EDITOR'S REPORT

The July newsletter contains several items of report and information that should be of interest to EPG members. Please note that the EPG has its own web page at http://www.iop.org/IOP/Groups/EP/ which is regularly updated by Lucy Parkin.

Forthcoming meetings

The next meeting of the Group will be on Monday 4 November at the Institute of Physics on Physics of the Built Environment, organised by Alexandra Wilson.

The Group will also be participating in next year Physics Congress at Heriot-Watt University, Edinburgh (23-27 March 2003) by organising a meeting on Waste Management.

The newsletter also contains notices of a meeting on the London environment in September and of the 4th International Conference on Urban Air Quality in Prague in March 2003 (which overlaps Physics Congress).

Other news

This issue contains the minutes and reports of the 11th AGM of the Group, a review of a new book on Environmental Physics, and news of work of the Science Council.

Derek Rose

11th Annual General Meeting of the Environmental Physics Group

The Minutes of the 11th AGM of the Environmental Physics Group held at the Institute of Physics on Wednesday 22nd May 2002 follow:

Welcome & Reports

The members present were welcomed to the AGM by the Chair of the Group, Edward Youngs. The Chair and Honorary Secretary proceeded to give their annual reports to the meeting. These are printed following the minutes of the meeting.

Elections

The following were elected unanimously to serve as Officers of the Group committee, for a term of three years.

Chair: Professor Edward Youngs (intends to serve for one further year only)
Vice-Chair: Dr. Alastair McCartney
Honorary Secretary: Mrs Alexandra Wilson

The following were elected unanimously to serve as Ordinary members of the Group committee, for a term of four years.

Dr Giles Harrison
Dr Tony Heathershaw
Dr Peter Hodgson
Dr. Rob Kimbereley
Dr Andrew Rowley

Meeting closed.
Chairman’s Report

The Environmental Physics Group continues to have over five hundred members and the Committee has endeavoured to organise events to cater for the wide range of their interests. We have held two well-attended evening lectures and one successful half-day meeting during this last year. Professor Dennis Anderson, the Head of the Imperial College Centre for Energy Policy and Technology, gave a lecture on renewable energy after the AGM on 16 May 2001, and on 9 January Professor James Milford from the Physics Department of the University of Zimbabwe gave a talk on the measurements he made during the African solar eclipse on 21 June 2000. Our half-day meeting was on “Environment and Sustainable Agriculture” on 31 October 2001 with four lectures that stimulated a very lively discussion. The evening lectures were held jointly with the London and South East Branch of the Institute of Physics. The half-day meeting was a joint meeting with the Royal Society of Chemistry.

Future events start tonight with a lecture on Volcanic Dynamics by Professor Steven Sparks of the Department of Earth Sciences at Bristol University, again to be held jointly with the London and South East Branch. On 19 June there will be a full-day meeting on “The Transport of Aerosols”, organized jointly with the Aerosol Society and the British Aerosciences Federation, and on 4 November there will be a half-day meeting on the Built Environment. We are planning also to participate in next years Physics Congress at Edinburgh with a meeting on waste disposal and possibly in a conference on energy with the Combustion Physics Group and the Energy Management Group.

Peter Hughes continues as Chairman of the Education Committee. In the past, this Committee has been concerned with introducing environmental physics as a sixth-form subject in schools and this has resulted in the production of a textbook that is selling well. It is now focusing its attention on new initiatives concerned with better links with the Institute of Physics Education Group, with the development of materials for teachers at the primary school level, and with organising a second Environmental Physics Summer School.

During the year, three Newsletters have been produced. Derek Rose, the Editor, is always pleased to receive items of interest for publication. Lucy Parkin is our Web Editor and Alexandra Wilson is in charge of our Bulletin board. We thank Derek, Lucy and Alex for their work in keeping Members informed.

For a number of years the Institute of Physics has made submissions on government reports and members of the Committee have assisted in advising on matters concerned with the physics and the environment. Douglas Pierson has been particularly involved as a representative on the Foresight Panels on Energy and the Natural Environment and on the Built Environment and Transport. He is also the Institute’s representative on the Environmental Group of the Science Council.

Changes on the Committee are imminent. Peter Hodgson is resigning from Secretary after five years’ office, and Douglas Pierson, who has been a member of the Committee since the Group’s formation, and Sheila Morris are leaving the Committee. We thank these members for the work that they have done for the Group.

particularly Douglas Pierson who has been both Chairman and Vice-chairman at sometime and has recently been much involved with government submissions, and Peter Hodgson who has been a most able Secretary over the last five years.

