

Future Earth

MOMENTUM is building for Future Earth, the new international ten-year research programme on global sustainability.

Future Earth received over 100 nominations for its Scientific Committee. About eight of the 16 or so committee members will be chosen from the Scientific Committees of the global-environmental-change (GEC) programmes including IGBP. An interim director will be announced shortly.

The final report from the Transition Team will be published soon. This report includes input from many stakeholders through regional workshops in 2012 and a workshop with core projects from the GECs. Further

dialogues are planned for 2013.

The draft report highlights the crucial role of existing GEC projects to the success of Future Earth. Furthermore, it states national committees will “play a vital role in implementation of Future Earth at the national level”.

The proposed research agenda identifies three themes: dynamic planet, global development and transformation towards sustainability.

Paving the way for the new initiative, the influential Earth System Science Partnership (ESSP) ended in December 2012 (see editorial). ESSP's four projects will continue to be sponsored by the four GEC programmes.

In January, IGBP Chair James Syvitski and Executive

Director Sybil Seitzinger met with other GEC programme chairs and directors to discuss the strategy for engagement with Future Earth.

Future Earth is currently being overseen by the Implementation Management Project Board. IGBP has two representatives on this eight-strong committee: IGBP Officer Jan Willem Erisman and LOICZ Executive Officer Hartwig Kremer.

IGBP's Owen Gaffney and ICSU's Head of Communications Denise Young have been working on a stakeholder analysis and development of the communications and engagement strategy.

A Future Earth website and social media sites will be launched soon.

EVENTS

2013

May

21-24. Water in the Anthropocene conference. Global Water System Project. Bonn, Germany.

June

24-25. Society in the Anthropocene conference. Bristol, United Kingdom.

July

7-12. Radiation and Climate. Gordon Research Conference. New London, NH, USA.

August

23-2. September. 6th SOLAS Summer School. Xiamen, China.

September

9-11. Living Planet Symposium. European Space Agency. Edinburgh, United Kingdom.

23-25. Beijing Symposium on Global Change. Beijing, China.

27. Launch of IPCC AR5 WGI summary for policymakers. Stockholm, Sweden.

28. Public event associated with IPCC launch. Stockholm, Sweden.

26-29. 14th International River Symposium. Brisbane, Australia.

October

15-18. WCRP-ACPC Africa Climate Conference. Arusha, Tanzania.

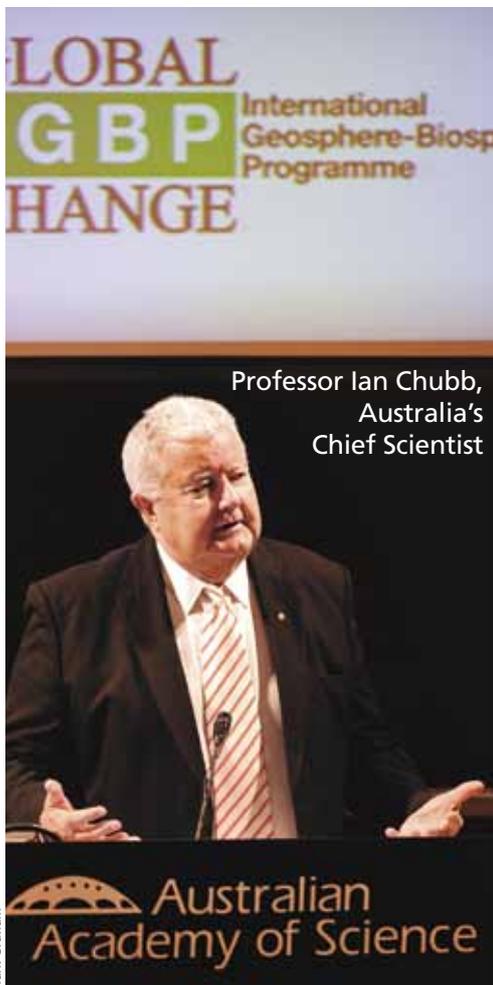
November

4-7. International Conference on Regional Climate - CORDEX 2013. Brussels, Belgium.

18-22. 6th International Nitrogen Conference. Kampala, Uganda.

December

9-13. American Geophysical Union Fall Meeting. San Francisco, CA, USA.



