SIRGAS Continuously Operating Network (SIRGAS-CON)

June 2009

General description

SIRGAS is the Geocentric Reference System for the Americas. Its definition corresponds to the IERS International Terrestrial Reference System (ITRS) and it is realized by a regional densification of the International Terrestrial Reference Frame (ITRF). Besides the geometrical reference system, SIRGAS includes the definition and realization of a vertical reference system.

SIRGAS was created in 1993 under the sponsorship of International Association of Geodesy (IAG), the Pan-American Institute for Geography and History (PAIGH), and the US National Imagery and Mapping Agency (NIMA), today National Geospatial-Intelligence Agency (NGA).

The original acronym of SIRGAS (Geocentric Reference System for South America) was changed in 2001 to Geocentric Reference System for the Americas, after the extension of the SIRGAS network to Central America, and the United Nations Organization recommendation to adopt SIRGAS as official reference system in all American countries.

SIRGAS is a member of the IAG Commission 1 (Reference Frames), through the Sub commission 1.3 (Regional Reference Frames), and it is responsible for the Regional Reference Frame for South and Central America (1.3b). SIRGAS is also a Working Group of the Cartographic Commission of the PAIGH.

Organisation

SIRGAS-CON network encompasses almost 200 GNSS receivers distributed all over the South and Central America continents, 50 of them belonging to the global IGS network (see Fig.1). The operational performance of SIRGAS-CON is based on the contribution of more than 50 Latin American organizations, which install and operate the permanent stations and voluntarily provide the tracking data. Many GNSS receivers have been provided by international research projects interested on geodynamics and atmospheric studies in the SIRGAS region. Data policy is primarily established by the organization that operates the receivers. Some organizations allow unrestricted access to data but others requires a special authorization.

The administrative issues of SIRGAS are managed by a Steering Council, which depends on the Executive Committee, main body of the organization. The official policies and recommendations of SIRGAS are approved and given by the Executive Committee. Since this Committee is composed by one representative of each member country and one of each supporting entity, it is also in charged of communicating the SIRGAS recommendations to the national bodies responsible for the local geodetic reference systems. The scientific and technical activities are coordinated by the Working Groups in close cooperation with the Scientific Council and the representatives of IAG (International Association of Geodesy) and PAIGH (Pan-American Institute for Geography and History).

Type of equipment

All SIRGAS-CON stations fulfill the IGS standards concerning GNSS receiver, antennas, site location, monumentation and documentation.

Control Centres

The SIRGAS-CON network comprises two hierarchy levels:

1. One core network (SIRGAS-CON-C), densification of ITRF in Latin America, with a good continental coverage and stabile site locations to ensure high long-term stability of the reference frame.

2. Several densification sub-networks (SIRGAS-CON-D), which should correspond to the national reference frames realized by continuously operating stations. At the moment, there are three SIRGAS-CON-D sub-networks (a northern one, a middle one, and a southern one), but in the future, there shall be given so many SIRGAS-CON-D sub-networks as countries in the region.

The SIRGAS-CON-C network is processed by the IGS-RNAAC-SIR (i.e. DGFI: Deutsches Geodätisches Forschungsinstitut, Germany). The SIRGAS-CON-D sub-networks are computed by the SIRGAS Local Processing Centres, which at present are: Instituto Brasileiro de Geografia e Estatistica, Brazil (IBGE), Instituto Geográfico Agustín Codazzi, Colombia (IGAC), and Instituto de Geodesia y Geodinámica at the Universidad Nacional del Cuyo, Argentina (IGG-CIMA). These processing centres deliver loosely constrained weekly solutions for the densification SIRGAS-CON-D sub-networks, which are combined with the SIRGAS-CON-C core network to get homogeneous precision for station positions and velocities in a continental level. The SIRGAS Combination Centres are DGFI and IBGE. The final SIRGAS coordinates and velocities are provided by DGFI as IGS-RNAAC-SIR. The main products are: loosely constrained weekly station coordinates in SINEX format for the IGS polyhedron solutions; constrained weekly coordinates for practical applications in Latin America; and multi-annual (cumulative) solutions (coordinates + velocities) for practical and scientific applications requiring time depending positioning.

