

# The experience of SIRGAS and its implementation in the Caribbean



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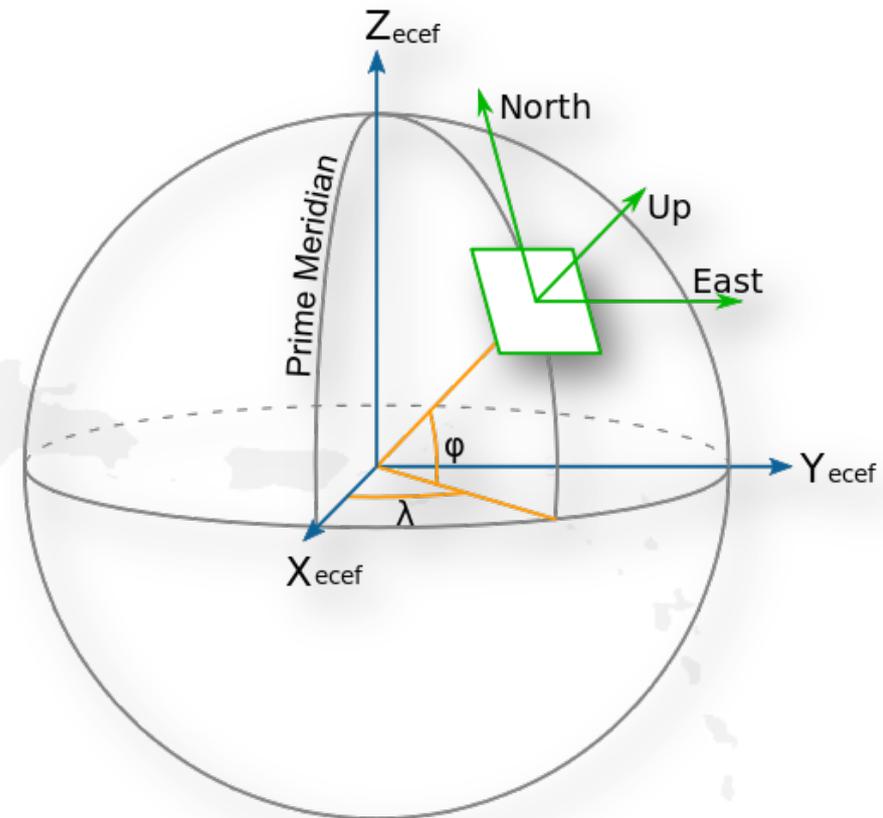


S.R. De Freitas

- What is SIRGAS
- SIRGAS and The Caribbean
- GGRF - Joint Action Plan
- Comments