Professor Ian Chubb,
Australia's
Chief Scientist

TICKING TIME BOMBS IN THE EARTH SYSTEM

CANBERRA was the venue for Ticking Time Bombs in the Earth System, an IGBP-sponsored conference in November 2012. The two-day conference focused on four themes: the mismatch between scientific evidence relating to climate and policy responses; polar deglaciation and sea-level rise; multiple stressors on the Great Barrier Reef; and food security.

The event was organised by IGBP's Australian National Committee and hosted at the Australian Academy of Science. It coincided with IGBP's Officers' Meeting. IGBP Chair James Syvitski and Executive Director Sybil Seitzinger both spoke at the symposium, highlighting the work of the IGBP projects.

The event, which attracted Australia's leading scientists as well as policymakers and industry, was the second Australian Earth-system outlook conference. The leadership and support of Australian National Committee Chair Roger Gifford, Tas Van Ommen and Jeanette Mill and colleagues was instrumental in making this event an outstanding success.

The presentations from the symposium can be viewed here: <http://science.org.au/natcoms/nc-ess.html>

NUTRIENT GLUT



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A NEW report from the IGBP-sponsored International Nitrogen Initiative highlights how humans have massively altered the natural flows of nitrogen, phosphorus and other nutrients. These alterations have boosted food production and benefited energy production. But they have also led to water and air pollution that is damaging human health, causing toxic algal blooms, killing fish, threatening sensitive ecosystems and contributing to climate change.

Entitled *Our Nutrient World*, the report was launched at the United Nations Environment Programme (UNEP) Global Ministerial Environment Forum in Nairobi, Kenya, 18-22 February. It presents an assessment by nearly 50 experts from 14 countries that a 20% improvement in nutrient-use efficiency by 2020 would reduce the annual use of nitrogen fertiliser by 20 million tonnes. The researchers describe this goal as "20:20 for 2020".

The researchers' analysis shows how such increased efficiency could provide a net saving ranging from 46 to 400 billion US dollars per year. This figure includes implementation costs and financial benefits from reduced nitrogen use and improvements to the environment and human health. The report stops short of recommending global legislation to control nutrient use, but recognises that this is a global problem, especially given the

global trade in agricultural products. It calls for an intergovernmental framework to address these issues, and proposes a road map of how such an agreement would look.

Lead author of the report, Mark Sutton from the UK's Centre for Ecology & Hydrology, said, "Our analysis shows that by improving the management of the flow of nutrients we can help protect the environment, climate and human health, while addressing food and energy security concerns."

Pollution sources considered in the report include emissions from agriculture and combustion of fossil fuel. Globally, around 80% of harvested nitrogen and phosphorus is consumed by livestock rather than directly by people, underscoring the links between meat consumption, global nutrient supply and pollution.

The report proposes a package of key actions to reduce these pollution threats, which include:

First, improve the management of nutrients in agriculture, including crops, livestock and manure management. Measures include a range of techniques which are already available, but typically not yet applied, including precision agricultural methods suitable for both developed and developing countries. One example already being used in Bangladesh is to "plant" large fertiliser pellets into the ground, preventing ammonia emission into the air.

Second, reduce nutrient losses from industry and wastewater treatment, including the recycling of available resources. A long-term ambition is identified to develop methods to recapture nitrogen oxides from combustion sources, which alone represents a lost resource worth around 39 billion dollars per year.

Third, improve local optimisation of nutrient flows, connecting arable and livestock farming to improve nutrient recycling opportunities.

Fourth, lower personal consumption of animal protein by voluntary reduction and avoiding excess, particularly in populations with diets dominated by meat. With rapidly increasing meat and dairy consumption, as Asia and Latin America aspire to European and North American norms, dietary choices have a huge potential to influence future levels of nutrient pollution.

Co-author Bruna Grizzetti, based at CNRS/Université Pierre et Marie Curie (UPMC) in Paris, France, said, "The option of localising agricultural production is a really important one. Crop and livestock farming are often separated by many hundreds of kilometres. Localisation helps improve nutrient recycling, reducing nutrient losses while bringing the production benefits and pollution responsibilities closer together."

www.initrogen.org

Sustainable development goals for people and planet

INTERNATIONAL goals for sustainable development must take a complex systems approach, argued researchers and analysts in a commentary published in *Nature* in March 2013.

The interdisciplinary group's commentary, *Sustainable Development Goals for People and Planet*, identified six goals that if met would contribute to global sustainability while helping to alleviate poverty. The goals are: lives and livelihoods, sustainable food security, secure sustainable water, universal clean energy, healthy and productive ecosystems, and governance.

