

PREFACE

The latest observations of the motion of the Earth's pole with respect to the terrestrial reference frame have not only achieved unprecedented accuracy, but these data are now being obtained with subdaily frequency, a situation unexpected only a few years ago. These circumstances call into question the very definition of the celestial ephemeris pole. The astronomical observations available from monitoring the satellites of the Global Positioning System, laser ranging to geodetic satellites, and Very Long Baseline Interferometry (VLBI), together with ocean and meteorological data of unprecedented accuracy and frequency, may permit a new understanding of the excitation of polar motion. These new data combined with a century of past observations provide further information, for example, on the secular motion of the pole which, in turn, contributes to an improved understanding of state-of-the-art geophysical models.

These issues, and the occasion of the centennial of the first observations of the International Latitude Service (ILS), provided the impetus for IAU Colloquium 178, "Polar Motion: Historical and Scientific Problems." Cagliari, Italy, capital of the autonomous region of Sardinia and situated on its southern coast, provided the scenic backdrop for the conference. It was held at the "Cittadella Universitaria," the new settlement of the Cagliari University in the immediate outskirts of the city, from Monday, September 27 through Thursday, September 30, 1999.

The ILS was organized in 1895 by the forerunner of the International Association of Geodesy, and was composed of observing sites on the parallel of 39 degrees 8 minutes North. The goal was to make astronomical observations to describe the motion of the Earth's rotation pole. In 1962 the ILS was reorganized into the International Polar Motion Service (IPMS), and in 1988 the IPMS was discontinued when the International Earth Rotation Service commenced. During its history the ILS/IPMS provided valuable observations of polar motion that continue to be analyzed today.

Many of the questions that the ILS was organized to address still remain, including the enigmatic nature of the excitation and damping of the free polar motion. The definition of the international celestial and terrestrial reference systems are based on the ILS definition of the pole. Today's precise astronomical and geodetic observations now require a re-definition of that pole to correspond with modern levels of precision. The centennial of the first observations of the ILS provided a fitting opportunity to address these problems, as well as the historical problems related to polar motion studies.

The Colloquium was held under the auspices of the International Astronomical Union. Commission 41 (History of Astronomy) was the sponsoring Commission, with support from Commissions 19 (Earth Rotation) and 31 (Time). It was co-sponsored by the International Association of Geodesy, the International Earth Rotation Service, and the International GPS Service. This range of support is an indication of how important polar motion and Earth orientation have become to a much broader range of disciplines than could have been foreseen a century ago. The dual focus of the meeting on history and science is an example of how the two can work together to shed light on problems of common interest.

Stazione Astronomica of Cagliari-Carloforte hosted the event, and also commemorated its centennial as one of the original ILS stations. A memorable excursion to the Carloforte site, on the little island of San Pietro about 90 km west of Cagliari, recalled the dedication of the many ILS observers who sacrificed much to obtain the astronomical data so important to our understanding of the Earth's motions. Another memorable event was the conference dinner and folk show in the typical Sardinian restaurant "Kalagonis" at Maracalagonis, a little country town near Cagliari.

Financial support for the meeting also came from the Ministero dell' Università e della Ricerca Scientifica e Tecnologica, Regione Autonoma della Sardegna and Comune di Monserrato.

We wish to extend our sincere thanks to the Scientific Organizing Committee, consisting of S. Dick (USA, chair), G. Beutler (Switzerland), N. Capitaine (France), T. Fukushima (Japan), D. Gambis (France), D. McCarthy (USA), E. Proverbio (Italy), J. Vondrák (Czech Republic), and Ya. Yatskiv (Ukraine). The Local Organizing Committee, whose members were F. Fusi Pecci (co-chair), E. Proverbio (co-chair), P. Calledda, C. Pili, A. Poma, S. Uras, and T. Zanzu, also deserves thanks for the innumerable details that went into making the meeting memorable for both history and science.

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Front cover illustration: Old and new techniques for polar motion include the Visual Zenith Tube and radio telescopes.