PREFACE

The concept of holding a conference in 1986 that would cover the rotation of the Earth, the terrestrial reference system and their applications to geophysics was agreed at the meeting of the MERIT/COTES Steering Committee that was held during the Second MERIT Workshop at the Royal Greenwich Observatory in May 1983. Many of the results that had been obtained by analyzing observational data from the MERIT/COTES Main Campaign of 1983/4 were presented at the International Conference on Earth Rotation and the Terrestrial Reference Frame that was held in conjunction with the Third MERIT Workshop at Columbus, Ohio, in August 1985, or at other later conferences. These results demonstrated the success of the MERIT/COTES project in stimulating the use of new techniques of high precision for the regular determination of earth- rotation parameters. This follow-up Symposium on Earth Rotation and Reference Frames for Geodesy and Geodynamics addressed two closely related topics: the observation and prediction of variations in the Earth's rotation, in terms of both statistical behaviour and geophysical interpretation, and the impact of the MERIT/COTES project on the theoretical and practical aspects of reference-frame definitions.

The recent improvements in the precision of observation and hence of the determination of the earth-rotation parameters have made it possible to determine celestial coordinates with a precision of the order of 1 mas (about 5 nanoradians) and to determine terrestrial coordinates with a precision of the order of 1 cm. At present, the differences between the results of different techniques (and of different implementations of one technique) are usually greater than this, but the presentations and discussions at this Symposium have helped to identify the methods that may be used to realize the full potential of the observations. An accurate knowledge of the Earth's orientation in space is needed in real-time for some applications, such as the navigation of spacecraft in the outer solar system, and so a reliable technique for the prediction of earth-rotation parameters is needed. Consideration was given to the possible use of weather forecasts to predict the variations in the angular momentum of the atmosphere that are accompanied by corresponding variations in the rotation of the Earth. On the other hand, the new observations on the Earth's rotation were shown to require that the shape of the boundary between the core and mantle of the Earth differs from that adopted in current models. The papers presented at the Symposium on these and many other topics demonstrated clearly the great scientific interest that is associated with the rotation of the Earth.

This Symposium was sponsored by the International Astronomical Union (IAU) and by the International Association of Geodesy (IAG). It also received support from the U. S. Naval Observatory, the National Geodetic Survey, the Defense Mapping Agency and the Naval Research Laboratory. The Chairman of the Scientific Organising Committee was D. D. McCarthy and the names of others who shared in the work of organising the Symposium are given later. At first it was suggested that the Symposium would be held in Washington in June, but it was later decided to hold

it in October (in order to avoid any conflict with the COSPAR General Assembly, which was held in Toulouse in July) and at the Coolfont Recreation Center in the mountains of West Virginia. The decisions about time and place proved to be sound; the pleasant sunny weather and the beautiful colors of the trees around the Center added much to the success of the conference.

As editors we were faced with the usual dilemma of whether to publish an incomplete volume or to delay publication by waiting for late papers and chasing discussion notes. The second policy appeared to be appropriate but, because of other demands on our time, the total delay has been much longer than we had expected. We apologise to those authors who supplied good quality camera-ready copy for their papers in good time. We were also faced with copy of varying quality and format. Many authors took advantage of the availability of small laser printers and sophisticated software for the composition of text and mathematics and supplied high-quality copy, but at the other extreme we have found it necessary to revise and retype some contributions. We hope that the final mixture of style and standards will be acceptable, even though we are aware that the differences in appearance and inconsistencies in usage will distract some readers.

In compiling this record of the proceedings of the Symposium we have not followed in detail the chronological sequence of presentation, and we have not distinguished between oral and poster contributions. Only a few papers are missing, but the discussion notes given with the papers do not reflect properly the full extent of the discussions that took place during the Symposium. Open meetings of the IAU Working Group on Reference Frames and of the IAG Special Study on the Atmospheric Excitation of the Earth's Rotation were organised by J. Hughes and J. O. Dickey, respectively. The second meeting of the Provisional Directing Board of the International Earth Rotation Service was held under the chairmanship of G. A. Wilkins. The organisers of these meetings presented short reports at the final session of the Symposium, just prior to the consideration of the resolutions that are given in their final form at the end of this volume. We have not included these reports, nor have we been able to record the amusing speech on "Geotics" given by Professor Irwin I. Shapiro at the banquet that was held during the evening of 23 October.

We are grateful to all the persons who have helped us in the compilation of this volume. In particular, we would like to thank Mrs Annette Hedges (Royal Greenwich Observatory) for her secretarial assistance.

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