The commentary coincided with several key meetings at the United Nations to discuss Sustainable Development Goals to follow on from the Millennium Development Goals due to end in 2015.

The researchers suggest that in the face of increasing pressure on the planet, adherence to traditional definitions of sustainable development threaten to reverse progress made in developing countries over past decades.

"Climate change and other global environmental threats will increasingly become serious barriers to further human development," said lead author Professor David Griggs from Monash University in Australia and former Vice-Chair of the World Climate Research Programme.

The team asserts that the classic model of sustainable development with three integrated pillars – economic, social and environmental – that has served nations and the UN for over a decade does not reflect reality.

"As population increases

EMISSIONS GROWTH "WORRYING"

THE Global Carbon Project's (GCP) annual carbon budget reported that carbon dioxide emissions rose 3% in 2011. Global carbon-dioxide emissions show no sign of moving off the high-emissions trajectory. The gap between reality and the emissions trajectory required to keep global average-temperature increase below 2°C is expanding.

From 2000 to 2011, emissions grew on average 3.1% per year. Adhering to climate targets is now more likely to entail using technologies that remove carbon dioxide from the atmosphere – for example, carbon capture and storage connected to bioenergy.

"We are effectively relying on technologies that are yet to be fully developed and this leads to persistent uncertainties on how much they can contribute to future mitigation," said lead author of the study Glen

Peters of CICERO, a climate research institute in Norway.

The study shows that global carbon-dioxide emissions in 2011 were 54% above 1990 levels. Most of the growth in emissions is from the so-called emerging economies. Chinese emissions grew 10% in 2011, or over 800 million tonnes of carbon dioxide, which is as much as Germany emits in one year. China is emitting almost as much per capita as the European Union, about 36% higher than the global average per capita emissions.

In 1990 developing countries accounted for 35% of global carbon-dioxide emissions, but in 2011 this was 58%.

However, per capita emissions in developed countries continue to remain much higher than those in most developing countries.

"Each year of increased emissions makes a

two-degree target harder to achieve. The only feasible way to keep below two degrees is for global reductions in emissions and this can only happen if the top emitters in the developed and developing world have deep and sustained mitigation," said Peters. "I am worried that the risks of dangerous climate change are too high on our current emissions trajectory," said co-author Corinne Le Quéré, Chair of GCP and Director of the Tyndall Centre for Climate Change Research. "We must reverse the trends in emissions before 2020," she added.

This research is based on the release of an extensive new dataset by the GCP. GCP is co-sponsored by IGBP.

Peters G *et al.* (2013) *Nature Climate Change* 3: 4-6.

Le Quéré C *et al.* (2012) *Earth System Science Data Discussions*, doi: 10.5194/essdd-5-1107-2012.



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towards 9 billion people, sustainable development should be seen as an economy serving society within Earth's life support system, not three pillars," said co-author Dr Priya Shyamsundar from the South Asian Network for Development and Environmental Economics, Nepal, and an IGBP Scientific Committee member.

The Amazon gets a breather

SOME climate models may overestimate the risk of Amazon forest dieback due to carbon-dioxide-induced global warming, according to a study published in *Nature*.

Peter Cox of the University of Exeter and colleagues used a statistical relationship between a suite of climate-model outputs

to estimate the sensitivity of tropical-land carbon loss to climate change. They estimate that tropical land will release 53 ± 17 gigatonnes of carbon per kelvin, which is much lower than the projections of some models (over 150 gigatonnes of carbon per kelvin).

Cox P M *et al.* (2013) *Nature* 341-344, doi:10.1038/nature11882.



Ocean-atmosphere interactions

A RECENT review published in *Environmental Chemistry* highlights emerging issues in ocean-atmosphere exchange and discusses the research strategies that will be deployed to deepen our understanding. The issues include: upwellings and associated oxygen minimum

zones; sea ice; marine aerosols; atmospheric nutrient supply; and ship emissions.

The review was commissioned by the Surface Ocean-Lower Atmosphere Study (SOLAS) project co-sponsored by IGBP. Since its inception in 2004, the project has implemented its science plan to coordinate international research on the biogeochemical

and physical exchanges across the ocean-atmosphere interface. The review – the project's mid-term strategy – responded to a growing realisation that emerging scientific challenges warranted a re-evaluation of the project's aims and research strategies.

Law C S *et al.* (2013) *Environmental Chemistry* 10: 1-16.

