PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A MATHEMATICAL, PHYSICAL & ENGINEERING SCIENCES

Introductory Remarks

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Introductory remarks

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This year marks not only the twenty-fifth anniversary of the first manned landing on the Moon (*Apollo 11*) but also the thirty-fifth anniversary of the first planetary missions. The latter was the Soviet Luna 1 and 2 carrying magnetometers to test whether the Moon possessed a global magnetic field. Luna 1 passed the Moon but Luna 2 crash landed, both showed that the Moon had no magnetic field as large as 50 or 100 γ ($1\ \gamma = 10^{-5}$ G $= 10^{-9}$ T). Such an experiment had been proposed by S. Chapman (*Nature* **160**, 395 (1947)) to test a speculative hypothesis concerning magnetic fields of cosmic bodies by P. M. S. Blackett (*Nature* **159**, 658 (1947)). Chapman's suggestion was greeted by general amusement: 12 years later it was accomplished. Also two years after the launch of Sputnik 1 in 1957, Luna 3 was launched and for the first time viewed the far side of the Moon on 9 October, 1959.

Laboratories from many countries were invited by NASA to take part in the analysis of rocks returned from the Apollo missions and later from the Soviet automated return of cores from the lunar regolith. British laboratories were very active in this work, and a review of the results of the new understanding of the Moon as a result of space missions formed the subject of a Royal Society Discussion Meeting in 1975 (published in *Phil. Trans. R. Soc. Lond.* A **285**). British laboratories received samples from the automated Soviet missions that took cores from the regolith and returned them to Earth. Work on Luna 16 and 20 samples were published in *Phil. Trans. R. Soc. Lond.* A **284** 131–177 (1977) and on Luna 24 in *Phil. Trans. R. Soc. Lond.* A **297** 1–50 (1979).

British scientists have been able to play a part in many of the missions to other planets. These have included contributions to the imaging science investigations on the Viking, Magellan and Voyager missions, as well as providing field, particle and dust instrumentation for the Ulysses spacecraft. Ulysses undertook the fifth fly-by of the Jovian system in 1992 as a gravity assisted manoeuvre to the Sun's polar regions. UK groups are also involved in the Galileo mission, which is at present en route to Jupiter orbit insertion at the end of 1995, having already undertaken the first asteroidal fly-bys, of Gaspra and Ida, as well as planetary fly-bys at Venus and Earth. These activities are set to expand over the next decade via a major involvement in the Cassini-Huygens mission to the Saturnian system (launch due in 1997), as well as the Russian Mars-96 spacecraft.

The papers and discussion printed here are a record of the Discussion Meeting held on 25 and 26 January this year. They not only review our developing understanding of the Solar System but mark, through the participation of American, Russian and European colleagues, the international nature of exploration of the Solar System. Solar System exploration will be perhaps this century's greatest achievement in international cooperation. It was appropriate therefore that the

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meeting ended in a survey by leaders of the four space agencies (Doctor W. T. Huntress Jr, NASA, Academician A. Galeev, Space Research Institute, Moscow, Doctor R. M. Bonnet, ESA, and Doctor Ichiro Nakatani representing Professor A. Nishida, Institute of Space and Astronomical Science, Tokyo) of their thinking about future planetary missions. The escalating costs of such missions has led to renewed emphasis on contributions by many countries to each mission and on small dedicated missions.

We express our appreciation to staff of the Royal Society, especially Christine Johnson, in the organization of the meeting and to the editorial staff, especially Jonathan Wainwright, for seeing the papers through to press.

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