March-02 April, Fort Collins, CO, USA

Contact: Dennis Ojima, dennis@nrel.colostate.edu

International Symposium on Climate Change (ISCC)

31 March-03 April, Beijing, China

Contacts: Mr. Wang Bangzhong, Ms. Zhang Yan or Ms. Chao Qingchen, ISCC@cma.gov.cn

GLOBEC: BENEFIT-GLOBEC Forum 2003

31 March-04 April, Swakopmund, Namibia

Contact: BENEFIT Secretariat, skapepu@mfmr.gov.na

GECAFS: Indo-Gangetic Plain Research Planning Workshop,

02-04 April, Kathmandu, Nepal

Contacts: John Ingram, jsii@ceh.ac.uk or http://www.gecafs.org

IGAC: Joint SPARC/IGAC workshop on Climate-Chemistry Interactions

03-05 April, Giens, France

Contacts: A. Ravishankara, ravi@al-noaa.gov or Shaw Liu, shawliu@earth.sinica.edu.tw

ProClim: 4th Swiss Global Change Day

04 April, Bern, Switzerland

Contact: http://www.proclim.ch/events/4thSGCD.html

European Geophysical Society/AGU/EUG Joint Assembly 2003: Session CL8 (Extreme Climate Events, their Evolution and their Impacts)

06-11 April, Nice, France

Contacts: EGS Office, egs@copernicus.org or http://www.copernicus.org/EGS/egsga/nice03/programme/overview.htm

DIVERSITAS Scientific Steering Committee meeting

07-09 April, Penang, Malaysia

Contact: DIVERSITAS Secretariat, Email: prieur_richard@icsu.org

LUCC: Framing Land Use Dynamics: Integrating knowledge on spatial dynamics in socio-economic and environmental systems for spatial planning in western urbanized countries

16-18 April, Utrecht University, The Netherlands

Contacts: Organising Congress Bureau, framingland@fbu.uu.nl or http://networks.geog.uu.nl/conference

GCTE: Interactions Between Increasing CO2 and Temperature in Terrestrial Ecosystems

27-30 April, Lake Tahoe, CA, USA

Contact: Tracey Walls, Tracey_E._Walls@umit.maine.edu

OCEANS: Transition Team sub-meeting

02-03 May, Washington, DC, USA

Contact: Penny Cooke, p.cooke@niwa.co.nz

JGOFS: 18th JGOFS Scientific Steering Committee Meeting

04 May, Washington, DC, USA

Contact: Roger Hanson, Roger.Hanson@jgofs.uib.no

GLOBEC: GLOBEC-ICES CCC Synthesis Workshop

05-07 May, New Bedford, MA, USA

Contact: Keith Brander, keith@ices.dk

JGOFS: Final JGOFS Open Science Conference: "A Sea of Change: JGOFS accomplishments and the Future of Ocean Biogeochemistry"

05-08 May, Washington, DC, USA

Contacts: Roger Hanson, Roger.Hanson@jgofs.uib.no or Ken Buesseler, kbuesseler@whoi.edu or Mary Zawoysky, mzawoysky@whoi.edu

International Conference on Land Degradation and Desertification in Semiarid Mountain Areas

05-10 May, Catamarca, Argentina

Contacts: Julio A. Costello, jacoste@huma.unca.edu.ar or Moshe Inbar, inbar@geo.haifa.ac.il

GLOBEC: ICES/GLOBEC CCC Working Group Meeting

07-09 May, New Bedford, MA, USA

Contact: Ken Drinkwater, drinkwaterk@mar.dfo-mpo.gc.ca

IGBP Book Series

The aim of the Series is to present major results of IGBP research – at both the project and programme-wide level – in a single series. The volumes emphasise the key findings of the programme and each is based on an integration of a large body of work carried out around the world under the auspices of IGBP.

The IGBP Synthesis project, involving most IGBP projects, is currently in progress, and is producing a set of state-of-the-science volumes on the nature of the changing environment of the Earth and the research challenges for the future.