BEYOND CITY LIMITS

HUMANITY is on course to build more urban areas during the first 30 years of this century than all of history combined. According to some projections, the total urban area is expected to triple between 2000 and 2030, while urban population is expected to increase to almost 5 billion.

"On this kind of trajectory, an area the size of 15,000 FIFA-accredited football fields will become urban every day during the first three decades of the 21st century," says Karen Seto, an urbanisation expert from Yale University.

Seto is co-author of a recent paper published in the journal *AMBIO*, the result of IGBP's 2011 planetary stewardship workshop.

The paper, *Planetary stewardship in an urbanising world: beyond city limits*, argues for broadening the concept of urban sustainability to account for the global flow of goods and materials into urban areas. Because urban areas drive much of the global changes we see, whether in energy use, food supply, resource depletion or land-use change, looking at the sustainability of individual cities is of limited value.

"Where is the food going to come from? Where is the water going to come from? Where are the minerals, the fibre, the wood?" asked lead author and IGBP Director Sybil Seitzinger in an interview in Reuters AlertNet.

Many cities are now developing strategies to reduce pollution and congestion, improve the quality of life of their citizens and respond to growing concern about human impact on climate and the environment. But such initiatives often ignore the environmental footprint from global flows of goods and services such as food, water and energy to cities: sustainability, it seems, stops at the city limits.

The paper states: "The sustainability of a city can no longer be thought of in isolation from the combined resource use and impacts of cities globally." Instead, the team proposes

that cities analyse how resources consumed within a city are sourced, produced and transported. One solution could be to view sustainable urbanisation from the perspective of a system of cities. A feature of such a system would be an awareness of the global resource use of cities combined. The benefits of a network of this kind could be twofold, contributing to "planetary stewardship" whilst providing long-term resource security for cities.

Assessing the sustainability of a system of cities will require adequate information on resource flows and their impacts, preferably in near real time and on a global scale. "Digital technologies are now putting this kind of information within our grasp," said Seitzinger. But she argues that even this is not enough. Cities could form partnerships with non-urban areas, the farmlands, coastal zones and other regions.

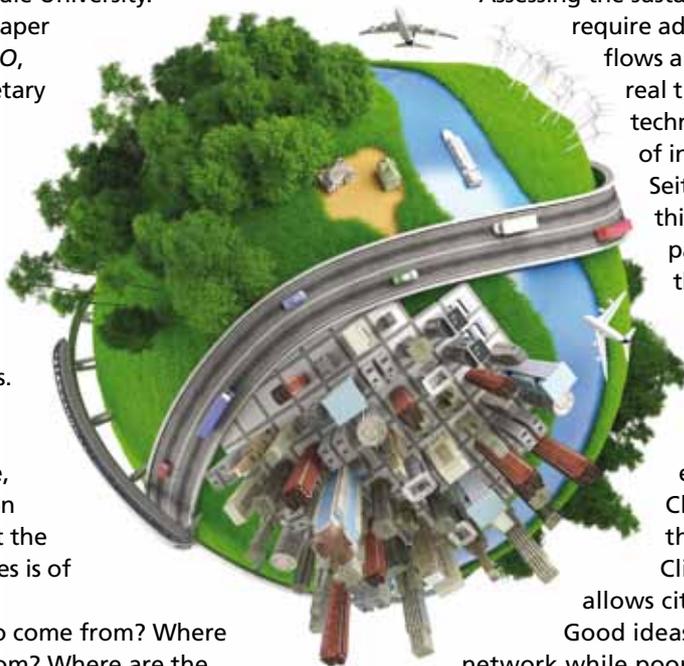
Recently, cities across the globe have joined forces in alliances to curb greenhouse-gas emissions, for example, through the C40 Cities Climate Leadership Group and the World Mayor's Council for Climate Change. This approach allows cities to learn from one another.

Good ideas can spread through the network while poor ideas can be ditched quickly.

However, these efforts may not focus explicitly on non-urban regions that often provide resources to urban areas. The notion discussed in the paper of a partnership between cities and between cities and non-urban regions is novel but untested. This new approach could harness existing partnerships and provide the foundations for a more sustainable approach to urbanisation and urban living this century.

These ideas resulted from a three-day international workshop on planetary stewardship organised by IGBP at the Royal Swedish Academy of Sciences, 13-15 June 2011.

