

## **Report on the Intercommission Committee on Theory**

When the Intercommission Committee on Theory (ICCT) was established at the 2003 IUGG General Assembly in Sapporo, we stated our missions as follows:

- (1) strongly encourages 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) provides the channel of communication amongst the different IAG entities of commissions, services, and/or projects, on the ground of theory and methodology, and directly cooperate with and support these entities in the topics-oriented work;
- (3) helps the IAG in articulating mathematical and physical challenges of geodesy as a subject of science and in attracting young talents to geodesy. The ICCT should certainly try to attract and serve as home to mathematically motivated geodesists and to applications-oriented applied mathematicians; and
- (4) encourages 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 advance our missions, the ICCT strongly encourages research on precise ocean bottom geodetic deformation measurement, GPS mathematics and mathematical modeling of highly precise space geodetic measurements, which are believed either as one of the most important directions for geodesy in the next decade(s) or so, or as one of the most possible contributions to mathematics from geodesists, or in order to meet the need and challenge of modern space geodesy. However, we have always kept in mind that new theory/methods can be borne out of “old practical problems”. Thus we never forget encouraging giving new insights into “old-fashioned or traditional problems”. Obviously, our missions will also have to be realized in another way via the activities of our working groups, some of which have been very active, for example, the working group headed by Dr Wolf has successfully held a workshop as one of the most important activity of his group.

More practically, the ICCT has been working on two projects. As the first project, we asked two of our working groups to work together in order to collect all the most recent progress on gravity field modeling and inverse problem theory and get it published as a special issue of *J Geod*. The project is working very well and will soon be undergoing the review process; As the second project, the ICCT is preparing the VI Hotine-Marussi Symposium to be held at Wuhan University, PR China, 29 May – 2 June 2006. The first phase for the Symposium has been well prepared and basically finished. The Symposium will serve two purposes: (i) to summarize important theoretical progress achieved; and (ii) to provide an opportunity for theoretically-oriented and practically-oriented geodesists to exchange ideas/opinions on any issues/problems of common interest. In particular, we hope that theoretically-oriented geodesists could gain new insights from “seemingly” practical problems for new inventions and practically-oriented geodesists could find new ideas/methods to retreat more or better physical information from geodetic measurements. The Symposium will focus on the following five topics: (1). Satellite gravity missions: open theoretical problems and their future application; (2). Earth-environmental, disaster monitoring and prevention by Geodetic methods; (3). GNSS: Mathematical theory, engineering applications, reference system definition and monitoring; (4). Deterministic and Ramdon fields analysis with application to BVP, approximation theory and inverse problems; and (5). Statistical estimation and prediction theory, quality improvement and data fusion. We will be planning other activities at the Committee level if necessary and if certain resources would be available.