IGBP Newsletter readers are entitled to a 10% discount. To take advantage of this special offer, please use the order forms available through the IGBP website:

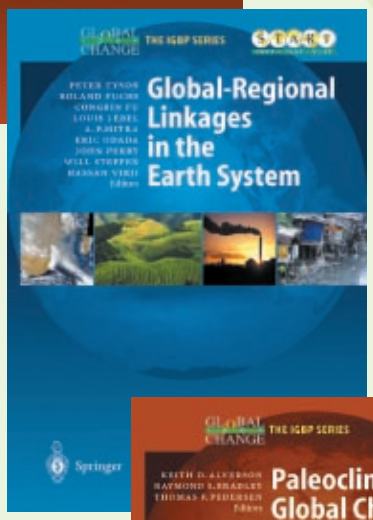
www.igbp.kva.se/bookpromotion/

Either follow the links to order online, or print and fax or post the order to the address given.

Challenges of a Changing Earth (Proceedings of the Global Change Open Science Conference, Amsterdam, the Netherlands,10-13 July 2001).

An overview of global change and its consequences for human societies.

Steffen W, Jäger J, Carson DJ, Bradshaw C (Eds.)

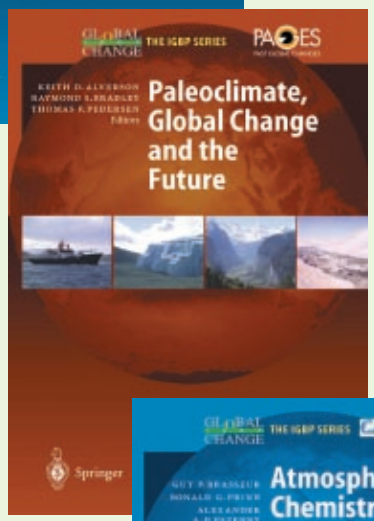


Global-Regional Linkages in the Earth System.

Springer Verlag, Heidelberg, Germany.

Synthesises current knowledge of regional-global linkages to demonstrate that change on a regional scale can enhance understanding of global-scale environmental changes.

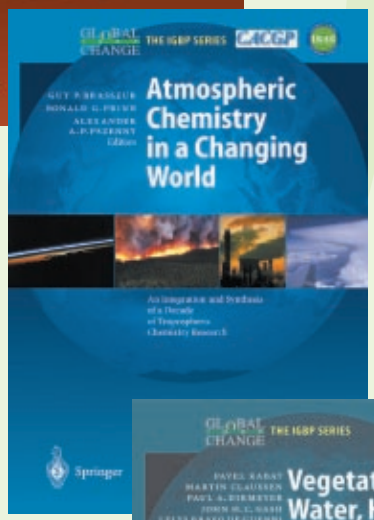
Tyson PD, Fuchs R, Fu C, Lebel L, Mitra AP, Odada E, Perry J, Steffen W, Virji H (Eds.)



Paleoclimate, Global Change and the Future.

A synthesis of a decade of research into global changes that occurred in the Earth System in the past.

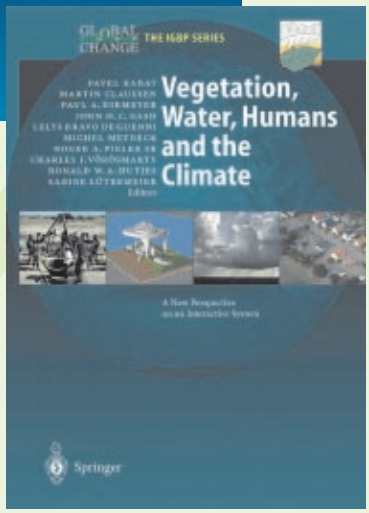
Alverson KD, Bradley RS,
Pedersen TF (Eds.)



Atmospheric Chemistry in a Changing World

Summary and integration of more than a decade of atmospheric chemistry research.

Brasseur GP, Prinn, RG, Pszenny AAP (Eds.)



Vegetation, Water, Humans and the Climate

Kabat P, Claussen M, Dirmeyer PA, Gash JHC, de Guenni LB, Meybeck M, Vörösmarty CJ, Hutjes RWA, Lütkemeier S (Eds.)

An overview of the influence of the terrestrial vegetation and soils within the Earth System (BAHC).

