



The Hazards Forum Newsletter

Issue No. 55
Autumn 2006

NEWSLETTER Issue no 55

Autumn 2006

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Edited by Dr Ian Lawrenson OBE Views expressed are those of the authors, not necessarily of the Hazards Forum

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Holidays at Risk

It has been predicted that by 2030 global average temperatures might have risen by 1°C and perhaps by 2°C, compared with the total rise over the 20th century, which was just 0.6°C. Climate change on this scale will have a range of serious and wide-ranging impacts on holiday destinations, both summer and winter.

A recent report^{*} by the Benfield Hazard Research Centre, at University College London, examines global climate over the millennia and the evidence that the world is warming up rapidly. Just how quick this warming will be during the course of the 21st century remains highly uncertain, partly because the earth's climate is extraordinarily complex and hard to model, even with present day super computers. Our planet's climate is driven ultimately by solar activity but also involves highly convoluted interactions between the atmosphere, the oceans, the land surface, and life. Before the industrial revolution the climate can reasonably be regarded as an almost entirely natural system. Since the late 17th century, however, the influence of human activities on the composition of the atmosphere and the utilisation of the land has meant that the climate system and its behaviour has become intimately linked to the growth and development of our industry- and commerce-based society.

The climate is naturally variable at all time scales, as demonstrated by significant changes in temperature and atmospheric composition throughout the Earth's history. Fifty million years ago, the concentration of carbon dioxide was probably over 1000ppm compared to pre-industrial levels of around 279ppm and today's level of 381ppm. These very high concentrations resulted in a much warmer world, with little ice locked up at the poles and sea level around 50m higher than it is today. Following this peak, carbon dioxide levels and temperatures fell progressively until around 30 - 40 million years ago a major icecap began to develop in Antarctica. Three to four million years ago, the

concentration of atmospheric carbon dioxide fell to levels below those of pre-industrial times, triggering the development of great ice sheets in the northern hemisphere. Over this period ice sheets spread towards the equator on many occasions, including four times during the past 680,000 years, covering much of Europe, North America and Asia in ice up to 3km thick. Each glacial episode was characterised by very low carbon dioxide levels and sea-levels up to 130m lower than they are today. During the intervening interglacials, carbon dioxide concentrations in the atmosphere rose along with sea levels, as the ice sheets retreated towards the poles.

The last glacial period ended around 11,500 years ago, and we are now in an interglacial known as the Holocene. Normally, we could expect the ice to make a return within around 15,000 years, although the effect of global warming due to human activities on the timing of this return is not known. While the transitions from interglacial to glacial period occur slowly, there is evidence for very rapid changes in climate that occurred in just a few decades. The best example is the Younger Dryas, a short, sharp period of cold Dryas which lasted from about 12,900 to 11,500 years ago and was characterised by a dramatic fall in temperatures within just a decade or so. Temperatures in Greenland fell 15°C, the Younger Dryas ended, with temperature rises as great as 7°C in perhaps just a few years, launching the beginning of the current Holocene interglacial.

Both the timing of ice ages and the patterns of glacial advance and retreat remain controversial, although it is broadly agreed that the major controls are a combination of changing concentrations of greenhouse-gases (primarily carbon dioxide and methane) in the atmosphere, variations in the Earth's orbit about the sun, and changes in the disposition of the continents. Smaller-scale natural variations in our planet's climate also occur, and are due to different factors, including small changes in the

output of the sun and volcanic activity. Two examples over the last 2,000 years include the Medieval Warm Period (MWP).

Since the end of the Little Ice Age, global temperatures have climbed inexorably. Over the 20th century, global temperatures rose by 0.6° C, with a sharp acceleration starting in the 1990s. Eighteen of the hottest 20 years on record have occurred since 1980, with the ten hottest years in the last twelve. Even if greenhouse gas concentrations could be frozen at today's values (381ppm), it is highly likely that temperatures would continue to rise by another 0.6°C before stabilising at a new level.

On the basis of current predictions, it would be reasonable to assume that by 2030 global average temperatures are likely to be around 1°C higher than they are now, with the rise higher in some places than in others. In addition to temperatures, sea levels are also on the rise, and climbed around 20cm during the 20th century. Currently sea levels are creeping upwards at about 3mm a year, and a continuation of this trend would see levels 72mm higher by 2030, although rapidly accelerating melting of the ice sheets could lead to a level three times this. It should be noted that a sea-level rise of 1mm equates on average to a 1.5m loss of shoreline.

