



*Workshop for the Implementation of the GGRF in Latin America  
Buenos Aires, Argentina, Sep. 16 – 20, 2019.*

# ***Sustainability of the regional reference frame organization in Latin America***



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## **The GGRF road map**

**Data sharing** ➔ *Development of geodetic standards and open geodetic data sharing are required to enhance and develop the Global Geodetic Reference Frame (GGRF).*

**Education and capacity building** ➔ *Appropriate geodetic skills and educational programs are essential for the development, sustainability and utilization of the GGRF.*

**Communication and outreach** ➔ *It is imperative to develop communication and outreach programs that enable the global geodetic reference frame to be more visible and understandable to society.*

**Geodetic infrastructure** ➔ *A more homogeneous distribution of geodetic infrastructure is needed to develop and utilize an accurate GGRF.*

**Governance** ➔ *The development and sustainability of the global geodetic reference frame is reliant on an improved governance structure*

## **More than 25 years**

*SIRGAS was established in 1993 by the International Conference for the Definition of a South American Geocentric Reference System, jointly convened by the IAG, PAIGH & DMA.*

*Its objective is to define, realize and maintain the 3-D geocentric reference system for the Americas, including a globally consistent system for physical heights (2011 Statute).*

*Today, 21 countries in the Americas are formally present in SIRGAS.*

*Argentina*

*Bolivia*

*Brazil*

*Chile*

*Colombia*

*Costa Rica*

*Dominican*

*Republic*

*Ecuador*

*El Salvador*

*USA*

*Guatemala*

*Guyana*

*French*

*Guyana*

*Honduras*

*Mexico*

*Nicaragua*

*Panama*

*Paraguay*

*Peru*

*Uruguay*

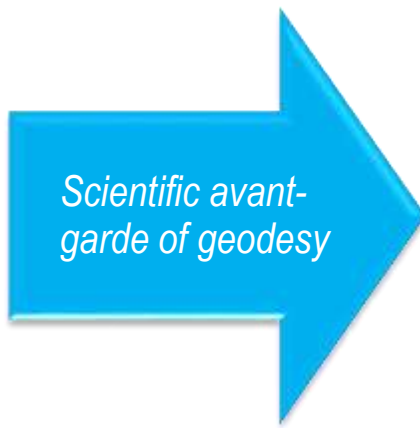
*Venezuela*



# Forefront science at the service of the region

Commission 1, 'Reference Frames'  
Sub-commission 1.3b, 'Regional Reference Frames'  
'South and Central America'

Working Group  
Cartography Commission



Scientific avant-garde of geodesy

## SIRGAS



Link to the problems of the region



*Joint Action Plans 2013-2015 & 2016-2020  
to Expedite the Development of the Spatial  
Data Infrastructure of the Americas*