Seitzinger S P *et al.* (2012) *AMBIO* 41(8): 787-794.



Business leaders to set global sustainability targets

THE WORLD Business Council for Sustainable Development (WBCSD), a CEO-led organisation representing nearly 10% of the global economy, is seeking advice from researchers on sustainability targets for businesses.

WBCSD has enlisted help from the Stockholm Resilience Centre (SRC) to turn the council's *Vision 2050* report, published in 2010, into action on the ground with targets set for 2020 – *From Vision 2050 to Action 2020*. SRC Director Johan Rockström, together with Will Steffen and Katherine Richardson, began

this dialogue with WBCSD in late 2012. SRC is coordinating international input from the research community.

"We are applying the 'planetary boundaries' concept as our starting point because it highlights the need to hold multiple global issues in mind simultaneously, recognising that their dynamic interactions also matter for sustainability," says Gail Whiteman, a sustainability and climate change academic at Erasmus University, Rotterdam, and Professor-in-Residence at WBCSD. The concept also helps identify the most urgent priorities, she added.

"We need to set realistic targets for businesses that push them to reduce greenhouse

gases, protect vital ecosystem services, and improve efficiency of nitrogen and phosphorus use," she said.

The organisers stress that the scientific legitimacy and authority of *From Vision 2050 to Action 2020* is crucial. Expert opinion is being sought. Covering a broad range of scientific issues in global sustainability, WBCSD plans to have a draft ready for circulation in March, and scientific input open until September 2013.

IGBP secretariat staff have attended two of the initial meetings with WBCSD in Stockholm.

Karen Smyth, IGBP's Deputy Director of Social Sciences, said, "This is a positive step

from the business community and it is encouraging to see that WBCSD wishes to address social, as well as biophysical conditions. We want to encourage our community to engage in the debate and help develop robust targets for business."

The WBCSD includes some of the world's largest companies including Unilever, Nestlé, Toyota, Sony, Dow Chemicals, General Electric, Chevron, Procter & Gamble and Coca-Cola.

For more information, contact Sarah Cornell at SRC (sarah.cornell@stockholmresilience.su.se) or Gail Whiteman, Professor-in-Residence at WBCSD (whiteman@wbcSD.org)

MILANKOVITCH THEORY ON FIRM GROUND

Dan Costa

A RECENT modelling study published in *Nature* confirms that climate change in the Southern Hemisphere (SH) during the last deglaciation was triggered by warming in the Northern Hemisphere (NH). It thus provides strong support for the Milankovitch theory, which posits that orbitally induced summer-insolation changes in the NH drive climate change in the SH.

Palaeoclimate data show that warming in the SH, during the last deglaciation beginning 22,000 years ago, was synchronous with or slightly preceded that in the NH. This observation has

been difficult to reconcile with the Milankovitch theory, suggesting that either (a) the NH signal was transmitted to the SH or (b) summer insolation changes in the SH more or less matched those in the NH (or were amplified by sea-ice effects). Analysis of the data themselves cannot confirm one or the other possibility.

To overcome this limitation, Feng He of the University of Wisconsin-Madison and colleagues turned to a coupled atmosphere-ocean general circulation model. They ran simulations to evaluate the effect of four different forcings on

temperatures in the two hemispheres: orbital changes, atmospheric carbon-dioxide concentration, ice sheets and the Atlantic meridional overturning circulation (AMOC). They also compared model results with temperature estimated from palaeoclimate data for the SH.

The researchers found that orbital forcing by itself is sufficient to explain significant NH warming at the onset of deglaciation; the SH in contrast shows little warming. The resultant retreat of NH ice sheets probably led to a significant decline in the AMOC beginning around

19,000 years ago. Indeed, the simulation forced solely by changes in this variable captures much of the temperature change in the SH.

Greenhouse-gas concentrations respond to Southern Ocean processes and Antarctic temperature. The simulations in this study support the argument that the increase in carbon-dioxide concentrations beginning 17,000 or so years ago – and the resultant greenhouse warming – were responsible for global deglaciation.

Feng H *et al.* (2013) *Nature* 494: 81-85, doi: 10.1038/nature11822.

BLACK CARBON: GLOBAL ASSESSMENT

IN JANUARY, Beijing made headlines worldwide when air pollution reached unbearable levels. Burning more coal to combat freezing temperatures is a likely cause of the pollution. A temperature inversion and other weather conditions caused the soot – or black carbon – to hang around the city.