What effect would climate change on the scale indicated have on primary holiday destinations world-wide? They could be serious and wide-ranging, in both summer and winter.

At present Europe is the world's principal tourist region. European summer destinations would suffer as a consequence of hotter days and nights, with associated longer dry spells, drought, spread of deserts and wildfires, but also with flash flooding. It

is increasingly difficult to be comfortable as temperatures increase above about 31°C, so alternative holiday destinations may emerge. Higher temperatures may lead to increased incidence of skin cancers (some have predicted a three-fold increase) and the possible re-emergence in Europe of vector-borne diseases, such as malaria and dengue fever. In addition, of course, rising sea levels will lead to increased erosion of beaches and loss of low-lying coastal land and wildlife habitats and infrastructure. In North Africa, Morocco and Tunisia will face similar rises, and there would be further encroachment of the Sahara Desert.

In Florida, and in the islands of the Caribbean, much of which is low-lying, beaches will be lost to rising seas, and more powerful and more frequent hurricanes will threaten land and property. Here and elsewhere in the world coral reefs and other coastal ecosystems will be destroyed by higher sea temperatures and storms. The Great Barrier Reef, a major tourist attraction in Australia, would be severely damaged or even disappear, while destinations such as the Maldives or the Seychelles would be threatened by rising sea levels and potentially erratic monsoons.

Winter sports destinations will suffer too. As snowlines rise by up to 300m, snow cover is reduced and the seasons get shorter. Resorts below 1,500m are most likely to suffer, particularly those in southern Europe.

On a more optimistic note, the World Tourist Organisation sees a healthy growth rate for world tourism. The WTO predicts that global international arrivals will rise by over 4% a year to 2020, despite other factors in addition to climate change which the tourist industry must address; these include at present global terrorism, high oil prices, and increasing pressure for green levies on aviation fuel and air passengers.

*'Holiday 2030', may be downloaded from the Benfield Hazard Research Centre website, at http://www.benfieldhrc.org/activities/misc_papers/Holiday.2030.pdf

New Chief Executives of the IMechE and the IET

Both the Institution of Mechanical Engineers and the Institution of Engineering and Technology have announced the appointment of new Chief Executives, to take up post in the New Year.

Ruth Spellman has been appointed to the Institution of Mechanical Engineers, taking over from Sir Michael Moore, KBE, LVE, who retires in the New Year. She has been Chief Executive of Investors in People UK; before that she was Human Resources Director for the NSPCC, following periods at Coopers & Lybrand, the National Economic Development Office, and the National Coal Board.

The Institution of Engineering and Technology has appointed Robin McGill as their new Chief Executive, taking over from Dr Alf Roberts. Mr McGill is at present the Managing Director, BP Grangemouth, with a successful international business career mainly with BP. He is a member of the Institution of Mechanical Engineers.

We wish them both success in their new posts.

NASA Earth Observatory

Earth scientists around the world use NASA satellite imagery to study the causes and effects of natural hazards. The goal in sharing these images is to help people visualize where and when natural hazards occur, and to help mitigate their effects. These images are freely available to the public for re-use or re-publication.

By taking out a subscription (free of charge) to 'Natural Hazards' you can receive, once a week or daily, a short notice by email from the Earth Observatory: Natural Hazards telling you about the latest events and letting you view the images on the site.

A subscription may be made by accessing <http://earthobservatory.nasa.gov/NaturalHazards/>

Report of Executive Committee Meeting, 21st September 2006

1. **Customer Satisfaction Survey.** The Executive Committee discussed the benefits of holding a customer satisfaction survey. The Secretary was charged with drafting a survey letter, which would eventually be sent to members and regular event attendees, for discussion at the next Executive Meeting in December.

2. **Membership/Sponsors.** Membership had remained pretty static over the past year and sponsors for events were difficult to find. As a result the Hazards Forum had contributed more to the costs of events than had been budgeted for. Suggestions for possible sponsors and new members were made and if readers are aware of any individuals or Companies who they feel would benefit from joining the Hazards Forum or sponsoring one of the events please contact the Secretariat, details on our website www.hazardsforum.co.uk.

3. **Trustee Vacancies.** The Executive Committee were reminded that two trustees complete their term of office at the next AGM. Suggestions for names to approach to fill these vacancies were sought. (Secretaries note: Several ideas were mooted but Members are also asked to consider possible nominations. Nominations must be with the Executive Committee not less than one month before the date of the AGM, which takes place on 13 March 2007, and should include a short note of the reasons for the nomination.)

4. **Learning from Accidents Brainstorming Meeting, Follow up Working Party.** The working party are due to meet on the 19th October 2006.

