VII SIRGAS School on Reference Systems

Santo Domingo, Dominican Republic, November 16 - 17, 2015

Sponsored by

- International Union of Geodesy and Geophysics - IUGG
- International Association of Geodesy - IAG
- International Association of Geomagnetism and Aeronomy - IAGA
- International Association of Seismology and Physics of the Earth's Interior - IASPEI
- Pan-American Institute for Geography and History - PAIGH
- Geocentric Reference System for the Americas - SIRGAS

Scope

The *VII SIRGAS School on Reference Systems* is addressed to all scientists, professionals, and technicians whose activities are related to the generation, usage, administration and interpretation of geo-data requiring high-precision positions and ionopsheric parameters.

Purpose

The main objective of the School is to strengthen the basic concepts needed for the appropriate generation and use of fundamental geodetic and geophysical data in the Caribbean Region, especially for studying, understanding and modelling deformations of the Earth's surface and features of the ionosphere and its influence on navigation systems used for civil aviation.

Duration and language

The School will be conducted in English and is scheduled in two seven-hour sessions from November 16 to 17, 2015. It will be held at the same place and in the previous days to the Symposium SIRGAS 2015, in such way that attendants to the School can also participate in the Symposium (which will be conducted in Spanish with presentations also in English and Portuguese). In addition to the lectures, attendants will have the opportunity of discussing about practical problems in open panels at the end of each topic.

Content

1. Types of coordinates, their definitions, relations and transformations (L. Sánchez)
   - 1.1 Cartesian 3D coordinates [X, Y, Z]
   - 1.2 Ellipsoidal coordinates [φ, λ, h]
   - 1.3 Local (topocentric) coordinates [n, e, u]
   - 1.4 Plane (cartographic)Coordinates [N, E]
   - 1.5 Coordinates transformation and conversion

2. Reference systems and frames (H. Drewes)
   - 2.1 Inertial conventional reference system
   - 2.2 International celestial reference system and frame (ICRS, ICRF)
   - 2.3 International terrestrial reference system and frame (ITRS, ITRF)
   - 2.4 ICRS – ITRS relations (precession, nutation, polar motion, length of day)

3. Coordinates determination from GNSS (C. Brunini)
   - 3.1 GNSS observables
   - 3.2 Observation equations
   - 3.3 Errors generated by the Earth atmosphere (neutral and ionized)
   - 3.4 Other error sources (multipath, thermal noise, electronic delays)
   - 3.5 Coordinates computation and error estimation

4. Vertical reference systems (L. Sánchez)
   - 4.1 Ellipsoidal (GPS) heights

4.2 Physical heights
4.3 Reference surfaces (ellipsoid, geoid, quasi-geoid)
4.4 Classical vertical datums
4.5 Modern vertical reference systems

5. Reference system and frame for the Americas (SIRGAS)
   5.1 Definition, realization, purposes, organization issues (C. Brunini)
   5.2 Dissemination and application of SIRGAS products (L. Sánchez)
   5.3 SIRGAS scientific objectives (H. Drewes)

Lecturers

Prof. Hermann Drewes is the Secretary General of the International Association of Geodesy (IAG), Honorary Professor of the *Technische Universität München*, Germany, and former Director of the *Deutsches Geodätisches Forschungsinstitut* (DGFI). He was appointed to the Representative of the International Union of Geodesy and Geophysics (IUGG) in the Pan-American Institute for Geography and History (PAIGH) in 2005 and to the Representative of the IAG in the SIRGAS Directing Council in 1995. His principal research areas are geodetic reference frames, chairing the DGFI Combination Centre for the ITRF2005 and ITRF2008, and geodetic geodynamics, computing the Actual Plate Kinematic and Crustal Deformation Models (APKIM) and the Velocity Models for South America and the Caribbean (VEMOS).

Prof. Claudio Brunini is Professor at the Universidad Nacional de La Plata (Argentina) and scientist of the *Consejo Nacional de Investigaciones Científicas y Técnicas* (CONICET) of Argentina. In 2007 he was elected SIRGAS President and re-elected in 2011. He has been granted by the Humboldt Foundation with a *Georg Forster Stipendium*. From 2000 to 2008 he joined the Editorial Board of Journal of Geodesy. His main research activities concentrate on the ionospheric modelling in four dimensions by combining different space geodetic techniques. He is co-author of over 50 publications in peer-reviewed journals. Since 2011, he a member of the Executive Committee of the International Association of Geodesy (IAG).

Dr. Laura Sánchez is Research Associate at the *Deutsches Geodätisches Forschungsinstitut der Technischen Universität München* (DGFI-TUM) since 2005 and acts as SIRGAS Vice-President since 2007. She is responsible for the Regional Network Associate Analysis Centre for SIRGAS of the International GNSS Service (IGS) and for the SIRGAS Processing and Combination Centres at DGFI-TUM. Her main research activities concentrate on the vertical datum unification problem and on the long-term stability in the regional realisation of geodetic reference systems. At present, she chairs the Working Group on Vertical Datum Standardisation of the Global Geodetic Observing System (GGOS) and contributes to the Working Groups "Strategies for Epoch Reference Frames", "Integration of Dense Velocity into the ITRF", and "Deformation Models for Reference Frames" of the International Association of Geodesy (IAG). She is an Associate Editor of the IAG Symposia series since July 2011.