Coincidentally, on 15 January IGBP's International Global Atmospheric Composition (IGAC) project published a landmark study on the effects of black carbon on climate in the *Journal of Geophysical Research: Atmospheres*. The report – the first comprehensive analysis of this issue – also generated headlines worldwide, appearing on the *BBC*, and in *The Economist*, *The New York Times*, *The Times of India*, *Reuters* and *The China Post*. Indeed, the report led to over 100 news stories in the world's leading media, many connecting it to city pollution.

The 232-page open-access report backs recent research proposing that black carbon is the second largest human contributor to global warming and its influence on climate has been greatly underestimated.

It says the direct influence of black carbon on warming the climate could be about twice previous estimates. Accounting for all of the ways it can affect climate, black carbon is believed to have a warming effect of about 1.1 Watts per square metre (W/m^2), approximately two thirds of the effect of carbon dioxide – the largest human contributor to global warming.

Co-lead author David Fahey from the US National Oceanic and Atmospheric Administration (NOAA) said, "This study confirms and goes beyond other research that suggested black carbon has a strong warming effect on climate, just ahead of methane."

The study, a four-year effort, is likely

to guide research efforts, climate modelling and policy for years to come.

The report's best estimate of direct climate influence by black carbon is about a factor of two higher than most previous work. This includes the estimates in the last Intergovernmental Panel on Climate Change (IPCC) assessment released in 2007, which were based on the best available evidence and analysis at that time.

The results indicate that there may be a greater potential to curb warming by reducing black-carbon emissions than previously thought.

"There are exciting opportunities to cool climate by reducing soot emissions but it is not straightforward. Reducing emissions from diesel engines and domestic wood and coal fires is a no brainer, as there are tandem health and climate benefits. If we did everything we could to reduce these emissions we could buy ourselves up to half-a-degree less warming – or a couple of decades of respite," says co-author Professor Piers Forster from the University of Leeds' School of Earth and Environment.

The international team urges caution because the role of black carbon in climate change is complex. "Black carbon influences climate in many ways, both directly and indirectly, and all of these effects must be considered jointly," says co-lead author Sarah Doherty of the University of Washington, an expert in snow measurements. The dark particles absorb incoming and scattered heat from the sun (solar radiation); they can promote the formation of clouds that can have either a cooling or warming effect. And black carbon can fall on the surface of snow and ice, promoting warming and increasing melting. In addition, many sources of black carbon also emit other particles that have a cooling effect and

thus serve to counteract the warming caused by black carbon.

The research team quantified all the complexities of black carbon and the impacts of co-emitted pollutants for different sources, taking into account uncertainties in measurements and calculations. The study suggests mitigation of black-carbon emissions must consider all emissions from each source and their complex influences on climate. Based on the analysis, reductions in black carbon targeting diesel engines followed by some types of small household stoves that burn wood and coal would have an immediate cooling impact.

In addition, the report finds that black carbon is a significant cause of the rapid warming in the Northern Hemisphere at mid to high latitudes, including the northern United States, Canada, northern Europe and northern Asia. This demonstrates that curbing black-carbon emissions could address regional climate change while having a positive impact on human health.

"Policymakers, like the Climate and Clean Air Coalition, are talking about ways to slow global warming by reducing black-carbon emissions. This study shows that this is a viable option for some black-carbon sources and, since black carbon is short lived, the impacts would be noticed immediately. Mitigating black carbon is good for curbing short-term climate change, but to really solve the long-term climate problem, carbon dioxide emissions must also be reduced," says co-lead author Tami Bond from the University of Illinois at Urbana-Champaign.

Bond T *et al.* (2013) *Journal of Geophysical Research: Atmospheres*, doi:10.1002/jgrd.50171. <http://onlinelibrary.wiley.com/doi/10.1002/jgrd.50171/abstract>



