

Editorial

This Newsletter is the first since our Annual General Meeting at the highly successful Members' Day in May. The Chairman's Report was presented at the meeting and summarises the activities of the Group over the last year. The Members' Day contained a broad range of well-received talks and posters, and a report is forthcoming in the next edition of the Newsletter. We welcome two new Committee Members, Paul Williams and Pat Goodman who were elected at the AGM. It has been an active summer for the EPG and the Newsletter contains some reports on events attended by Group members. We also congratulate Alastair McCartney, the Group Chairman, recently received a National Friendship Award from the People's Republic of China.

Thanks are due to Hannah Quigley, a Year 11 student at John Mason School in Abingdon, who compiled this edition of the Newsletter during her Work Experience placement at the Rutherford Appleton Lab.

Karen Aplin

Environmental Physics Group Chairman's Report: 2003-2004

The Group has continued to be active over the last year. The membership continues to be around 500 (see Secretary's Report), which makes us one of the larger Groups in the Institute. The Committee met three times (10 September 2003, 14 January 2004 and 21 April 2004) which is the number of Committee meetings we usually hold during a year. The Committee had eight members, including the Officers and four co-opted members (total 12). This is a matter for concern, as the Committee has a full compliment of up to 13 members. Nevertheless Committee meetings were all well attended (8-9 per meeting). The Committee is trying to find new members, but we need support from the Group Membership.

Group Meetings/Visits

The Group was involved in the organisation of three meetings (including *Members Day*). A one day meeting on *Electrified Aerosols in the Environment* was held at Portland Place on 9 July 2003. It was well attended and included a range of presentations covering aspects of charged aerosol behaviour in the environment. This was a joint meeting with the *Aerosol Society* and was organised by Giles Harrison and Denis Henshaw. An evening lecture on *Freak Ocean Waves* was held on 28 January 2004 in conjunction with the London and south east Branch. The speaker was Dr Peter Janssen from the *European Centre for Medium-Range Weather Forecasting*, Reading. The meeting was well attended, considering the appalling weather on the night. The main meeting of the year was the *Members' Day* organised by Peter Hodgson (at which the 2004 AGM will take place) on 19 May 2004. Seven speakers covered a number of topics related to Environmental Physics.

Recent/Forthcoming Meetings/Visits

Weather and Disease Forecasting: 8 June 2004: Portland Place. A half day meeting organised by John Garland. Four speakers (William Bird, Met Office, Noel Nelson, Met Office, Mark Cresswell, Manchester Metropolitan University, Frank van den Bosch, Rothamsted Research) discussed a number of topics including human and crop disease.

Visit to Eskdalemuir Geophysical Laboratory: 17 July 2004. This visit was organised by Giles Harrison, in collaboration with The British Geological Survey, to commemorate the 100th anniversary of the field station. Julian Hunt attended and he spoke about Lewis Fry Richardson.

Optical Environmental Sensing: Glasgow, 9 September 2004. A one day meeting in collaboration with the Optics Group. The meeting is part of a larger meeting. The EPG agreed to commit £150 towards travel expenses for an overseas speaker.

Climate Change: 20th October 2004: Portland Place. An evening lecture by Joanna Haigh. This is a joint meeting with the *L&SE Branch*.

Meetings in Planning

Workshop on Aquatic and Airborne Particles. This meeting is being organised by Rob Kinnersley.

Waste Minimisation /Resources. Andrew Rowley is planning this with Peter Hodgson, and is linked with a Sustainability Alliance initiative

Surface Measurement Sensors: Possibly in collaboration with the Aerosol society in Summer 2005.

History of Air Pollution: A joint meeting has been proposed with the *History of Physics Group*, date and venue to be decided.

Other Activities

Newsletter: Two newsletters were sent out to members. I would like to thank Karen Aplin for editing these.

Web Pages: Peter Hodgson is reviewing and revising the information on the EPG site. He has now updated the committee information. We would like the organisers of meetings to include information about their meeting on the IoP calendar on the IoP website.

Bulletin Board: This is not being used, but as there is no effort required to keep it up and running it will be kept open.

Members Database: The IoP data protection arrangements cover any data that would be held by the EPG. The Committee is drafting another questionnaire to try and compile a database of members' interests.

Education sub-committee

The EPG's education sub-committee has been run for many years by Peter Hughes. Unfortunately, through pressure of work Peter has announced that he will have to give up organising the activities of this sub-committee. In the absence of anyone willing to continue with this, the Committee has decided to hold the Education sub-committee in abeyance until a new remit and members can be identified. I would like to thank Peter for putting in so much work to advance Environmental Physics education in schools, and hope he will continue to be of service to the Group.

