
Introduction

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The space environment is currently of intense interest as the subject of multidisciplinary studies in science, applications and engineering, including the remote observation of the Earth and planets, probing the Sun–Earth connection, studying the Earth’s environment from space, hazard warning and forecasting and exploring the underlying space and spacecraft technologies. There are natural connections between these areas in terms of the scientific techniques and the space technology required. Some of the connections are only now being discovered and exploited, and this conference, held at The Royal Society on 16–18 October 2001, provided a timely focus for pursuing these further and identifying others.

Keywords: space science; space technology; Earth observation;
Sun–Earth connection; space hazards; space environment

1. Introductory remarks

The main goals of the meeting were to identify

- (i) links between different areas of science and technology;
- (ii) gaps in science, interpretation and applications; and
- (iii) the underlying technology.

The meeting format consisted of a wide range of talks by invited speakers for key topics, contributed papers in each area, with panel discussions to encourage wide participation. These proceedings include several of the invited and contributed (shorter) papers, and finally a review of the developments presented at the conference. Where no paper was submitted, we have included a list of the titles and authors at the end of this issue to illustrate the breadth of the meeting.

The four main topics of the meeting, as illustrated in figure 1, were as follows.

- (a) Observation of the Earth and other planets: climate change, ocean and sea-bed studies, land-use monitoring, Earth’s atmosphere, lessons from other planets.
- (b) Sun–Earth connection and the space environment: understanding the Sun, impacts on the near-Earth environment, the magnetosphere, Sun and climate, space weather.

One contribution of 25 to a Theme ‘Science and applications of the space environment: new results and interdisciplinary connections’.



Figure 1. Images illustrating the four themes of the meeting. (a) Earthrise over the Moon as taken by Apollo 8, illustrating remote sensing and symbolizing environmental concerns (reproduced courtesy of NASA). (b) Coronal mass ejections from the Sun on 8 November 2000, as seen by the LASCO instrument, with an EIT 304 Å image from the same day superimposed, from the ESA–NASA SOHO mission (reproduced courtesy of SOHO/LASCO and EIT consortia. SOHO is a project of international cooperation between ESA and NASA). (c) Simulation of an Earth-impact event 65 million years ago at Chicxulub (reproduced courtesy of Don Davis, NASA). (d) Artist’s impression of ESA’s ENVISAT in orbit (reproduced courtesy of the ESA).

- (c) Hazard warning and forecasting for Earth and space, through integration of measurement and computational modelling: space weather, storm and severe weather forecasting, space dust and debris, hydrology, air pollution.
- (d) Space and spacecraft technologies: communications, navigation, spacecraft technologies, technology benefits for science and applications, software, formation flying, miniaturization, enabling role of satellites.

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