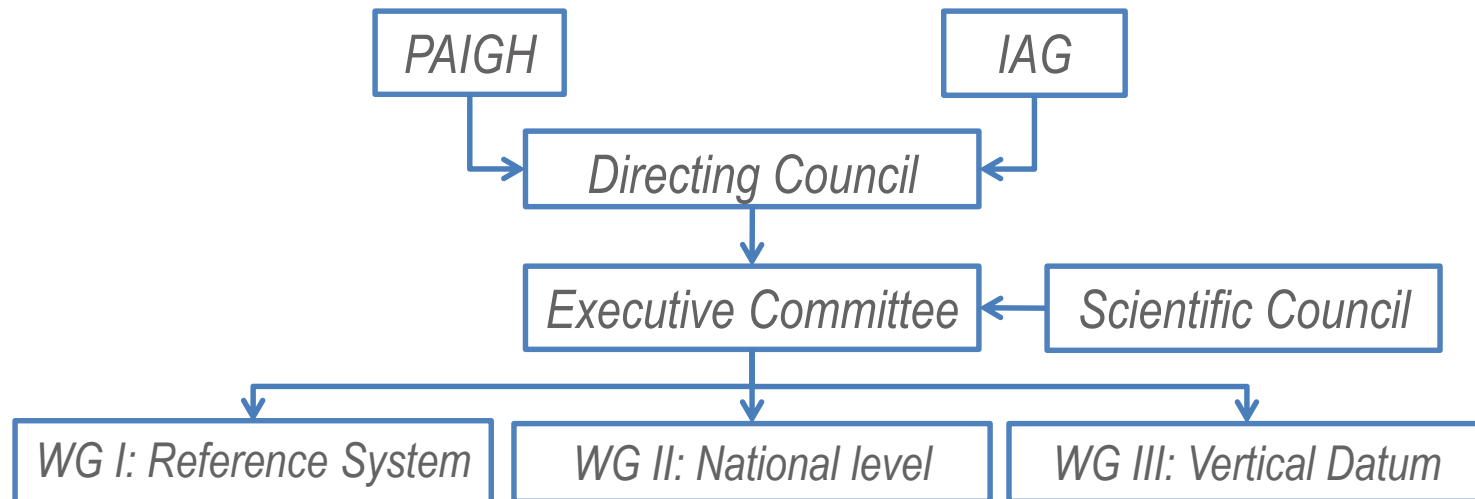
# SIRGAS governance

*The operation of SIRGAS is regulated by a Statute established in 2002 and revised in 2011. It allowed to reasonably and harmoniously manage all disputes raised in these years, demonstrating to be an efficient instrument of governance.*

*According to the Statute:*

*The highest authority of the organization is the Directing Council, consisting of one representative from each country (in most cases appointed by the national mapping agencies), one from the IAG and one from the PAIGH.*

*It delegates to the Executive Committee the responsibility of managing the daily businesses of the organization.*



## ***SIRGAS is the reference frame in 15 countries***

*Argentina*  
*Bolivia*  
*Brazil*  
*Chile*  
*Colombia*  
*Costa Rica*  
*Ecuador*  
*El Salvador*  
*French Guyana*  
*Guatemala*  
*Mexico*  
*Panama*  
*Peru*  
*Uruguay*  
*Venezuela*





## **SIRGAS developed a powerful processing infrastructure**

- 10 Analysis Centers (9 in Latin America + 1 in Germany) for processing SIRGAS data;
- 2 Combination Centers (1 in Latin America + 1 in Germany) for combining solutions;
- 2 Atmospheric Analysis Centers (both in Latin America) for monitoring the ionosphere and the troposphere and effects on GNSS;
- 2 Data Centers (1 in Latin America + 1 in Germany) for Vertical Datum realization.

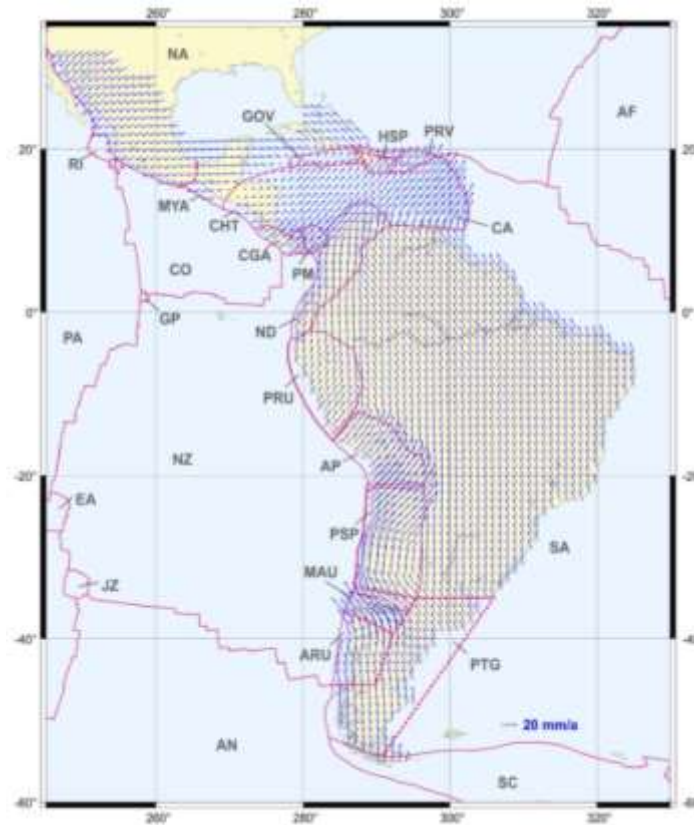
<i>Ecuador</i>	<i>Proc</i>
<i>Venezuela</i>	<i>Proc</i>
<i>Brazil</i>	<i>Proc/Comb</i>
<i>Colombia</i>	<i>Proc</i>
<i>Chile</i>	<i>Proc + Exp</i>
<i>Argentina</i>	<i>Proc</i>
<i>Mexico</i>	<i>Proc</i>
<i>Uruguay</i>	<i>Proc</i>
<i>Germany</i>	<i>Proc/Comb/RNAAC</i>





## **SIRGAS products over 25 years**

*Uninterrupted series of products timely released to and used by the community;*  
*SIRGAS products fulfill the highest international standards (IERS);*  
*Precise station positions and velocities full consistent with ITRF;*  
*Continuously updated velocity models for interpolation.*