E.G. Youngs
22 May 2002

Honorary Secretary’s & Treasurer’s Report

I will begin this year’s report with an update on two of the organisational and Institute matters that have cropped up throughout the year. Several months ago there was a move to get all Subject Groups affiliated to a Division. The intention was, in essence, to facilitate Group financial and activity monitoring for central IoP staff. Along with most of the other non-affiliated Subject Groups, the EPG was against this proposal, on the grounds that there was insufficient subject affinity with other Groups and that the effect of another organisational layer would be counter-productive in meeting the administrative aims. At the current time, the IoP is re-thinking the proposal.

The Physics Congress is, after 10 years of mixed success, subject to a major review. Congress 2003 in Edinburgh is likely to be the last in its current style, before a new format is launched in 2005. The template for the new format is currently under discussion, but the Congress organising committee is already seeking significant levels of commitment from those Groups and Divisions that wish and are able to support the Congress. The EPG has a strong track record of organising meetings at Congress and it is my belief that the Group should continue to play an active part.

Membership

Membership of the Group is now at 501, from 555 the previous year. Perhaps more significant and pleasing is a discernible increase in the number of active members. We have had good attendance at EPG events this year and a positive response to the request for nominations for new committee members. However it is difficult to see any real trends, given that the uptake of travel bursaries more recently has been very disappointing. It is essential that we continue in our attempts to foster a lively community and that the committee strives to organise events that the membership is interested in and will make the effort to attend. An active membership is also important so that valuable opinions can be sought for policy and media submissions when the need arises. Please do contact the committee with ideas for events, support the events that are organised, submit articles to the Newsletter and in any other way get involved.
Finance 2001

Opening Balance: £8,175.51  2001 Expenditure: £3,750.73, including:
- Printing & Postage £1,534.07
- Committee Expenses £1,247.22
- Room Hire & Catering: £550.09
- Bursaries: £306.90
- Speaker expenses: £50.65

Ending Balance: £4,424.78  2002 Budget award = £4,740.00

Let me also remind members of the existence of the IoP’s Benevolent fund, aimed at helping physicists (not necessarily members) in times of their hardship. Contact Susan Dowling at the Institute of Physics for further details.

Finally let me say that it has been my real privilege to have served as Honorary Secretary of the Environmental Physics Group and I wish my successor well. My thanks go to all the Group members for their contributions to the well-being of the EPG. Thanks also to all the committee members, but particularly to the retiring Doug Peirson and to the Chair, Edward Youngs, who over the last 5 years has given generously of his time and effort in steering the Group through a period of expansion and diversification.

Peter Hodgson

The Dynamics of Volcanoes, by Professor Steve Sparks, FRS

EPG and London and South East Branch Members were treated to a fascinating talk on the dynamics of the Soufrière Hill volcano, Montserrat following the EPG AGM on 22nd May. Professor Steve Sparks of Bristol University gave an insight into research that is bringing about an understanding of the geophysical processes underlying the periodic nature of the activity of one of two active volcanoes on British territory. It is hoped that this understanding will lead to the capability to predict the devastating eruptions associated with this and similar volcanoes around the world.

Although regular (every 30 years) earthquake activity had been noted on Soufrière, the volcano had not erupted in the time since Montserrat was colonised in 1632. The earthquakes are now thought to be evidence of earlier, unsuccessful attempts to erupt, before the volcano finally mustered sufficient energy to do so in July 1995. The activity continues to the present day - the total volume of material erupted is currently twice as much as that erupted from Mount St. Helens in the 1980's. Graphic slides and a video presentation of the volcano in action brought an appreciation of the devastation that can be brought upon an unprepared population by the lethal pyroclastic flows characteristic of the Soufrière Hill volcano. These dense flows, of solid, hot material, can reach velocities of 90 m s⁻¹, and sweep down the hillsides with tremendous destructive power.

A variety of specialised techniques have been employed to measure topography changes (to derive volume flow rate), the pressure within the lava dome and the earthquake activity. These and other parameters have been fed into non-linear models that seek to describe the dynamic behaviour of the volcano, different elements of which have been observed to cycle over periods of hours, days, weeks and years. Although these are complex systems, involving many coupled processes (including flow, crystallisation dynamics and the release of gases under pressure), the models were shown to follow the observed behaviour accurately and offer the potential to predict future eruptions.

One idea put forward to explain the observed dynamics is of a magma chamber 5 km under the ground, containing viscous material behaving as a Newtonian liquid, fed with material from a source deeper still. High pressure in the chamber forces the magma to seek an escape route upwards. As it rises, the magma pressure drops, releasing gases dissolved in the magma and allowing crystallisation processes to start. As these processes proceed, the magma forms a rock-like lava dome of extremely high viscosity, effectively capping the volcano, which then expands slowly as more material arrives from below. This creates a region of over-pressure a few hundred metres below the surface, a friction zone, the source of many of the earthquakes associated with the volcano prior to an explosive eruption. With the aid of phase diagrams, the audience was shown how the magma system could exist in one of two states, leading to the periodic nature of the activity.