Services and products

SIRGAS provides access to the GNSS observations collected by the SIRGAS-CON network (daily files, compressed RINEX format, with 15-30 sec sampling rate). Besides, SIRGAS delivers to users several products elaborated from those data, namely: loosely constrained weekly station coordinates in SINEX format; constrained weekly coordinates; multi-annual (cumulative) solutions (coordinates + velocities); hourly maps of vertical total electron content for the SIRGAS region.

Users

SIRGAS has been adopted as the oficial reference frame in 13 of its 18 member countiries. SIRGAS is the backbone for all projects based on the generation and use of geo referenced data in a national as well in an international level. Besides to provide the reference coordinates for the development of practical applications such as engineering projects, digital administration of geographical data, geospatial data infrastructures, etc., SIRGAS is also the platform for a wide range of scientific applications such as the monitoring of cortical deformations, vertical movements, sea level variations, atmospheric studies, etc.

Contact information

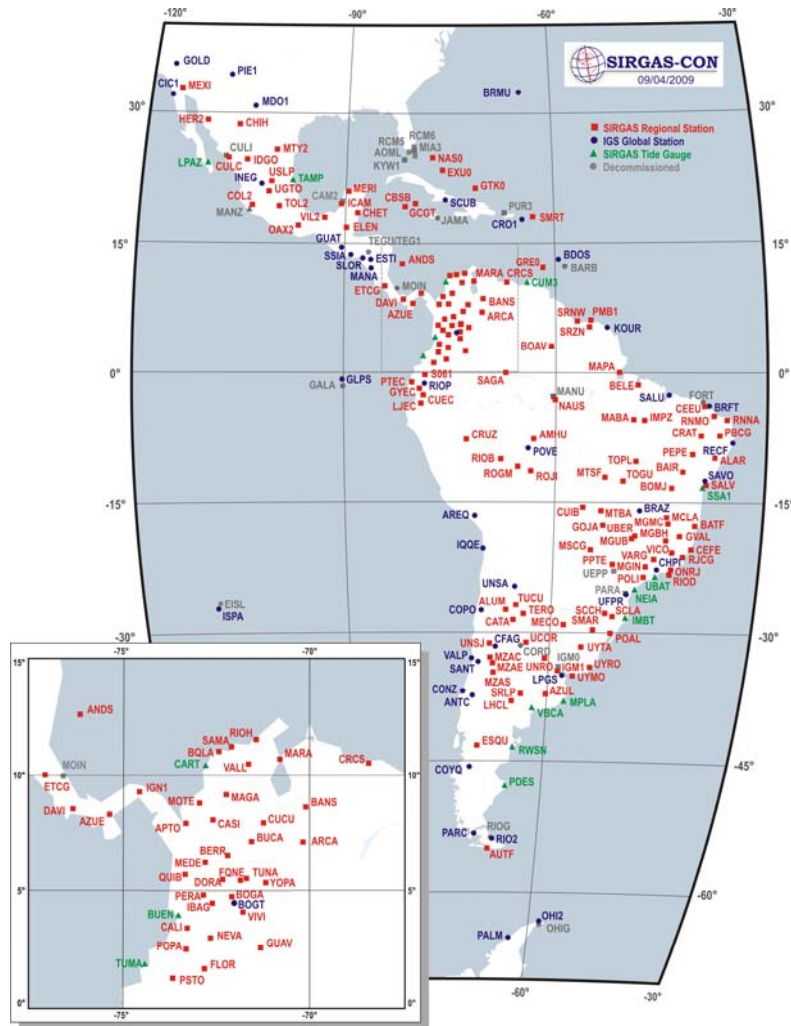sirgas@dgfi.badw.de

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Figure 1. Distribution of SIRGAS-CON stations as by April 2009. Different colors correspond to Regional Stations (red); Global Stations (blue); Stations co-located with tide gauges (green); and decommissioned stations (gray).