

Preface

The famous Hotine-Marussi Symposium series is held once every four years and has been traditionally focused on mathematical geodesy. The VI Hotine-Marussi Symposium was organized by the Intercommission Committee on Theory (ICCT) and successfully held from 29 May to 2 June, 2006, at Wuhan University, PR China, with 162 registered scientists and students from 20 countries and regions, in addition to many more unregistered attendees. It was kindly sponsored by the International Association of Geodesy and Wuhan University.

The VI Hotine-Marussi Symposium was unique in the senses that: (i) this is the first Hotine-Marussi symposium to go beyond mathematical geodesy; (ii) this is the first time for a Hotine-Marussi symposium to be held outside Europe; and (iii) this is the first time that a Hotine-Marussi symposium was organized by an IAG entity instead of by Prof. F. Sanso and his group, as was traditionally the case. An attentive reader might soon notice the change of the title for the VI Hotine-Marussi Symposium. Indeed, this should be one of the most important aspects of the Symposium and was carefully designed as a result of many hours of discussion among Prof. A. Dermanis (ICCT Vice President), Prof. F. Sanso (IAG Past President and past organizer of the Hotine-Marussi symposia), Prof. J.N. Liu (President of Wuhan University) and P.L. Xu (ICCT President), in particular, also among the Scientific Committee members Prof. J.Y. Chen, Prof. B. Chao, Prof. H. Drewes, Prof. H.Z. Hsu, Prof. C. Jekeli, Dr. N.E. Neilan, Prof. C. Rizos and Prof. S.H. Ye.

In fact, as part of the IAG restructuring, the ICCT was formally approved and established after the IUGG XXIII Assembly in Sapporo, to succeed the former IAG Section IV on General Theory and Methodology, and more importantly, to actively and directly interact with other IAG Entities. The most important goals and/or targets of the ICCT are: (1) to strongly encourage frontier mathematical and physical research, directly motivated

by geodetic need/practice, as a contribution to science/engineering in general and the foundations for Geodesy in particular; (2) to provide the channel of communication amongst the different IAG entities of commissions/services/projects, on the ground of theory and methodology, and directly cooperate with and support these entities in the topics-oriented work; (3) to help the IAG in articulating mathematical and physical challenges of geodesy as a subject of science and in attracting young talents to geodesy; and (4) to encourage closer research ties with and directly gets involved with relevant areas of the Earth Sciences, bearing in mind that geodesy has been playing an important role in understanding the physics of the Earth. In order to partly materialize the ICCT missions, we decided to use the VI Hotine-Marussi Symposium as a platform for promoting what we believe would be of most importance in the near future and for strengthening the interaction with commissions. This should clearly explain why we further decided to modify the traditional title of Hotine-Marussi symposia from “Mathematical Geodesy” to “Theoretical and Computational Geodesy”, with a subtitle to emphasize challenge, opportunity and role of modern geodesy, and why you could see from our symposium programs that the IAG President Prof. G. Beutler, the IAG Secretary General Prof. C.C. Tscherning and IAG commission Presidents Prof. H. Drewes, Prof. C. Rizos were invited to deliver invited talks at the Symposium, with our great honour, pleasure and gratitude.

Scientifically, recognizing that geodetic observing systems have advanced to such an extent that geodetic measurements:

- (i) are now of unprecedented high accuracy and quality, can readily cover a region of any scale up to tens of thousands of kilometers, consist

of non-conventional data types, and can be provided continuously;

- (ii) consequently, demand new mathematical modeling in order to obtain best possible benefit of such technological advance; and
- (iii) are finding applications that were either not possible due to accuracy limit or were not thought of as part of geodesy such as space weather and/or earth-environmental monitoring,

we designed and selected for the symposium the following five topics:

- (i) Satellite gravity missions: open theoretical problems and their future application;
- (ii) Earth-environmental, disaster monitoring and prevention by Geodetic methods;
- (iii) GNSS: Mathematical theory, engineering applications, reference system definition and monitoring;
- (iv) Deterministic and random fields analysis with application to Boundary Value Problems, approximation theory and inverse problems; and
- (v) Statistical estimation and prediction theory, quality improvement and data fusion.

Some of these are either of urgent importance to geodesy or are of potentially fundamental importance to geodesy, but not necessarily limited to geodesy, at the very least, from our point of view. To name a few examples, let us say that: (i) satellite gravity missions are of current importance in and far beyond geodesy, environmental monitoring, for example; (ii) seafloor geodesy will become essential in the next one or two decades in Earth Sciences, even though the invited speakers could not find time to contribute their papers on the topic; and (iii) mixed integer linear models should be a subject that geodesists can make greatest possible contributions to mathematics and statistics.

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