

Joint Working Groups of Commission 2

JWG 2.1: Relativistic Geodesy: Towards a new geodetic technique

(joint with Commission 1, ICCT)

Chair: Jakob Flury (Germany)

Vice-chair: Gerard Petit (France)

Terms of Reference

In recent years major technology breakthroughs on the fields of optical frequency standards and optical frequency transfer have been achieved, which provide a new basis for relativistic geodesy. Optical frequency standards at the leading National Metrology Institutes today have relative frequency inaccuracies in the order of 10⁻¹⁷ to 10⁻¹⁸ range, and long-distance optical frequency transfer through phase-stabilized optical fiber has been demonstrated even with a relative frequency inaccuracy at the 10⁻¹⁹ level. The current, very dynamic activities on the field of optical frequency transfer are expected to pave the way towards continental or even global clock networks. This development will contribute to a redefinition of the SI second based on optical standards, and it could allow tying height reference and height networks to atomic standards. In addition, upcoming space missions such as Microscope and GRACE Follow-On will provide measurements at an accuracy level that is very relevant for relativistic geodesy. The Joint Working Group 2.1 will foster the exchange on concepts and methods in relativistic geodesy and will promote the development of clock networks and their use for relativistic geodesy. This requires strong links with time and frequency metrology and, in this aim, the JWG will establish liaisons with the Consultative Committee on Time and Frequency (CCTF) of BIPM to enhance communication and coordination. Within IAG, the group is joint and with IAG Sub-Commission 1-2 on Global Reference Frames to enhance communication and coordination.

Goals and Objectives

- Act as interface between groups in geodesy (gravity fields, reference frames...) and in time and frequency metrology (clock development, clock comparisons ...);
- Provide a platform to promote the further development and application of relativistic geodesy, e.g. in physics, astronomy and other fields of geodesy and metrology;
- Foster the geodetic interests in the realization of the concept of relativistic geodesy;

- Develop an optimal strategy for the installation and analysis of clock networks and for the combination of clock data with classical geodetic data (e.g. for height systems);
- Advocate the implementation of a clock network of sufficient capability to obtain data products essential for geodetic applications;
- Study the use of clock networks in space;
- Provide relevant information for the geodetic community including key contacts and links;
- Organize meetings and sessions on relativistic geodesy;
- Prepare a document on the perspectives and applications of relativistic geodesy.

Program of Activities

The JWG 2.1 will work on meeting these objectives. In particular, the group will meet regularly during major conferences on geodesy and on time and frequency metrology, such as IAG Scientific Assembly, IUGG General Assembly, IFCS, EFTF. If needed, dedicated meetings will be organized. The group will exchange information and discuss questions on measurement techniques, standards, and analysis methods. The group will foster communication and coordination related to measurement campaigns and infrastructure in clock networks and Relativistic Geodesy. If appropriate, the group will make recommendations on methods of measurement and analysis.

Members

Jakob Flury (Germany), Chair
Gerard Petit (France), Vice-chair
Geoff Blewitt (US)
Claude Boucher (France)
Pascale Defraigne (Belgium)
Pacome Delva (France)
Gesine Grosche (Germany)
Claus Lämmerzahl (Germany)
Christian Lisdat (Germany)
Jürgen Müller (Germany)
Pavel Novak (Czech Republic)
Paul Eric Pottie (France)
Bijunath Patla (US)
Nikos Pavlis (US)
Stefan Schiller (Germany)
Piet Schmidt (Germany)
Pieter Visser (The Netherlands)
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