# *SIRGAS fosters HR qualification*

*6 SIRGAS Schools*

*603 attendants*

*17 countries/school on average*

*E.g.: SIRGAS School on RT GNSS  
Chile, October 2012*



*13 workshops*

*396 participants*

*10 countries/workshop on average*

*E.g.: SIRGAS Workshop in VRS  
Costa Rica, November 2017*



## ***SIRGAS is the largest geodetic forum of Latin America***

*One general meeting (since 2009 Symposium) per year since 1993*

*>2000 participants*

*15 countries/symposium on average*

*62 presentation/symposium on average*

*E.g.: SIRGAS Symposium 2018*

*Mexico, October 2018*



# SIRGAS keeps a geo-portal open to the world

[www.sirgas.org](http://www.sirgas.org)

*Continuously updated web page  
Spanish, Portuguese and English  
Documentation of all government acts  
Technical guidelines and procedures*

*Complete metadata  
Interactive maps  
Presentations, publications, newsletters  
Historical information*



Sistema de Referencia Geocéntrico para las Américas (SIRGAS)

**Home**  
Organización  
Sistema de referencia SIRGAS  
Resoluciones SIRGAS  
Red SIRGAS-CON  
Manual de instalación VEMOS  
Mapas interactivos  
SIRGAS-RT  
Notas técnicas  
Simposios SIRGAS  
Escuelas SIRGAS  
Publicaciones  
Presentaciones  
Web, URL & Contacto

**SIRGAS: Sistema de Referencia Geocéntrico para las Américas**

SIRGAS es el Sistema de Referencia Geocéntrico para las Américas. Su definición es idéntica a la del Sistema Internacional de Referencia Terrestre (ITRS: [International Terrestrial Reference System](#)) y su realización es una derivación regional del Marco Internacional de Referencia Terrestre (ITRF: [International Terrestrial Reference Frame](#)) en América Latina. Además del sistema de referencia geocéntrico, SIRGAS se ocupa de la definición y realización de un sistema vertical de referencia basado en alturas síncronas como componente geométrica y en números geodésicos referidos a un valor W<sub>0</sub> (geoid convencional) como componente física.

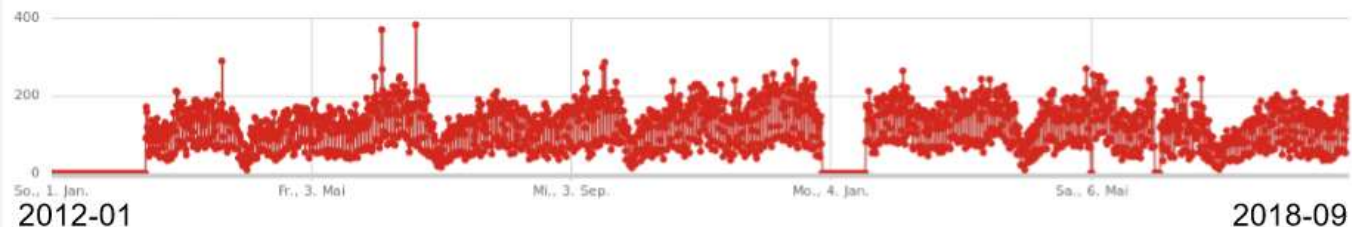
SIRGAS inició en la Conferencia Internacional para la Definición de un Sistema de Referencia Geocéntrico para América del Sur celebrada en Asunción, Paraguay, en 1980. Esta Conferencia fue convocada y patrocinada por la Asociación Internacional de Geodesta (IAG: [International Association of Geodesy](#)), el [Instituto Panamericano de Geografía e Historia \(IPGH\)](#) y la [US Defense Mapping Agency \(DMA\)](#), actualmente [National Geospatial-Intelligence Agency \(NSA\)](#). El nombre oficial de SIRGAS (Sistema de Referencia Geocéntrico para América del Sur) fue cambiado en febrero de 2001 a Sistema de Referencia Geocéntrico para las Américas, dada la extensión del marco de referencia (SIRGAS2000) y la recomendación de la Organización de las Naciones Unidas en su Séptima Conferencia Cartográfica de las Américas (Nueva York, enero 22 al 26 de 2001) sobre la adopción de SIRGAS como sistema de referencia oficial en todos los países de las Américas.

SIRGAS es una implementación de la [Proyección 4 \(Reference Frame\)](#) de la IAG: el trabajo de la Referencia 1.4.