Applied Physics Division

The Institute is keen that all Groups are affiliated to a Division and to accommodate Groups that did not fit well within the old Divisional structure, they have created a new *Applied Physics Division*. The Committee thought that because of the wide interests of the members of this Group and as "environmental physics" was certainly an "applied" branch of physics, the Group would fit well within an *Applied Physics Division*. We have written to the new *Applied Physics Division*, indicating our interest in the new Division. We have been invited to apply, subject to getting the approval from the membership at our next AGM.

Group Coordination Committee

The Group Coordination Committee is a committee made up of Officers of Groups and Divisions. Its brief is to oversee the running of Groups and Divisions. The GCC monitors the activities of Groups and Divisions via “Annual Returns”, and one of its aims is to make sure that Groups remain active. The Annual Returns are a set of forms that summarise the activities of each Group. At present the activities of the EPG fall within what is expected of a Group, and the Committee intends that they will continue to do so.

The GCC has also recently approved a new “General Constitution” applicable to all Groups. This Constitution will be in operation from January 2005. There is little difference in the new Constitution. However, there is a new rule that concerns the make up of Committees. The GCC is keen to encourage continual change in the membership of Group Committees, to prevent Committees from becoming “moribund”. Part of item 8 of the new Constitution states that: “No person may be a member of the Committee in any capacity for more than nine years”. There are several members of this Committee (me included) who will break this rule when it comes in to force. I doubt that the GCC will implement this rule immediately, but the Committee and Membership should be aware of the consequences, and make strenuous efforts to attract “new blood” into the Committee.

Group and Division Officers’ Forum

This is a meeting open to all Officers of Groups and Divisions, where concerns of the Groups can be brought to the attention of the GCC. Two meetings are held each year. Unfortunately, I was only able to attend one of the meetings (11 May 2004). At the meeting on the 11 May the main concern of Groups was the question of the restriction of the length of time people could serve on Committees (9 years). The other major topic of discussion was a mechanism for preventing date clashes for Group and Divisional meetings.

Annual Representatives Meeting

This is an annual meeting between Group and Divisional Officers and the IoP. It was held on May 12, 2004. I was able to attend the morning session of the meeting. The main topic for the morning session was “Einstein Year – 2005”. This is an International celebration to mark the centenary of Einstein publishing his major papers. The Institute wants to make this a general celebration of “Physics”. The members of ARM were asked to discuss how local events could be organised to bring physics to the attention of the public, especially school children. It struck me that “environmental physics” was an ideal candidate as a vehicle to illustrate the importance of physics to “real life”. I hope the Committee will pursue ideas to contribute to *Einstein Year*, and I would welcome suggestions from the membership on how this could be done. *Einstein Year* is being organised by the Institute and they would contribute to promoting events organised and sponsored by Groups.

Summary

I feel that the EPG has remained active and hope that it continues to promote *Environmental Physics*. However, the success of the Group needs input from

its members, and I would encourage all to do what they can for the Group. This includes considering joining the EPG Committee!

Alastair McCartney (Chair)
17 May 2004

Congratulations

Dr. Alastair McCartney has been awarded a “National Friendship Award” from the State Administration for Foreign Expert Affairs of the People’s Republic of China. The award is the highest honour given to “foreign experts” by the People’s Republic of China. Eighty-four awards were presented to people from 22 countries at a ceremony at the Great Hall of The People in Beijing on 29 September. The award was for work on crop protection, which includes studies of environment/disease interactions.



Meeting Reports

Eskdalemuir Geophysical Observatory

Centenary visit, Saturday 17 July 2004

In the early 1900s, electrical interference from trams caused difficulties with geomagnetic measurements conducted by the National Physical Laboratory at the long-established Kew Observatory, near London. Using £10,000 compensation money from the Electric Tram Company, a search began for a suitable replacement site which was ideally at least 10 miles from potential magnetic disturbances such as railways, but not inaccessible. The site finally chosen was Eskdalemuir and construction of a new observatory began on 19 July 1904. Our visit commemorated the centenary of the cutting of the first sod, but the observatory did not start operation until 1908 when the NPL began recording under the supervision of the original superintendent, G.W. Walker. Since then, the observatory has been the responsibility of the NPL (1908-15), the Meteorological Office (1915-67), NERC Institute of Geological Sciences (1967-82) and the British Geological Society (since 1982), making seismic, geomagnetic, meteorological and atmospheric electrical measurements.