Book Review

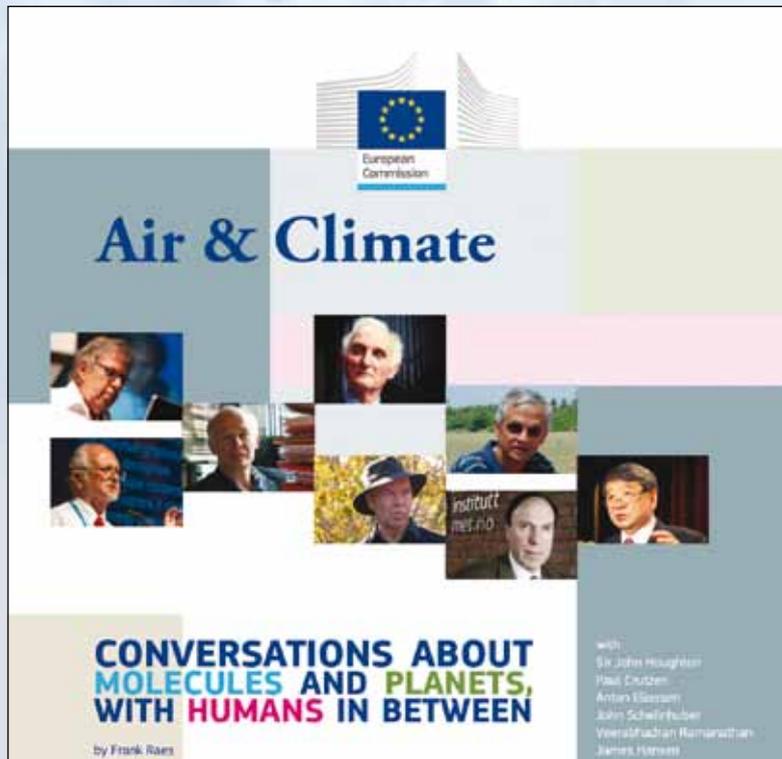
BLUE SKIES: A HOMAGE TO FUNDAMENTAL RESEARCH

FROM the ozone hole to acid rain, in the last 40 years the sky really was the limit for major scientific breakthroughs in atmospheric research. A small handful of scientists played pivotal roles in many of the major discoveries. Now their stories have come together in one volume written by Frank Raes.

Raes' book, *Air & Climate: Conversations about molecules and planets, with humans in between*, captures a series of interviews with some of the world's most influential atmospheric researchers. Between 2009 and 2011, in quiet moments snatched between talks at science conferences and en route to airports, Raes recorded candid conversations with Paul Crutzen, James Hansen, Mario Molina, Sir John Houghton, John Schellnhuber, Veerabhadran Ramanathan, Anton Eliassen and C S Kiang.

Each academic tells his own remarkable story, from early upbringing to major discoveries, Nobel prizes and life in the policy and media spotlights.

These are the people who linked CFCs to stratospheric ozone destruction, who grasped the full implications of climate change, identified greenhouse gases beyond carbon dioxide and tracked long-range pollutants. From



their work emerged the new discipline of Earth-system science. Paul Crutzen and John Schellnhuber were members of IGBP's Scientific Committee and had a profound influence on its direction.

Raes explained, "At a certain moment I realised I was in contact with all these people and that they inspired me. Inspired, not about how to tackle specific issues in our research, but more about how to be a responsible scientist, standing with both feet within society. I wanted to share that inspiration."

Some common threads emerge from the book, published by the Joint Research Centre (JRC) of the European Commission where Raes is Head of the Climate Risk Management Unit. For example, Swedish

academic Bert Bolin appears several times. Bolin, who died in 2007, was a major figure in international research and is often credited with spearheading the Intergovernmental Panel on Climate Change (IPCC), the World Climate Research Programme and IGBP.

Another common theme was the difficulty breaking through the barrier between science and society, though the rewards for some were substantial. Sir John Houghton, Chair of IPCC Working Group One (1988-2002), described it as one of the greatest experiences of his life. But all interviewees faced frustration at the difficulties convincing the world to sit up and listen. How do you explain that "invisible gases are attacking an invisible layer

high up in the atmosphere that shields us from invisible rays," opined Mario Molina.

Raes' book gives a brief glimpse into the creative minds of the greatest scientists; people who can persist with problems long after everyone else has packed up and gone home. Paul Crutzen remarked that you need "total concentration on the subject. You wake up and go to bed thinking about it. Early morning hours can be especially productive."

Few of the researchers had any inkling their research would be particularly relevant to society at the beginning of their journey. But once they realised, they felt there was no other way than reaching out until their findings became common knowledge. This wonderful book shows time and time again the unexpected value – to our entire civilisation – of basic research in environmental sciences. As the global – change programmes morph into Future Earth – a programme focusing on solutions – this message comes at an important time.

The book can be downloaded from the JRC website (Google the title and author). Hard copies are freely available while stocks last. Email JRC-H07-SEC@ec.europa.eu.