To pre-order this book (Kabat et al), please contact Cora Boesenach (Email: c.d.a.boesenach@alterra.wag-ur.nl) before 28 Feb 2003

Springer

GLOBAL CHANGE
IGBP

GWSP: Global Water System Project meeting

08-09 May, TBA, The Netherlands

Contact: Holger Hoff, hhoff@pik-potsdam.de or

GLOBEC: GLOBEC-PICES-ICES Zooplankton Production Symposium

20-23 May, Gijon, Spain

Contacts: Luis Valdes, luis.valdes@gi.ieo.es or
http://www.pices.int/meetings/gijon/gijon.asp

LUCC: Workshop on Integrated Land Use Change Analysis in Southern Africa: Process Modeling, Impacts and Implications for Sustained Development

25-30 May, Blantyre, Malawi

Contact: Paul Desanker, desanker@virginia.edu

The XIVth Global Warming International Conference

27-30 May, Boston, USA

Contact: http://www.GlobalWarming.net

SCOR: SCOR/IOC study group on "Extending Ecosystem models to the basin scale"

30 May-02 June, Cambridge, UK

Contact: Brad de Young, bdeyoung@physics.mun.ca

ESSP: Chairs and Directors Meeting

02-04 June, Paris, France

Contact: Anne Larigauderie, anne@icsu.org

GCP/GTOS: Improved Quantification of Terrestrial Global Carbon Fluxes

03-06 June, Sheffield, UK

Contacts: Shaun Quegan, s.quegan@sheffield.ac.uk or
GTOS Secretariat, GTOS@fao.org or
http://www.fao.org/gtos/meetSHE.html

AGU Chapman Conference on Ecosystem Interactions with Land Use Change

14-18 June, Santa Fe, USA

Contacts: Ruth DeFries, rd63@umail.umd.edu or
Greg Asner, greg@globalecology.stanford.edu or
http://www.agu.org/meetings/chapman.html

IGBP: 3rd IGBP Congress (See page 25)

19-24 June, Banff, Canada

Contacts: Clemencia Widlund, clemencia@igbp.kva.se or
Charlotte Wilson-Boss charlottew@igbp.kva.se

SOLAS: SOLAS Summer School

30 June-11 July, Corsica, France

Contacts: Corinne Le Quéré, lequere@bgc-jena.mpg.de or
http://www.bgc.mpg.de/~corinne.lequere/solas/

Symposium at the IUGG 2003 General Assembly: "State of the Planet: Frontiers and Challenges"

03-04 July, Sapporo, Japan

Contacts: IUGG 2003 Secretariat, iugg_service@jamstec.go.jp or
http://www.jamstec.go.jp/jamstec-e/iugg/index.html

START: 2nd Lake Victoria Training Workshop

July, Kisumu, Tanzania

Contact: Eric Odada, eodada@uonbi.ac.ke

GCP/START: Urbanization, Emissions and the Carbon Cycle Institute

03-24 August, Boulder, CO, USA

Contact: Amy Freise, afreise@agu.org

LUCC: Studying Land Use Effects in Coastal Zones with Remote Sensing and GIS

13-16 August, Kemer/Antalya, Turkey

Contact: http://www.ins.itu.edu.tr/rslucoast1/

PAGES: 9th International Paleolimnology Symposium

24-28 August, Otaniemi Espoo, Finland

Contacts: Atte Korhola, Atte.Korhola@helsinki.fi or
Veli-Pekka Salonen, Veli-Pekka.Salonen@helsinki.fi or
Antti Ojala, antti.ojala@gsf.fi

GAIM: GAIM and WGCM (WCRP) - International Conference on Earth System Modelling

15-19 September, Hamburg, Germany

Contact: Annette Kirk, annette.kirk@dkrz.de

GAIM: Coupled Carbon Cycle Climate Model Intercomparison Project (C4MIP) Workshop

18-20 September, Hamburg, Germany

Contact: Pierre Friedlingstein, pierre@lsce.saclary.cea.fr

World System History and Global Environmental Change

19-22 September, Lund, Sweden

Contacts: Symposium Secretariat,
christian.isendahl@humecol.lu.se or
http://www.humecol.lu.se/woshglec/

JGOFS: JGOFS Executive Meeting

24-27 September, Bergen, Norway

Contact: Roger Hanson, roger.hanson@jgofs.uib.no

ILEAPS: ILEAPS Open Science Conference

29 September-03 October, Helsinki, Finland

Contacts: Taina Ruuskanen, Taina.Ruuskanen@helsinki.fi or Tanja Suni, Tanja.Suni@helsinki.fi or
Maarit Raivonen, Maarit.Raivonen@helsinki.fi or
http://www.atm.helsinki.fi/ILEAPS/

