

Coupling between the Earth's Magnetospheric, Atmospheric and Ionospheric Regions and Comprehensive Modelling of the Sun-Earth Environment

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Abstract

General Circulation Models of the Earth's thermosphere and ionosphere started in the 1980s as a tool to understand the processes in the Earth's upper atmosphere. As the complexity of Space Weather processes in the terrestrial system became appreciated it was realised that detailed models would be needed to understand the interplay of effects. The models have thus grown in complexity to match the increase in knowledge as the years have passed. There have been a number of attempts to couple models that simulate the processes of solar-wind magnetosphere interaction, magnetosphere-ionosphere coupling and further coupling into middle and lower atmospheres. This means modelling a wide dynamic range and several completely different chemical and morphological regimes. we will look at the history of the progress of the modelling work, concentrating particularly on thermosphere-ionosphere modelling, but seeing also how this can be coupled to above and below and what we might expect to see from such coupling. The complexity of magnetosphere, ionosphere and atmosphere modelling reflects the complexity of the processes under study, and there seem still to be surprises in store.

Date: Monday 25 October 2010

Time: 11:10-13:00

Room: Kastler Lecture Hall @ Adriatico Guest House

University College London

Abridged Curriculum Vitae

- 1. Name:** Prof. Alan David Aylward
- 2. Date of Birth:** 15/9/49
- 3. Present position:** Professor of Atmospheric Physics, Department of Physics and Astronomy since October 2005, Reader in Physics since 1/10/98
Director Research Projects, Atmospheric Physics Lab since 1994
Research Fellow joint UCL/RAL 1991-4
- 4. Work history:** 1972-3 Guided Weapon Division, British Aircraft Corporation, Filton, Bristol
(Mechanical and Electrical Engineer)
1973-5 University College London, PhD studentship
1976-7 On-Line Systems Timesharing Bureau, Consultant, London
1977-9 Tymshare UK (timesharing bureau). Applications Consultants Manager,
City Office, London
1979-82 EISCAT (European Incoherent SCATter scientific association) Kiruna,
Sweden - programmer, then Head Programmer
1982-91 various positions (consultant, then RA, then fixed-term grade 7) in the
EISCAT support group at the Rutherford Appleton Laboratory, Oxon
- 5. Educational qualifications, post school:**
PhD in Space Science, Univ London 1984
MA (Hons) Cambridge 1968-71 (Natural Sciences Tripos)
Diploma in Space Science, UCL 1972
- 6. Summary of teaching experience at university level:**
Lecture course on Computers and Microprocessors at 2nd year level, on Information and Systems at 3rd year level and Solar System Science at 3rd year level, on Environmental Physics 2nd year level, Physics of the Earth at 3rd year level: also postgraduate teaching of Atmospheric Physics
Physics Labs demonstrating at 1st year level and 2nd year, Mathematica classes (2nd year)
8 PhD students (5 finished, 3 current), 1 MPhil student
3rd year group projects - one project group for 4 years, then running the Group projects for 11 years (2000-2010)
3rd year and 4th year half- and full-unit projects (pairs and singles)
Tutorials for 2nd years
Training course for EISCAT radar studies at RAL and PPARC ISTP summer school
- 7. Administrative experience in higher education:**
Head Atmospheric Physics Laboratory
Examining Board of Planetary Sciences
- 8. External examining experience:**
5 UK PhD theses examined (Leicester, Sheffield, Aberystwyth, Bath)
1 Finnish PhD examination

ICTP - EC COST Action ES0803 - EC FP7 Project SOTERIA – INAF - ESA
International Advanced School on Space Weather Modelling and Applications

9. Research specialisms:

Incoherent Scatter radar, ionospheric and magnetospheric physics, (upper) atmospheric physics, exoplanet atmospheres, large scale atmospheric models
ground-based optical instruments for upper atmosphere and ionosphere studies

10. Publication summary:

80 publications in refereed journals
(I don't keep a list of conference presentations: at least 40 oral)
8-10 popular science articles or columns in magazines like New Scientist

11. Any other observations:

Assessor on NASA grant panels (4 to 2010, e.g. MIDEX satellite missions (thermospheric/ISTP science missions) November 1998, then theory/heliosphere panel
IAGA (International Association of Geomagnetism and Aeronomy) WG IIb (Thermospheric Dynamics) Chairman until 2007
Previously Chairman EISCAT/ESR time allocation panel (PPARC).
Am on PPARC (now STFC) Cluster Oversight Committee and UK STP National Facilities Committee. Chair STFC EISCAT Oversight Committee until 2010

12. Programme of work

The Atmospheric Physics Lab has a programme of modelling of the Earth's atmosphere and ionosphere from 15km altitude to the exosphere (CTIP, CMAT and CTIM models)
It also carries out observations of the earth's thermosphere – winds and temperature – using Fabry-Perot Interferometers and planetary observations (Gas Giant aurorae) using large Infra Red telescopes like UKIRT and IRTF
It also has a comprehensive planetary atmosphere modelling programme – the thermospheres and ionospheres of Mars, Jupiter, Saturn, Titan and extrasolar Gas Giants
It also now has programmes of exoplanet observations and modelling (3-d GCMs)