Professor Sparks gave a clear and entertaining account of his fascinating work, observing and modelling the volcano. The audience departed with a proper sense of the danger and power of the subject and the challenge in trying to understand this aspect of the natural environment. He was warmly thanked at the end of the meeting.

Peter Hodgson
FORTHCOMING MEETINGS

LONDON ENVIRONMENT CONFERENCE 2002
17-19 September 2002, University of London

This meeting will be held under the auspices of the Bloomsbury Institute of the Natural Environment.

London's natural environment consists of its atmosphere, its water in rivers and under the ground, its green spaces and its people and animals. Together with the various physical components of buildings and infrastructure services such as transport, waste and communications systems, the total environment is hugely complex. But we must attempt to understand, plan and improve it to ensure a better future for our city. A group representing academic and governmental bodies in London is organizing a conference on London's environment to be held between 17th-19th September 2002 at the Senate House, University of London. The aim is to enable a general audience of about 400 to gain some insight into our present knowledge of the various aspects of the environment - there will be nine themes - from lecturers and panellists who will also draw conclusions about policy options and the public direction for the future, both in terms of research, planning and action on the ground. Of course participants at the conference will be able to add their contributions in discussion and question sessions.

There will be three main elements to the conference:

- Keynote and contributed lectures

- Panel discussions involving leading local and national politicians, and environmental policy makers from UK and abroad

- Poster discussion sessions when large numbers of posters, especially from young researchers and environmental activists, will be displayed and their presenters questioned.

The nine themes are:

- Biodiversity
- Energy
- Noise
- Air Quality
- Waste and the 'metabolism' of the city
- Water and the rivers
- Land use
- Health
- Transport

For further information contact http://www.ucl.ac.uk/ene/LEC2002.htm

PHYSICS OF THE BUILT ENVIRONMENT


The Environmental Physics Group is hosting an afternoon meeting on Monday 4 November 2002 at the Institute of Physics Headquarters, 76 Portland Place, London.

The subject of the meeting will be Building Physics and will include talks on the following topics:

The Urban Environment.
Modelling and Monitoring the Internal Environment.
The Physics of Fire Design
Energy Sources

Speakers will include the following:

Professor Julian Hunt - Professor of climate modelling in the Department of Space and Climate Physics and Geological Science, UC London.

Professor Mike Holmes - Associate Director, Arup Research & Development.

Professor David Infield - Director of the Centre for Renewable Energy Systems Technology (CREST) at Loughborough University.

Dr Suresh Kumar - Fire Research,BRE.

The aim of the meeting is to provide a forum for physicists and engineers working in the area of building physics to meet and discuss their work and the latest developments and research. It is hoped that this meeting will encourage an interdisciplinary exchange of ideas and collaboration. It would also be an ideal opportunity for students to learn about the applications of physics in construction.

Further details of the meeting to follow.

If you are interested in this meeting or have any questions then please do not hesitate to contact Alexandra Wilson or Edward Youngs at the following addresses:

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Herts.
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THE 4TH INTERNATIONAL CONFERENCE ON URBAN AIR QUALITY
25-28 March 2003
Carolinum University, Prague

The organisers wish to announce that the 2003 International Conference on Urban Air Quality is to be held at Carolinum University, Prague, 25 – 28 March, 2003 Czech Republic.

Please note the following important dates for your diary:

Monday 9 September 2002  Receipt of 300 word abstract
October 2002  Notification of Acceptance
Friday 6 December 2002  Receipt of extended abstract

Further details about the conference will be announced shortly.

For general information about the conference please contact Jasmina Bolfek-Radovani, Institute of Physics, at jasmina.bolfek-radovani@iop.cz.

For queries about the Scientific Programme, please contact Ranjeet Sokhi, University of Hertfordshire, at r.s.sokhi@herts.ac.uk

OTHER NEWS

SCIENCE IN THE ENVIRONMENT GROUP

The Science Council, founded in 2000, is a new body representing the science community comprising most of the UK’s leading science based professional institutions and learned societies. Under the presidency of Sir Gareth Roberts FRS the Science Council has evolved an ambitious programme of work. Delivery of the programme will fall to four newly established Groups.

The Science Council’s membership, including the Institute of Physics, is broad based and represents almost every aspect of science and technology. The Science Council exists because there is a need to ensure that all science disciplines play their full part in the sustainable wealth and health of the nation. A single voice for science, supported by a programme of action control projects, will ensure that the Science Council promotes a positive image of science to people, the media and governments; enhances the essential role of scientists in society and communicates effectively with the public, industry, academia and Government.