GWSP: Global Water System Project Open Science Conference

08-10 October, Portsmouth, NH, USA

Contacts: Holger Hoff, hhoff@pik-potsdam.de or
http://www.gwsp.org

Open Meeting of the Human Dimensions of Global Environmental Change Research Community

16-18 October, Montreal, Canada

Contacts: McGill School of Environment, info.mse@mcgill.ca or
http://sedac.ciesin.columbia.edu/openmeeting

IGFA Plenary 2003

29-31 October, Capetown, South Africa

Contact: IGFA Secretariat, sofia.wretblad@formas.se

START: Pan-Africa Regional Committee (PACOM) Meeting

TBA October, Capetown, South Africa (tentative)

Contact: Eric Odada, eodada@uonbi.ac.ke

START: Young Scientists 1st International Global Change Conference

16-19 November, Trieste, Italy

Contacts: Kristy Ross, kristy@crg.bpb.wits.ac.za or http://www.start.org/Fellowships/YS_Conference.html

START: 17th START Scientific Steering Committee Meeting

19-22 November, Trieste, Italy

Contact: Ching Wang, xwang@agu.org

LAND: LAND Open Science Meeting "Global Change and the Terrestrial Human Environment System"

01-04 December, Morelia, Mexico

Contacts: Dennis Ojima, dennis@nrel.colostate.edu, dennis@saccharum.nrel.colost or Victor Jaramillo luque@ate.oikos.unam.mx or http://www.gcte.org or http://www.geo.ucl.ac.be/LUCC/lucc.htm

START: Regional Workshop on Assessment of Nutrient, Sediment and Carbon Fluxes, to the Coastal Zone in South Asia and their Relationship to Human Activities

09-11 December, TBA, TBA

Contact: Janaka Ratnasiri, janakar@itmin.com

GLOBEC: SPACC Workshop on Long-term Dynamics of Small Pelagic Fish and Zooplankton in Japanese waters

December, Tokyo, Japan

Contacts: Juergen Alheit, juergen.alheit@io-warnemuende.de or Takashige Sugimoto, sugimoto@ori.u-tokyo.ac.jp

2004

GLOBEC: IOC-SCOR-GLOBEC Symposium on 'Quantitative Ecosystem Indicators for Fisheries Management'

31 March-03 April, Paris, France

Contacts: Philippe Cury, curypm@uctvms.uct.ac.za or Villy Christensen, v.christensen@fisheries.ubc.ca

4th World Fisheries Congress, Reconciling Fisheries with Conservation: The Challenges of Managing Aquatic Ecosystems

02-06 May, Vancouver, Canada

Contact: http://www.worldfisheries2004.org/

Third IGBP Congress

Banff, Alberta, Canada, 19-24 June 2003

The third IGBP Congress is an important milestone in the evolution of the IGBP and the international research effort that is focussing on compelling issues of human-induced planetary change. The IGBP has embarked on an ambitious restructuring of its research programme, built solidly on the results of the first decade of IGBP research but focusing on the emerging questions that are now challenging global change science. In early 2003 the IGBP launched a new structure, based on work in the Earth's major compartments (atmosphere, ocean, land), the interfaces between them, and their integration in the past, present and future timeframes using a systems-oriented approach. In addition, IGBP is joining with the other international global change research programmes (WCRP, IHDP, and DIVERSITAS) to launch four new joint projects centred on water resources, the carbon cycle, food systems and human health.

The Congress Participants (members of IGBP committees and key guests from our partner organisations) will, through a series of presentations and working group discussions, develop further the new implementation strategies that will be used to tackle the questions.

IGBP: Congress Main Scientific Programme: Connectivities in the Earth System

20-23 June, Banff, Canada

Contacts: Clemencia Widlund, clemencia@igbp.kva.se or Charlotte Wilson-Boss charlottew@igbp.kva.se