OWEN GAFFNEY

New deputy director appointed



DR KAREN SMYTH has joined IGBP as Deputy Director of Social Sciences. Smyth is a social scientist who joined IGBP in 2011 to help coordinate Planet Under Pressure. Previously, Smyth led the Rural Society Research team within the Land Economy and

Environment research group at Scotland's Rural University College (www.sruc.ac.uk/). As a senior lobbyist, she was also heavily involved in environmental and agricultural policy development in the UK and Europe. She will promote stronger ties between the traditional IGBP community and the social-science community as we move into Future Earth.

IPCC report to be launched in Stockholm

ON 27 SEPTEMBER 2013, all eyes will be on Stockholm when the Intergovernmental Panel on Climate Change (IPCC) releases the first part

of its Fifth Assessment Report. IGBP is working with IPCC on a series of public and policy briefings in the city.

The Working Group One report, chaired by Thomas Stocker (former Chair of IGBP's Past Global Changes project) and former IGBP Scientific Committee member Qin Dahe, assesses the "physical scientific aspects of the climate system and climate change".

IPCC was created in 1988 by a team of scientists led by Swedish atmospheric physicist Bert Bolin. Bolin had set up IGBP, which has its secretariat in Stockholm, the previous year.

Since the previous IPCC report released in 2007 and

its recognition by the Nobel Committee, the organisation has come under fire from climate sceptics and a section of the media intent on challenging the credibility of the panel. In response, the IPCC has reviewed procedures to reduce errors and appointed a new head of communications, former Reuters correspondent Jonathan Lynn, to improve interactions with the media.

Earth System Science Partnership dissolves

FOR A DECADE, the Earth System Science Partnership (ESSP) has brought together the four global environmental change programmes, IGBP, DIVERSITAS, the International Human Dimensions Programme on Global Environmental Change and the World Climate Research Programme. As part of the transition to Future Earth, ESSP formally dissolved on 31 December 2012.

For many years ESSP has been led by leaders in the field of Earth-system science. Rik Leemans, Martin Rice and Ada Ignaciuk created a strong partnership and oversaw the development of some of the most influential interdisciplinary research projects in recent years, including the Global Carbon Project, which produces the influential global carbon budget, and the Global Water System Project. All existing projects will continue in the interim and will be sponsored directly by the global-change programmes, including IGBP. The programmes will also continue their close collaboration.

Rik Leemans and Martin Rice continue to play active roles in the formation of Future Earth.

STRESSED OCEANS IN THE SPOTLIGHT

OCEAN acidification is already affecting oyster hatcheries on the US West Coast, according to findings reported at an international symposium late last year.

Convened by IGBP, the Scientific Committee on Oceanic Research and the UN's Intergovernmental Oceanographic Commission, the Third Symposium on the Ocean in a High-CO₂ World attracted 540 researchers from 37 countries. The event was chaired by Ulf Riebesell from German research institute GEOMAR.

The symposium held a policy day led by Prince Albert of Monaco and former NOAA chief Jane Lubchenco, with participants from the US Congress, the shellfish industry, NGOs and the media. Over 30 journalists attended the symposium, leading to high-profile coverage in *Science*, *Nature*, *Scientific American*, *The Washington Post* and many

more media. Marine scientist Joanie Kleypas from the Center for Global Dynamics in Colorado summarised the findings from the previous three days.

Delegates discussed the state of the oceans and the rate of change of ocean chemistry. Three key stressors on oceanic ecosystems were highlighted: ocean acidification, rising temperatures and de-oxygenation. Scientists report that while some organisms will struggle as ocean chemistry changes, there is evidence that others may adapt and thrive in these new conditions. Predicting how whole ecosystems will change in response to rising levels of CO₂ will be challenging, but we know that change is inevitable.

"A main theme coming through strongly was the multiple stressors

on the oceans. This may be the focus of the next symposium," said IGBP Deputy Director Wendy Broadgate. Also discussed was the impact on aquaculture.

The economics of ocean acidification was higher on the agenda than previous symposia. Indeed, social scientists more generally were out in force, indicating this is a fertile area of research. But estimation of the economic and social costs of ocean acidification is in its infancy and prone to large uncertainties.

Following the symposium, Broadgate is coordinating a new ocean acidification summary for policymakers based on the outcomes of the event. The event was used to launch a new data visualisation on ocean acidification produced by Google, IGBP and the International Union for Conservation of Nature.