The visit began at 13.00 hours with substantial refreshments, then John Riddick outlined the history of the site, and Giles Harrison described his work on atmospheric electricity, in particular the potential gradient from the ionosphere to earth and the causes of its variation. We then visited the control and record room for the meteorological work, before going outdoors to view four different aspects of the observatory's work, starting with the extensive range of standard and specialist meteorological instruments, including several for monitoring atmospheric pollution. We proceeded to the Geomagnetic Underground chamber, containing proton and fluxgate magnetometers giving scalar and vector data respectively, in a shielded environment with little temperature variation through the year. Then up the hill to the Absolute Huts, where fortnightly manual measurements with a fluxgate theodolite magnetometer enables absolute values of the vertical and horizontal components of the earth's magnetic field, plus the declination from true north, to be made. Our final visit was to the Seismic Vault to inspect the various seismometers and learn how to distinguish earthquake events from disturbances caused by underground nuclear tests and other activities such as blasts in local quarries.

We then returned to the main building for an informative and entertaining talk by Lord Julian Hunt on the life and work of L.F. Richardson who spent some years at Eskdalemuir before the 1914-18 war. He also developed many important methods and ways of thinking about the natural world during his career, from approximate methods of solving differential equations (1910), though the theory of the development of plumes (Richardson number), to non-linear dynamics, mathematical psychology, and fractals. After a cup of tea and a visit to the museum, the visit ended at 16.00 hours.

Thanks are due to Giles Harrison for arranging the meeting, past and present members of staff of the Observatory for their enthusiastic participation and Julian Hunt for his stimulating lecture. The visit was enjoyed by the two dozen or so participants, especially as the weather proved kind, and was a joint venture between the EPG and the Scottish branch.

Derek Rose

OPTICAL ENVIRONMENTAL SENSING

At PHOTON 04: The UK's premier conference in optics and photonics

The conference at Glasgow Caledonian University from the 6th to 9th of September 2004 encompassed many areas of optics and photonics, and quantum electronics, the session of particular interest to environmental physicists being Optical Environmental Sensing. The optical environmental sensing session chaired by M Hilton (Reading University) and P Hodgson (Sci-fact) covered research into a range of different sensing methods focusing mainly on gas detection.

The seminar began with a talk by M Campbell (Glasgow Caledonian University) on X-ray topography, a new X-ray absorption system used for imaging irregularities in tree trunks and the uses in industry. This was followed by M Mazurenka (University of Bristol) on Atmospheric Trace Gas Detection of NO₂ and IO, the use of a cavity ring-down spectrometer to detect sub-parts per billion concentrations of nitrogen dioxide. K A Tillman (Heriot-Watt University) spoke on a new implementation of optical absorption spectroscopy in which a titanium:sapphire pumped femtosecond optical parametric oscillator was used as a broadband source to directly acquire mid-infrared absorption spectra of methane gas. Next, F Davies (University of Salford) explained how dual Doppler lidar measurements are being used to improve atmospheric dispersion models. The last talk before the coffee break by D V Vladutescu (City University of New York) focused on the use of a series of Planar Fabry Perot cavity sections in conjunction with conventional charge-coupled device detectors to accomplish spatial-spectral filtering that will be used for satellite imaging.

After the coffee break we had another session of interesting presentations starting with C J Massie (University of Strathclyde), who described his work on a portable optical system used for methane gas detection, the device was brought along to the talk to show the portability. This was followed by T Parameswaran (Natural Resources Canada) with a report of their work using spectroscopy to monitor combustion and burner performance. Small spectrometers were used to monitor the flame. G Gibson (University of Glasgow) presented a new technique for oil and gas prospecting, demonstrated to locate a controlled gas release in the desert environment, this included an entertaining video of the desert tests. The penultimate talk by B van Well (University of Glasgow) summarised the development of a hand held laser pointer used for the detection of methane, this project with Siemens

gave a qualitative method for gas leak detection from a safe distance. The session ended with R G M Milne (The Robert Gordon University) and an account of an investigation into the measurement of soil parameters.

Poster sessions throughout the conference contained papers on a variety of subjects including environmental sensing abstracts for these and the above papers can be found on Photon 04 website at www.photon04.org.

I would like to thank the Environmental Physics Group for the travel grant, which allowed me to attend the conference and present my poster on Low Cost Airborne Methane Detection for which I won a poster prize.

Oliver Chapman, Physics Department, University of Reading

WEATHER AND DISEASE FORECASTING

Report of meeting held at the Institute of Physics on 6 June 2004

Investigations exploring the effect of weather on disease in both animals and plants are aimed at providing a means for the prediction, mitigation and possibly control of outbreaks. This meeting discussed some current developments.