5. **Evening Meetings.** The Executive looked forward to the 'Risk Management of Critical Computer Based Systems' event which was due to take place at the Institution of Engineering & Technology later that day. A report of the meeting is included elsewhere in this Newsletter. Final preparations were then made for this year's third event, 'Design and Risk', to be held jointly with the Design and Industries Association at the Design Council, will take place on 21st November when presentations will be given by Dr Brian Thompson, Mark Phillips and Ian Liddell under the Chairmanship of Paul Traub. Again greater detail is included elsewhere in the Newsletter. The meeting next year that will follow our AGM on 13th March 2007 will be 'Off-site Risks from Major Hazard Sites', the venue to be decided. The Executive were pleased to note that in 2008 a joint meeting with the Geological Society and the Society of Radiological Protection is now likely to go ahead as part of the Geological Society's centenary celebrations.

6. **Inter-Institutional Health and Safety Working Group.** The Committee was told that Dr Dick Taylor would give a presentation of the E-learning demonstration CD before the next meeting on 7 December. This was being produced to advertise the concept and scope in the hope that sufficient funds would be forthcoming to further develop the material.

J F Lee

Report of the Meeting 'Risk Management of Critical Computer-Based Systems'

21st September 2006

The second event of 2006, postponed from its original June date because of the threatened Rail Signallers Strike, finally took place at the Institution of Engineering & Technology, Savoy Place, London on 21st September.

We were delighted that Dr Phil Bennett, past Chairman and now a Distinguished Member of the Hazards Forum, was able to chair the meeting and our thanks to the British Computer Society for co-sponsoring it. We also thank the Institution of Engineering & Technology who provided the venue and excellent refreshments which followed the event.

Although the attendance was a little disappointing, 32 guests heard excellent informative presentations by Ron Bell OBE, late of HSE and now an independent consultant; Tim Rowe (a late stand in for Ron Pierce who had been called away on business) who is a consultant to CSE International Ltd; and Professor John McDermid FREng from the Department of Computer Science at the University of York.

Ron Bell spoke of his experience in the drafting and use of IEC 61508, the lifecycle standard for computer-based systems. He

described how he was an advocate of Functional Safety and used Buncefield as a perfect example. He went on to explain three layers of protection for any system and reminded guests that a programmable electronic system included sensors, actuators and everything in between. Tim Rowe, who performed extremely well even though he had been called upon at the last minute, centred his talk on his experience in the Air Traffic Control Industry and the International Civil Aviation Organisation. Finally John McDermid approached his subject based on the Defence Standards 00-54,5,6 and 8 rather than IEC61508.

A fascinating discussion then took place when the relative merits of the two types of standard were debated. It was also suggested that the legal framework had not kept pace with developments in this area. As with all our events a full report will be produced and sent to all those who attended the event and a copy will be posted on our web site www.hazardsforum.co.uk. For the first time at a Hazards Forum event the presentations were recorded by the IET and they will be capable of being seen and heard by visiting the IET web site www.theiet.org and clicking on IET.tv.

J F Lee

Hazard and Risk Science Review 2006

The latest edition of the Hazard & Risk Science Review, sponsored by the reinsurers, Benfield and PartnerRe has been issued by the Benfield UCL Hazard Research Centre.

This Review is a unique digest of the latest academic and technical research into natural hazards. Since the launch of the first edition in 2004, the Review has become established as an important reference point for the latest summarized research in this field.

With claims to property insurers from natural disasters totalling USD78billion in 2005 - USD65 billion of which were triggered by hurricanes Katrina, Rita and Wilma in the United States - there remains a need for the insurance industry to be kept fully informed of the latest research into emerging risk science in order to develop appropriate insurance and reinsurance solutions.

The 2006 Review, provides a synopsis of some 78 scientific papers published during the period between July 2005 and July 2006,

with full references to the original papers. It is focused on the four major areas of hazards that are relevant to catastrophe insurance and reinsurance - atmospheric, geological, hydrological and climate change - and includes a wide range of examples in each.

Every year brings a reminder of the growing impact of natural hazards on both developed and developing countries. Last year there occurred the Kashmir earthquake and Hurricane Katrina, among other catastrophes, and the period included the most active Atlantic hurricane season on record. The Review aims to improve awareness of the latest research and ideas, to help to improve the forecasting of such disasters and to mitigate and manage their consequences more effectively.