GLOBEC: 8th Scientific Steering Committee Meeting

18-19 & 24 June, Banff, Canada

Contact: GLOBEC IPO, globec@pml.ac.uk

PAGES: Scientific Steering Committee Meeting

18-19 June, Banff, Canada

Contact: PAGES IPO, pages@pages.unibe.ch

GCP: 3rd Global Carbon Project Scientific Steering Committee Meeting

18-19 June, Banff, Canada

Contact: Rowena Foster, rowena.foster@csiro.au

OCEANS: Transition Team Meeting

18-19 & 24 June, Banff, Canada

Contact: Penny Cooke, p.cooke@niwa.co.nz

LUCC: Scientific Steering Committee Meeting

19 June, Banff, Canada

Contact: LUCC IPO, lucc.ipo@geog.ucl.ac.be

GCTE: Scientific Steering Committee Meeting

18-19 June, Banff, Canada

Contact: GCTE IPO, gcte@gcte.org

SOLAS: Scientific Steering Committee Meeting

19 & 24 June, Banff, Canada

Contact: Casey Ryan, casey.ryan@uea.ac.uk

LOICZ: 14th Scientific Steering Committee Meeting

19 & 24 June, Banff, Canada

Contact: LOICZ IPO, loicz@nioz.nl

ILEAPS: ILEAPS Transition Team Meeting

19 & 24 June, Banff, Canada

Contact: Almut Arneth, arneth@dkrz.de

IGBP: Meeting of National Committee Chairs

19 & 24 June, Banff, Canada

Contacts: Suzanne Nash, nash@igbp.kva.se

IGAC: Scientific Steering Committee Meeting

24 June, Banff, Canada

Contact: IGAC IPO, igac.cpo@unh.edu

LAND: Transition Team Meeting

24 June, Banff, Canada

Contact: Rowena Foster, Rowena.Foster@csiro.au

GLOBEC: Focus 4 Working Group Meeting

25-26 June, TBA, Canada

Contact: Ian Perry, Perryl@pac.dfo-mpo.gc.ca

For up-to-date information about the congress visit the congress website:

www.igbp.kva.se/congress/

GLOBEC: ICES-GLOBEC Symposium on 'The Influence of Climate Change on North Atlantic Fish Stocks'

11-14 May, Bergen, Norway

Contacts: Harald Loeng, harald.loeng@imr.no or
http://www.imr.no/2004symposium/

PAGES: Scientific Steering Committee Meeting

24-25 May, Beijing, China

Contact: PAGES IPO, pages@pages.unibe.ch

PAGES: PAGES Open Science Meeting

26-28 May, Beijing, China

Contact: PAGES IPO, pages@pages.unibe.ch

CLIVAR 2004: 1st International CLIVAR Science Conference

21-25 June, Baltimore, MD, USA

Contacts: CLIVAR, info@clivar2004.org or
http://www.clivar2004.org/

IGAC: 8th Scientific Conference of the IGA Project

05-09 September, Christchurch, New Zealand

Contact: Dave Lowe, d.lowe@niwa.co.nz

SOLAS: 1st SOLAS Open Science Conference

10-15 October, TBA, Canada (tentative dates)

Contact: Daniela Turk, solas@dal.ca

6th International Symposium on Plant Responses to Air Pollution and Global Changes: from Molecular Biology to Plant Production and Ecosystem

19-22 October, Ibaraki, Japan

Contacts: Luit J. De Kok, l.j.de.kok@biol.run.nl or
http://apgc2004.en.a.u-tokyo.ac.jp/

ILEAPS: Integrated Land Ecosystem – Atmosphere Processes Study

INTERNATIONAL OPEN SCIENCE CONFERENCE

29 September - 3 October 2003

Helsinki, Finland

Towards the development of the new land-atmosphere project in IGBP

This conference will focus on the processes of land – atmosphere exchange of energy and matter, emphasising feedbacks and interactions between these two components of the Earth System. It will address these processes at all scales, reaching from the local through the regional and continental to the global scale. The conference is designed to summarise the current scientific knowledge in this area and to discuss the research agenda for the coming years.

More specifically, the conference is a major step in the development of a science plan and implementation strategy for ILEAPS as a 10-year international research project within the framework of IGBP. Broad community input and support is required to build this new project; the ILEAPS International Open Science Conference is a key event in this process.

The conference will combine:

- Plenary presentations and discussions by leading scientists in the field
- Extensive working group discussions for direct input into ILEAPS planning
- Poster presentations by meeting participants

Further information can be found at http://www.atm.helsinki.fi/ILEAPS/

After a decade of research, the GCTE and LUCC projects are coming together to develop an integrated research agenda under the new LAND project. The goal is to build on the knowledge generated by these projects in order to elucidate the ecological and social responses to changes and feedbacks in the terrestrial biosphere.