**Workshop for the implementation of the GORP in Latin America**  
Buenos Aires, Argentina  
September 16-20, 2014

**Symposium SIRGAS2016**  
Rio de Janeiro, Brazil  
November 11-14, 2016

**GLB-Workshop CT**  
Rio de Janeiro, Brazil  
November 4-6, 2014



Visit statistics

## ***SIRGAS has been endorsed by the main regional forums***

*2001: the 7<sup>th</sup> United Nations Cartographic Conference for the Americas (UN-RCCA) recommends that the countries of the Americas integrate to SIRGAS.*

*2005: the 8<sup>th</sup> UN-RCCA recommends that the countries of Central America and the Caribbean integrate to SIRGAS.*

*2013: the 2013-2015 Joint Action Plan to Expedite the Development of the Spatial Data Infrastructure of the Americas is established between PAIGH, CP-IDEA (later UN-GGIM:A), GeoSur and SIRGAS;*

*2016: the 2016-2020 edition of the Plan is established.*

*Both editions of the Plan stated: “To consolidate SIRGAS as single supplier of the geodetic reference frame for the region”.*

*2015: UN-GGIM Americas defines the ‘Marco Geoestadístico Espacial de las Américas (MEGA)’, and recommends SIRGAS as its reference frame.*

## Summarizing

- *More than 25 years of continuous work*
- *Forefront science at the service of the solution of 'real life' problems in the region*
- *Well established and unanimously respected rules of governance*
- *Officially adopted by 15 Latin American countries*
- *Coordination of the largest observational infrastructure in Latin America*
- *Development of a powerful data-processing infrastructure in Latin America*
- *Reliable and state-of-art products delivered to the community for more than 25 years*
- *Over 1000 persons from many countries benefited by capacity building activities*
- *Over 2000 persons from many countries interacting in meetings and symposia*
- *Dissemination of useful data and information through a continuous updated geo-portal*
- *Formal endorsements by the main forums of the region*

*SIRGAS is more than a scientific-technical advisory group: it is an operating organization that coordinates a powerful observation and analysis infrastructure and generates reliable and community-accepted products, outreach and capacity building.*

## ***Looking ahead***

*The implementation of the UN resolution on the GGRF has opened a debate on how Geodesy should be represented in UN-GGIM: Americas.*

*We take for granted that this debate must start on the solid foundations constructed by SIRGAS and should turn around the changes that should be made in SIRGAS to better fit the GGRF roadmap.*

- The last "S" of SIRGAS (the Americas) must be transformed into a tangible reality: Canada, US and the Caribbean must be effectively integrated into SIRGAS.*
- Differences that may exist between North and South regarding technical and scientific criteria should be discussed and harmonized within SIRGAS.*

## **Looking ahead**

*SIRGAS Statute must be reviewed and the necessary changes must be made to better comply with the UN-GGIM structure.*

### **Modificación o actualización del estatuto**

*Art. 33. Los órganos de SIRGAS (Art. 8) deben revisar el presente estatuto por lo menos cada ocho años...*

- *SIRGAS governance could be strengthened by demanding that countries officially designate national representatives (for example, using a procedure similar to that used by the Organization of American States) and that representatives be empowered to make binding decisions.*
- *Taking advantage that PAIGH is revising its own Statute, the two revisions could be carried out in parallel.*
- *This would open the possibility of improving the status of SIRGAS within the PAIGH structure (from a WG of the Cartography Commission to a statutory technical body?).*



## *Looking ahead*

- *SIRGAS WG II should be more intensely committed to the implementation of geodetic standards, mechanisms for data sharing and the improvement of observation infrastructure.*
- *Strong link must be established between SIRGAS WG II and representatives of the Americas in the UN-GGIM Subcommittee on Geodesy (could they be the same people?).*
- *New working groups could established for Gravimetry and Gravity Field in order to cover both the ITRF and the IHRF.*
- *The meaning of the 'G' in SIRGAS would change from 'Geocentric' to 'Geodetic' .*
- *The academic community must commit more intensely with training activities required for the development, sustainability and use of the GGRF.*
- *The representation of this community in SIRGAS could be improved (including a representative of that community in the Directing Council? Creating a dedicated working group?).*

## ***Looking ahead***

- *The 2016-2020 Joint Action Plan to Expedite the Development of the Spatial Data Infrastructure of the Americas should be revised (and eventually extended on time) for better fitting the GGRF roadmap.*
- *The close link that SIRGAS always maintained with the IAG must be preserved to ensure the connection with the scientific avant-garde.*

## **Closing remarks**

*We have presented some ideas aimed at improving the articulation between SIRGAS and UN-GGIM Americas.*

*We believe that in order to better respond to the challenge that lies ahead, SIRGAS must implement some changes, and that those changes must arise from solid and broad consensus.*