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## Preface

Reference systems and frames are of primary importance for many Earth science applications, satellite navigation as well as for practical applications in geo-information. A precisely defined reference frame is needed for the quantification of, e.g. Earth rotation and its gravity field, global and regional sea level variation, tectonic motion and deformation, postglacial rebound, geocenter motion, large-scale deformation due to Earthquakes, local subsidence and other ruptures and crustal dislocations. All of these important scientific applications fundamentally depend on a truly global reference system that only space geodesy can realize.

IAG Commission 1 activities are to deal with theoretical aspects of reference systems and the practical applications for their realizations as well as applied researches. The main objectives of Commission 1 are:

- Definition, establishment, maintenance and improvement of the geodetic reference frames
- Advanced terrestrial and space observation technique development for the above purposes
- International collaboration for the definition and deployment of networks of terrestrially based space geodetic observatories
- Theory and coordination of astrometric observation for reference frame purposes
- Collaboration with space geodesy/reference frame-related international services, agencies and organizations
- Promoting the definition and establishment of vertical reference systems at the global level, considering the advances in the regional sub-commissions

In order to review the progress in the above objectives, the Commission had organized the IAG Symposium “Reference Frames for Applications in Geosciences (REFAG2010)”, held in Marne la Vallée, France, during October 4–8, 2010, at the premises of Ecole Nationale des Sciences Géographiques & Université de Marne La Vallée. The primary scope of REFAG2010 was to address today’s achievements on theoretical concepts of reference systems and their practical implementations by individual space geodetic techniques and their combinations, underlying limiting factors, systematic errors and novel approaches for future improvements. Additionally, reference frame requirements, usage and applications in geosciences were also addressed during the Symposium. The program of the Symposium was divided into six sessions:

1. Theory and realization of global terrestrial reference systems
2. Strengths, weaknesses, modelling standards and processing strategies of space geodetic techniques
3. Definition, establishment, maintenance and integration of regional reference frames
4. Interaction between the celestial and the terrestrial reference frames
5. Definition and establishment of vertical reference systems
6. Usage and applications of reference frames in Geosciences

The Scientific organizing Committee consisted of:

- Zuheir Altamimi (IAG Commission 1 President)
- Mike Craymer (IAG Commission 1 Vice President)
- Markus Rothacher (President SC1.1)
- Claude Boucher (President SC1.2)
- João Torres (President SC1.3)
- Harald Schuh (President SC1.4)

and the local organizing committee consisted of:

- Xavier Collilieux
- David Coulot
- Laurent Métivier
- Christiane Guerin

who are members of the Geodetic Research Laboratory (LAREG) of the Institut National de l'Information Géographique et Forestière (IGN) , France.

More than 150 scientists from 31 countries attended the Symposium. There were 43 oral and 25 poster presentations during the 5 days of the Symposium. More information is available at the REFAG2010 Symposium web site: <http://iag.ign.fr/index.php?id=138>. Forty papers were peer-reviewed and published in these proceedings, summarizing the main outcome of the Symposium.

The Symposium and the review process would not have been possible without the contribution of the following colleagues who acted as session conveners and associated editors, in alphabetic order: Claude Boucher, David Coulot, Mike Craymer, Richard Gross, Johaness Ihde, Frank Lemoine, Markus Rothacher, Harald Schuh, Michael Sideris, Peter Steigenberger and João Torres. I am also very grateful to all the reviewers listed in the front matter of these Proceedings for their concise reviews of the REFAG papers. My deep gratitude goes to my IGN colleagues who organized the logistics of the Symposium, and in particular to my co-editor, Xavier Collilieux, who created, managed and operated not only the Symposium website, but also the website of the Commission during its 4-year term (2007–2011).

Zuheir Altamimi  
President, IAG Commission 1 (2007–2011)

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