After a brief introduction by the chairman, Alastair McCartney, Noel Nelson from the Meteorological Office (seconded to DEFRA) outlined the weather factors that impact on health, as indicated by hospital admissions and mortality rates. Besides the effect of extreme weather events, human health can also be affected by air pollution. Complex interactions between weather and other factors can decrease the quality of air, particularly SO₂, NO₂, O₃, CO and particulates, the pollutants that mostly affect health. The risks are greatest for the elderly and those suffering from respiratory and cardiovascular diseases. Weather is also the prime factor in the release, transport and deposition of air-borne pollen grains and other allergenic particles that can affect allergy sufferers of all ages.

William Bird, also of the Meteorological Office, spoke on the problem of health forecasting and the planning of medical services. Different time scales are involved in assessing the risk for different medical conditions induced by the weather. Although it is possible to give fairly good forecasts for number of hospital admissions, it is difficult to forecast peak requirements.

Frank van den Bosch from Rothamsted Research discussed the development of risk prediction algorithms for plant disease. Two approaches were discussed. Mechanistic disease progress models can be developed to try and relate environmental factors to epidemic development. An alternative is to use "statistical mining of data" to obtain empirical relationships between environmental factors and disease to identify weather patterns associated with disease. Both approaches can be used to forecast the risk of disease outbreaks as part of integrated disease management systems.

The last talk was on the geography and dynamics of malaria and given by Mark Creswell from the Manchester Metropolitan University. Historical data together with remote sensing have been used to produce effective models that identify conditions necessary for mosquitoes to thrive. Modelling approaches are concerned with the insect behaviour, not malaria itself. A holistic approach will be necessary to take account of potential changes in the distribution of malaria due to climate change.

The meeting was attended by about twenty five delegates, about half being students. It provided a good overview of the effect of weather on disease and of current developments in forecasting outbreaks.

Edward Youngs & Alastair McCartney

Forthcoming Events

Waste Minimisation & Resource Efficiency: The Role of Physics

One-day Seminar
Institute of Physics, 76 Portland Place,
London
Wednesday 23 March 2005



Call for Papers

In striving for a more sustainable society, it is important to ensure that we are using our primary resources as efficiently as possible. Science and technology are fundamental to achieving sustainability, with physics, in particular, having a key underpinning role to ensure that manufacturing and production processes are operating as efficiently as possible, with minimum waste.

This one-day seminar will focus on the role physics and physics-based technologies can play in the reduction of waste, resource efficiency and sustainability.

The event will be aimed at a scientific audience, who may not necessarily be experts in the field, but who do have an interest in the environment, environmental technologies and/or sustainability.

If you would like to give a presentation at this seminar, please could you send the title of your talk along with your name and affiliation to:

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Examples of real, industrial applications will be particularly welcomed. The closing date for the submission of papers is **21 January 2005**.

“Physical Sites” Exhibition 17a Electric Lane, London (near Brixton stations)

The Institute of Physics is sponsoring an exhibition called 'Physical Sites' at Photofusion.

The work on show is by a physicist-turned-photographer and a photographer who has undertaken periods 'in residence' at nuclear power stations.

Go to www.photofusion.org for more info.

The exhibition runs from 1 October to 13 November and is free. There will also be a panel discussion about art and physics associated with the exhibition at University College on 28 October (7.00 - 9.00pm).

Accelerating Sustainable Development Conference 16-17 November 2004 IEE, Austin Court, Birmingham, UK

Uniquely, this conference will bring together engineers and technical professionals from many different fields to exchange their knowledge and learn from each other's best practice. In addition to featuring a line up of leading speakers on sustainable development policy and practice, the conference will:

- * Produce an interdisciplinary technical action plan to drive forward sustainable development in the UK
- * Generate interdisciplinary professional input into the current review of UK Sustainable Development Strategy and other policy developments

The conference and implementation plan will focus on 6 key areas: Energy, Transport and Infrastructure, Waste, Water, Food, Rural land use and ecology, Buildings and urban planning.

For full details see: <http://conferences.iee.org/sustain/>

Survey

As part of our preparations for the conference, the Alliance is conducting a survey of technical professionals. Your answers will be used in an analysis of attitudes to current policies, and will be a great help towards the debate at the conference. As a token of our appreciation, if you give your name and email ID then you will be entered into a prize draw where you could win a free registration at the conference!!! (We will only contact you if you win).

To take part in the survey, go to the link below. It will only take you 5 minutes: <http://www.iee.org/sustainabilitysurvey>

Energy Demand-Spiralling out of Control? 7 November 2004, Institute of Physics, London

Please note that registration details including a registration form in pdf format are now available on the conference web site at

<http://conferences.iop.org/ENE>

If you would like to register for the meeting please do so latest by 10 November by returning the registration form to Registrations, Institute of Physics, London. After the 10 November and extra 10 pounds onsite fee charge will be added.

