

**Report on the SIRGAS Working Group III “Vertical Datum” Workshop 2016
Quito, Ecuador, November 21 to 25, 2016**

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The main objective of the SIRGAS (Sistema de Referencia Geocéntrico para las Américas, Geocentric Reference System for the Americas) Working Group III Workshop 2016 was to face the challenges associated with the unification of vertical networks in the SIRGAS region by promoting each member country as a protagonist in the related activities. This Workshop is in the sequence of the SIRGAS WG III capacity building held as the SIRGAS School on Vertical Reference Frames in Rio de Janeiro, Brazil, 2012, and as Workshops in La Paz, Bolivia, 2014, and Curitiba, Brazil, 2015. The Workshop 2016 took place in Quito, Ecuador from November 21 to November 25, with the support of the Military Geographic Institute, Ecuador, the Pan-American Institute of Geography and History (PAIGH) and the International Association of Geodesy (IAG). It involved 44 persons from 10 countries of South America, Central America and the Caribbean (Argentina, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Panama, Peru and Uruguay). Most of the participants are working in institutes in charge of the national vertical networks. The main motivation of the Workshop 2016 was in the context of the new IHRS (International Height Reference System) conception, its realization (IHRF), and the future Global Geodetic Reference Frame (GGRF) proposed by the United Nations Resolution (A/RES/69/266) in February 26, 2015. The specific objectives involved the classical and modern aspects related to the realization of vertical reference networks and gravity networks. In this context are the following protocols of SIRGAS WG III related to the national vertical networks of member countries:

- Strategies to realize vertical networks by physical heights [$H_p = f(C_p)$];
- Link of national vertical networks to the SIRGAS GNSS continuous stations;
- Integration of national vertical networks of members countries in the geopotential space;
- Approaches for referring the SIRGAS Vertical Network to the W_0 value of IHRS;
- Association to a specific epoch by considering the realization epoch and temporal variations of coordinates;
- Planning of activities for establishing a GGRF station profile in the SIRGAS region;
- Future link of the SIRGAS Vertical Network to a profile of GGRF stations.

The Workshop coordinated by Prof. Dr. Sílvio R.C. de Freitas, Chair of the SIRGAS WG III, involved two parts. The 16 hours first part was directed to the foundations and data processing strategies related to vertical reference systems/frames as well as gravity reference systems/frames. The 24 hours second part was directed to the analysis of databases and data processing of the national vertical network realization in the geopotential space by introducing the geopotential numbers. The basis of data processing was a software package developed by Prof. Dr. Hermann Drewes and Dr. Laura Sánchez. They acted as instructors in the Workshop. Preliminary analyses of the consistency of national nets were done by using a software package developed by Prof. Dr. Roberto Teixeira Luz who also acted as instructor in the Workshop. All software was furnished freely for all participants.

A series of activities were coordinated for the solution of problems related to the national networks involving original data, data completion, temporal deformations, vertical datum and the link of networks of neighboring countries. The integration of gravity data was an important subject along with the activities. Other aspects were discussed as the planning for the future profile of GGRF stations in the SIRGAS context.

Different stages of development among the countries may be mentioned. Argentina and Uruguay concluded the geopotential differences adjustment of their nodal vertical networks points. Most of the countries have got partial or preliminary results. However, there was gain for each country when considering the positive results related to the understanding of problems related to their networks and the increase of their capability in data processing. No doubts, the ongoing IAG activities related to the IHRs/GGRF are now diffusing in the SIRGAS community.



Attendants to the SIRGAS "Vertical Datum" Workshop 2016, Quito, Ecuador, November 21 to 25, 2016.