Open Science Conference on

Global Change and the Terrestrial Human-Environment System

1-4 December 2003, Morelia, MEXICO

Conference Goals:

(i) To present the state-of-the art science on a number of research areas dealing with global change and the terrestrial biosphere with an emphasis on integrative projects addressing the coupled biophysical-human system.

(ii) To provide input into the development of the research agenda that will steer the new LAND project. The new project will be launched in early 2004 after feedback from the Conference has been taken into consideration.

(iii) To stimulate the scientific community to develop more integrative research on issues related to biogeochemical cycles, disturbances, and biodiversity under global change, with attention to consequences for the delivery of ecosystem services and vulnerabilities of the human-environment system.

Who should attend?

All scientists with an interest in understanding components or the totality of the terrestrial biosphere as a coupled biophysical-human system.

Further information and Contact: Information on the Conference will be posted at the websites of GCTE (http://www.gcte.org) and LUCC (http://www.geo.ucl.ac.be/LUCC/lucc.html). A second and third announcement with detailed information on the registration procedures, agenda, and venue will follow.

The Global Water System Project (GWSP) is a new activity of the Earth System Science Partnership: IGBP, WCRP, IHDP and DIVERSITAS.

Theme

The central theme of the GWSP is human-induced changes to the global water cycle, the associated biogeochemical cycles and the biological components of the global water system, as well as the social and biophysical feedbacks of these changes.

Focus

The Open Science Conference will focus on scientific planning and co-ordination with other water-related activities. We invite inputs and critical comments to the draft of the Scientific Framework (science and implementation plan) for the GWSP, which will be made available before the Conference.

Global Water System Project

Open Science Conference 8 - 10 October 2003, Portsmouth, New Hampshire, USA

For latest updates contact Holger Hoff, e-mail: hhoff@pik-potsdam.de. or visit the GWSP website.

Earth System Science Partnership

www.gwsp.org

Note to contributors

Articles for “Science Features” should achieve a balance of (i) solid scientific content, and (ii) appeal for the broad global change research and policy communities rather than to a narrow discipline. Articles should be between 800 and 1500 words in length, and be accompanied by one to three key graphics or figures (colour or black and white).

Contributions for “Discussion Forum” should be between 500 and 1000 words in length and address a broad issue in global change science. A “Discussion Forum” article can include up to 2 figures.

Contributions for ‘Integration’ should be between 800-1200 words in length and highlight how IGBP or its core projects are integrating with other areas of Earth System Science. The article can include up to two figures.

“Correspondence” should be no more than 200 words and be in the form of a Letter to the Editor in response to an article in a previous edition of the Newsletter or relating to a specific global change issue. Please include author and contact details.

Required Image Quality for IGBP Publications

Photographic images should be saved in TIFF format. All other images including charts, graphs, illustrations, maps and logos should be saved in EPS format. All pixel images need to be high resolution (at least 300 pixels per inch).

Some charts graphs and illustrations can be reconstructed at the IGBP Secretariat, however, poor quality photographic images, maps and logos cannot be improved. Material “borrowed” from the Internet cannot be used for publication, as it does not fit the requirements listed above.

If you have queries regarding image quality for the Global Change NewsLetter please contact John Bellamy
E-mail: john@igbp.kva.se

Please note: figures of any kind must either be original and unpublished, or (if previously published) the author(s) must have obtained permission to re-use the figure from the original publishers. In the latter case, an appropriate credit must be included in the figure caption when the article is submitted.

Deadlines for 2003:

June issue	Deadline for material: May 5, 2003
September issue	Deadline for material: Aug 4, 2003
December issue	Deadline for material: Nov 3, 2003

Send contributions by email to the Editor, Angelina Sanderson
E-mail: angelina@igbp.kva.se; Phone: +46 8 6739 593;
Reception: +46 8 16 64 48; Fax: +46 8 16 64 05

IGBP’s mission is to deliver scientific knowledge to help human societies develop in harmony with Earth’s environment. The Global Change NewsLetter serves its readers as a forum for up-to-date source of information on IGBP science, programmatic development, people and events. Published quarterly since 1989, the NewsLetter is available free-of-charge from the IGBP Secretariat.

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NEWSLETTER

Edited by Angelina Sanderson

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http://www.igbp.kva.se

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