Registration for Energy Management Group members is free of charge, however members are requested to fill in a form in advance in order to register their attendance.

Royal Meteorological Society, Main Society Wednesday Meeting 17 November 2004: "Surface Ocean and Lower Atmosphere" 2.00pm in the Zoological Society of London Meeting Rooms, London Zoo, Regents Park.

"New UK initiatives on the interaction of the lower atmosphere and surface ocean", Dr R Upstill-Goddard, University of Newcastle.

"Surface processes controlling air-sea gas fluxes", Prof Wade R McGillis, Department of Earth and Environmental Engineering and Lamont-Doherty Earth Observatory, Columbia University, New York

"Atmospheric inputs to the oceans and their effects", Prof T. Jickells, University of East Anglia.

"Aerosol dynamics and fluxes in the lower marine atmosphere", Prof C O'Dowd, National University of Ireland, Galway

"Feedbacks of DMS and Fe on climate in a coupled ocean-atmosphere model", Dr J Gunson, Met Office

(meeting organiser: Dr D Woolf, Centre for observation of Air-Sea Interactions and fluxes, Southampton Oceanography Centre)

**Indirect effects of aerosols on climate.
January 5-7, 2005
UMIST - Manchester Conference Centre, Manchester, England**

The meeting goals are

- * to bring together experts from the various fields involved in the very interdisciplinary studies of the aerosol indirect effect
- * to facilitate the preparation of reviews of climate and the indirect effect that will be underway in 2005

Questions to be addressed at the meeting include:

1. What are the observational constraints on the indirect effect?
2. What are the most important times and locations for aerosol-cloud interactions?
3. What is the role of ice clouds in the indirect effect?
4. What are some indirect effects besides the number of cloud droplets?

The meeting format will be primarily invited review talks along with posters for new results. Registration will be limited to approximately £150.

More information on the meeting and a registration application can be found at www.al.noaa.gov/igac/

Organizers

- * *Tom Choularton, UMIST (University of Manchester)*
- * *Ulrike Lohmann, Dalhousie University*
- * *Daniel Murphy, NOAA Aeronomy Laboratory*
- * *Bruce Wielicki, NASA*

**Conservation and Preservation Issues in Digital Printing
24 - 25 April 2006
Institute of Physics, London**

Organised by the Printing, Papermaking and Packaging Group of the Institute of Physics

A two day conference for conservators of prints, photographs and textiles

Following the successful conferences in October 2000 and April 2003, the Institute of Physics in collaboration with the University of the Arts London are staging a third two day conference to examine progress and research on materials and processes used for producing digital prints and photographs for archival storage. For the 2006 conference we anticipate expanding the areas of interest from fine art prints and photographs to include digitally printed textiles. The aims of this conference are to inform those responsible for the preservation and conservation of digitally produced material about the

developments in digital photography and digital printing technologies, the progress in research on inks and substrates and their significance for the archiving of artefacts. As with the previous conferences our aim is to promote links between industry and the conservation world.

For updated information and details please go to the following web page: <http://conferences.iop.org/PPP/>

**International symposium on Advances in Marine Ecosystem Modelling Research (AMEMR 2005)
27 - 29 June 2005, Plymouth, UK**

This conference is already attracting some of the world's leading scientists specializing in understanding and forecasting the functioning of marine ecosystems. Its focus is a forum to present and discuss scientific excellence in state-of-the-art model based research emphasising developments in understanding how marine ecosystems function, leading towards creating a predictive capability. This is highly relevant to today's emerging challenges such as climate change, sustainable management of marine bio-resources (e.g. fisheries) and human impacts on marine systems through pollution.

Marine, coastal and estuarine ecosystems are complex interactions of biota, chemical processes and physical dynamics that are influenced by both climate and human activities. As a result, changes in species distributions and seasonal responses are rarely fully understood. Modelling provides key scientific techniques by which we can elucidate the workings of the marine system and predict its evolution in both the short and long term.

This symposium is organised and hosted by Plymouth Marine Laboratory, one of the world's first truly multidisciplinary marine research centres, and endorsed by GLOBEC (Global Ocean Ecosystem Dynamics), NERC (Natural Environment Research Centre), IMBER (Integrated Marine Biogeochemistry and Ecosystem Research) and CASIX (Centre of Observation of Air-Sea Interactions and Fluxes).

For further information, please refer to www.amemr.info

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