The Review may be read or downloaded as a pdf file (38 pages) from the Benfield UCL Hazard Research Centre website, http://www.benfieldhrc.org/activities/hrsr/h&rsr_2006/index.htm

'Science in Parliament'

As a member of the Parliamentary and Scientific Committee the Hazards Forum receives a copy of the Committee's journal 'Science in Parliament', which is published quarterly. As it is not feasible to circulate our copy of the journal widely, the contents of each issue are shown in the Hazards Forum Newsletter. Any member who wishes to see any of the articles should contact the Editor at ilawrenson@theiet.org

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Calendar of Events

Date	Event	Venue	Contact/further information
2006			
NOVEMBER			
21	“Design and Risk: Design Decision Making under Uncertainty during the early stages of Design” ; a meeting by the DIA, the Design Council and the Hazards Forum	Design Council 34 Bow Street London WC2E 7DL	Simon Whalley T: 0207665 2230 e: hazardsforum @ice.org.uk www.hazardsforum.co.uk
DECEMBER			
6	‘Disseminating the lessons learnt from recent onshore and offshore Incidents’ meeting organised by the IChemE	London School of Economics London	Dave Fergie T: 01932 767293 e: fargieda@bp.com www.icheme.org/pdfs/Disseminating61206.pdf
2007			
MARCH			
5,13,19	‘Total Health and Safety Legislation’ course by Safety Solutions Ltd, sponsored by the IET	Rugby (5 March), Croydon (13/March), Cardiff (19 March)	T: 01322 303399 F: 01322 303197
13	Hazards Forum Annual General Meeting	TBA	Simon Whalley T: 0207665 2230 e: hazardsforum @ice.org.uk www.hazardsforum.co.uk
13	‘Off-site Risks from Major Hazard Sites’, meeting organised by the Hazards Forum	IChemE Portland Place London	Simon Whalley T: 0207665 2230 e: hazardsforum @ice.org.uk www.hazardsforum.co.uk
22-23	6 th International Conference on Quality, Reliability and Maintenance	Oxford	QRM Ltd T: 01792 885089 F: 01792 885089 e: rod@qrmconference.co.uk
JUNE			
19	‘Learning from Accidents – just Culture’, meeting organised by the Hazards Forum (further information in the Winter 2007 Newsletter)	TBA	Simon Whalley T: 0207665 2230 e: hazardsforum @ice.org.uk www.hazardsforum.co.uk
SEPTEMBER			
	‘Managing the Risks re London 2012 Olympics’ (further information in the Winter 2007 Newsletter)	TBA	Simon Whalley T: 0207665 2230 e: hazardsforum @ice.org.uk www.hazardsforum.co.uk

Membership of the Hazards Forum 2006

Distinguished Members

Professor P A Bennett, FREng
Professor Sir Bernard Crossland, CBE FRS FREng
Dr S N Mustow, CBE FREng

Dr A C Patterson, CBE FREng
Professor P O Wolf, FREng
Professor Sir Frederick Warner, FRS FREng

Institutional, Corporate and Individual Members include:

British Computer Society
British Hydrological Society
British Psychological Society
City University
Cranfield University
Ergonomics Society
Eurogears Ltd
Geological Society
Institute of Measurement and Control
Institution of Chemical Engineers
Institution of Civil Engineers
Institution of Engineering and Technology
Institution of Mechanical Engineers
Institution of Materials, Minerals and Mining

Institution of Occupational Safety and Health
Institution of Structural Engineers
Lancaster University
Met Office
National Health and Safety Groups Council
Risk Management Solutions Ltd
Risk Support Ltd
Royal Academy of Engineering
Royal Society of Chemistry
Safety and Reliability Society
Society of Industrial Emergency Service Officers
University of Nottingham
University of York

BP plc
Corus Group
CSE International Ltd
Du Pont de Nemours (Luxembourg) sárl
DSTL
Health and Safety Executive

Lloyd's Register
NEBOSH
Rail and Safety Standards Board
Shell UK Ltd
United Utilities

Mr Ade Adeyemo
Dr John Bond
Mrs Patricia Bond
Mr Iain Carter
Mr Nigel Cheetham
Mr Frank Crawley
Mr Graham Dalzell
Dr Chris Elliott
Mr David Eves CB
Mr Robert Foster
Mr Robert Gilchrist

Mr Frank Groszmann
Mr Peter Livock
Dr J McQuaid CB
Mr Brian Neale
Mr Mark Paradies
Mr Fred Pell
Mr Michael Selfe
Mr Gordon Senior CBE
Mr Ed Spence
Mr Brian G J Thompson
Mr Simon Turner