The four Groups are “Science in the Environment”, “Science and Society”, “Science and Health” and “Science and Education”. All of the constituent bodies of the Science Council are able to participate in the work of the Groups which work to clearly defined Terms of Reference approved by the Board of the Science Council. Each Group is working on a major project that relates to current Government and/or social priorities. For example, the Science in the Environment Group is undertaking a thorough review of environmental indicators (EI)s. It has identified a need to evaluate those that currently exist, test their relevance and identify gaps. This represents a major piece of work and the Group will be supported by experts both within and outside the Group. In particular, Baroness Young, Chief Executive of the Environment Agency (EA), has committed some EA staff resource to support the project. For obvious reasons the outcomes from this work will be of great value to the EA.

The scope of the Environmental Indicators’ project is as follows:-

1) Identify which EI’s are currently used by Government and its agencies to monitor the atmosphere, surface and underground waters, the oceans, soils, plant and animal ecology and those carried by humans and animals;

2) Seek the views of those who generate and use EI’s on their adequacy, current applications, comprehensiveness, time range and Utility, the costs of data collection, storage and manipulation, sources and security of funding, and;

3) Recommend future requirements for EI’s given current knowledge of the environment and future needs from a UK and international perspective.
The outputs from this project are:

1) A Report to the Science Council;
2) A Conference to launch the Report and discuss its findings;
3) A Briefing Paper for Government Ministers, MPs, Civil Servants, the media and the science community;

Apart from undertaking project assignments the Groups are committed to developing contacts with eminent practitioners and others in the science community. From time to time such people are invited to Group meetings for an exchange of views and ideas on issues of common interest and concern. The Groups are, in effect, the engine room of the Science Council and will play a key role in ensuring that the Science Council is well placed to identify and address issues of concern as well as meeting existing priorities for science and its practitioners.

Douglas Peirson
April 2002

[This report is derived from a note from Nick Reeves, Chairman of the "Science in the Environment Group"]

REVIEW OF CURRENT UK MARINE OBSERVATIONS

This report assesses what marine observations are currently being made in the UK, where, when, why and by which organisations, focusing on observations of a "long-term" nature. It is available for download from the Reports section of the OceanNET website (http://www.oceanet.org)

Graham Alcock
March 2002

BOOK REVIEW


This book is intended for "the science student who is interested in environmental problems and wants to get acquainted with the physics approach to them". It is less limited in scope than the authors' earlier book Environmental Physics, but contains less mathematics and fewer derivations. Nevertheless, it is a physics textbook and readers are expected to have a good grounding in physics. An A-level in mathematics according to the British system or comparable level in other educational settings is needed for a full appreciation of the text. The title Environmental Science is rather misleading – a better title would be Principles and Applications of Environmental Physics. The authors' philosophy in writing the book is given in the Preface. They write: "Environmental physics as the authors see it, deals with problems arising from the interaction between man and his natural environment. It is therefore oriented towards understanding, analysing and mitigating problems, all from a physics perspective".

The book is divided into eleven chapters. Chapter 1 is a general introduction to the subject, giving a general overview of a physics approach to environmental problems and discussing such issues as pollution and the greenhouse effect and their economic and social contexts. The following chapters deal with climate (Chapter 2) and the human influence on it (Chapter 3). Thermodynamics and the harnessing of energy for human needs, including nuclear power and renewables, are discussed in Chapters 4 and 5. Chapter 6 reflects on the preceding chapters, summarises the problems of climate and global change, and pointed the way to some methods of achieving a slow-down of the rate of environmental change. Chapters 7 to 10 deal with particular problems – transport of pollutants, noise, environmental spectroscopy and geophysical methods. The authors believe that the relationship between man and environment cannot be decoupled from society as a whole, so they use the final chapter on the societal aspect. Useful exercises are given at the end of each chapter to stimulate the student, "not to train the student in problem solving". Appendices provide a list of numerical and physical data, a short description of simple vector algebra, a list of websites and journals, and short descriptions of some students' laboratory experiments. There are 148 references to other works, and the book ends with a good index. "Appetisers" – brief edited quotations from a book or general scientific journal inserted into a textbook – are used liberally throughout the book to illustrate the scientific or social context of the subject matter.

With no universal definition as to what environmental physics is, no textbook on the subject seems to be sufficiently comprehensive. This book provides a clear account of the physics of the environmental processes considered, albeit without mathematical derivations for which the interested student is directed to other texts, but omits some topics that some consider important issues of environmental physics. For example, the present book only briefly considers the subject of particulates in the atmosphere with no
mention of Stokes' law for their terminal velocity of fall; there is insufficient discussion of the soil environment; the soil-plant-atmosphere continuum is not included; and a chapter on light pollution and atmospheric optics could also be expected in a book on environmental physics. Nevertheless, the book ably draws attention to the importance of a physics approach in tackling environmental problems. It is a valuable addition to the few available textbooks on environmental physics.

E.G. Youngs

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