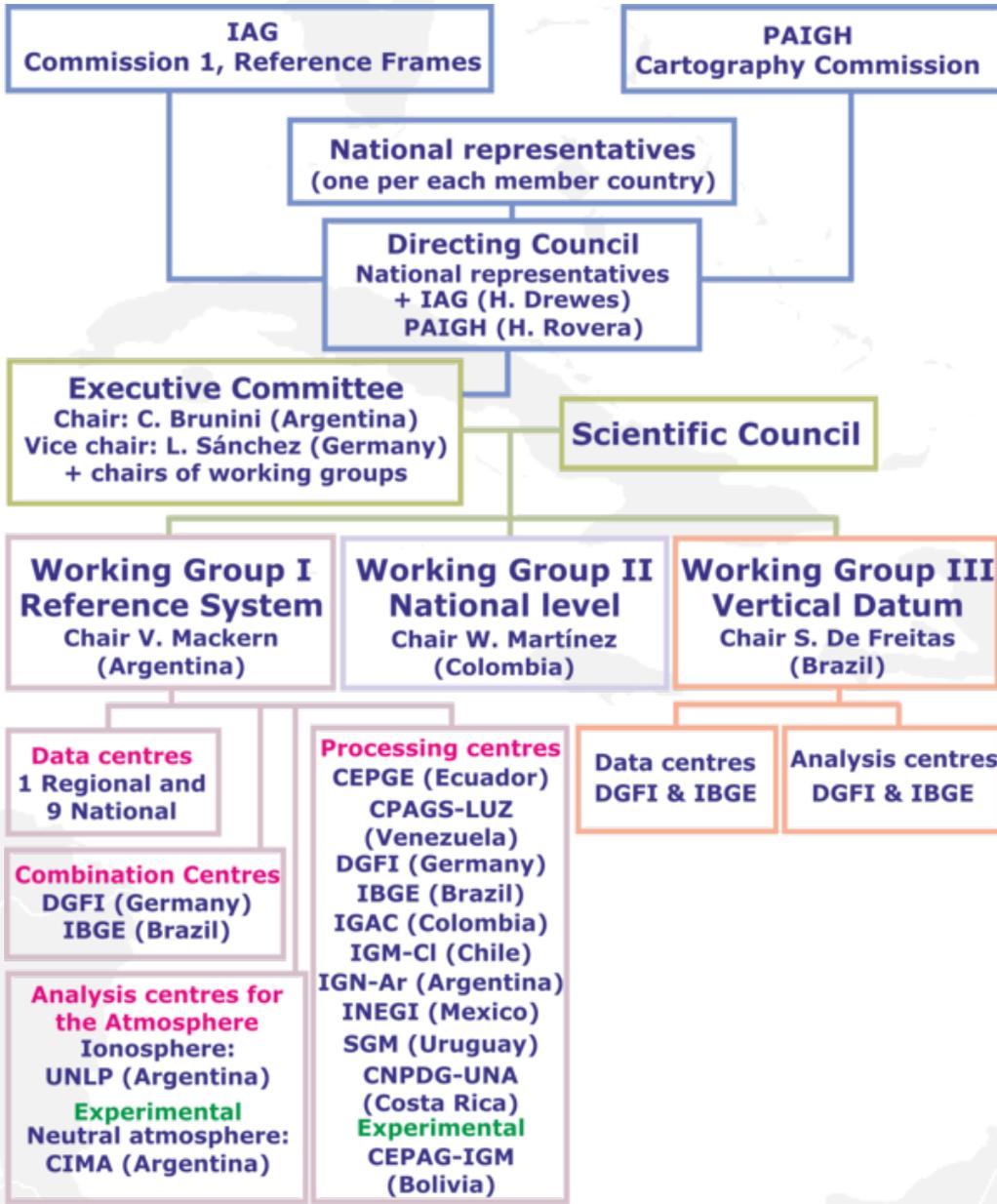


- SIRGAS stands for The Geocentric Reference System for the Americas
- It is the definition, realization and maintenance of the 3D geocentric reference system, including a gravity field-related vertical reference system.
- It is identical to the International Terrestrial Reference System (ITRS).
- Its realization is a regional densification of the global International Terrestrial Reference Frame (ITRF).
- The extension of the SIRGAS frame is carried out by national densifications, which serve as local reference frames.

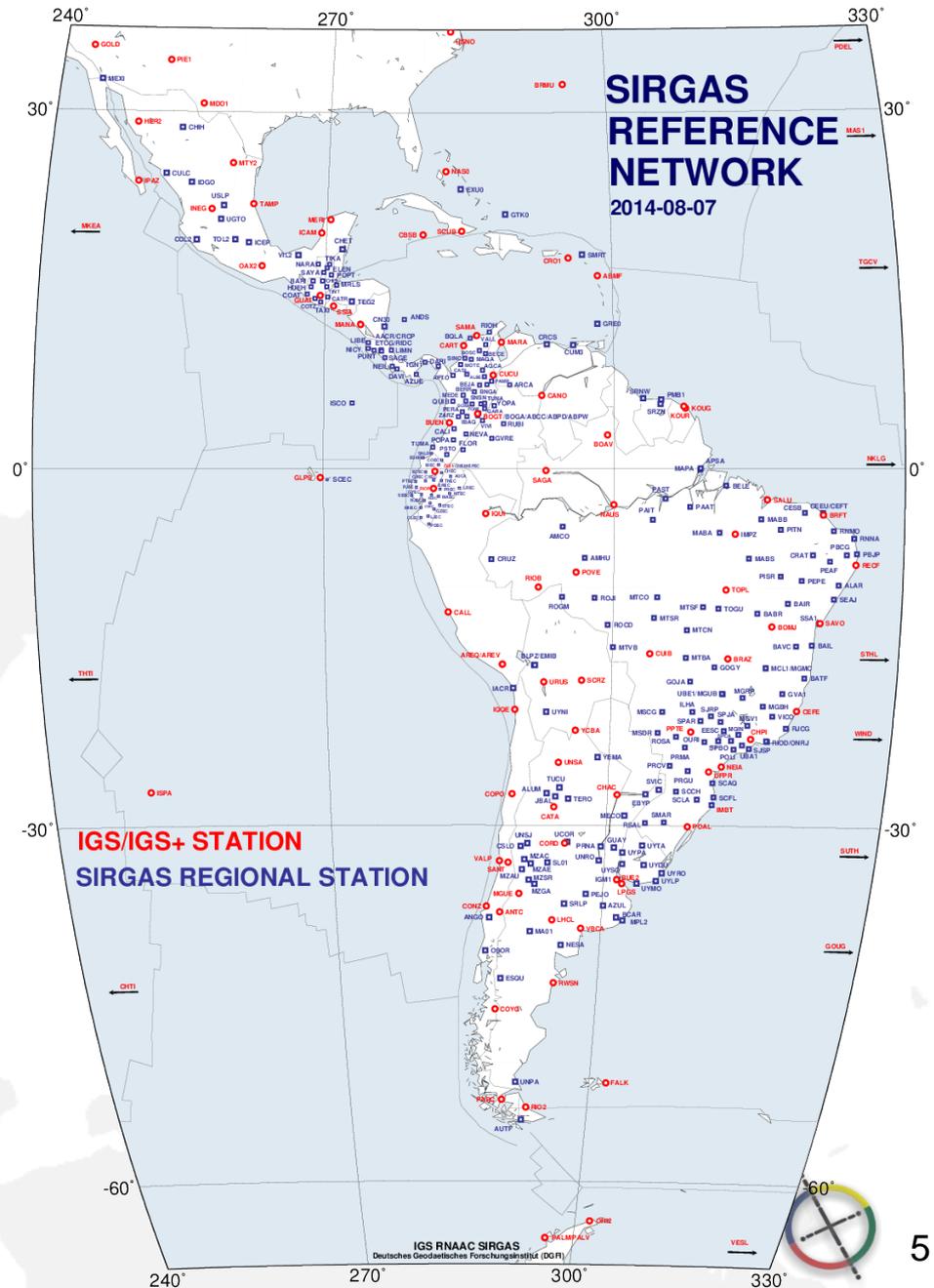


- It is a member of the Commission 1 (Reference Frames) of the International Association of Geodesy (IAG)
- It is a Working Group of the Cartographic Commission of the Pan-American Institute of Geography and History (PAIGH)
- It is a member of the Working Group on the Global Geodetic Reference Frame GGRF (created in January 2014) of the UN-GGIM

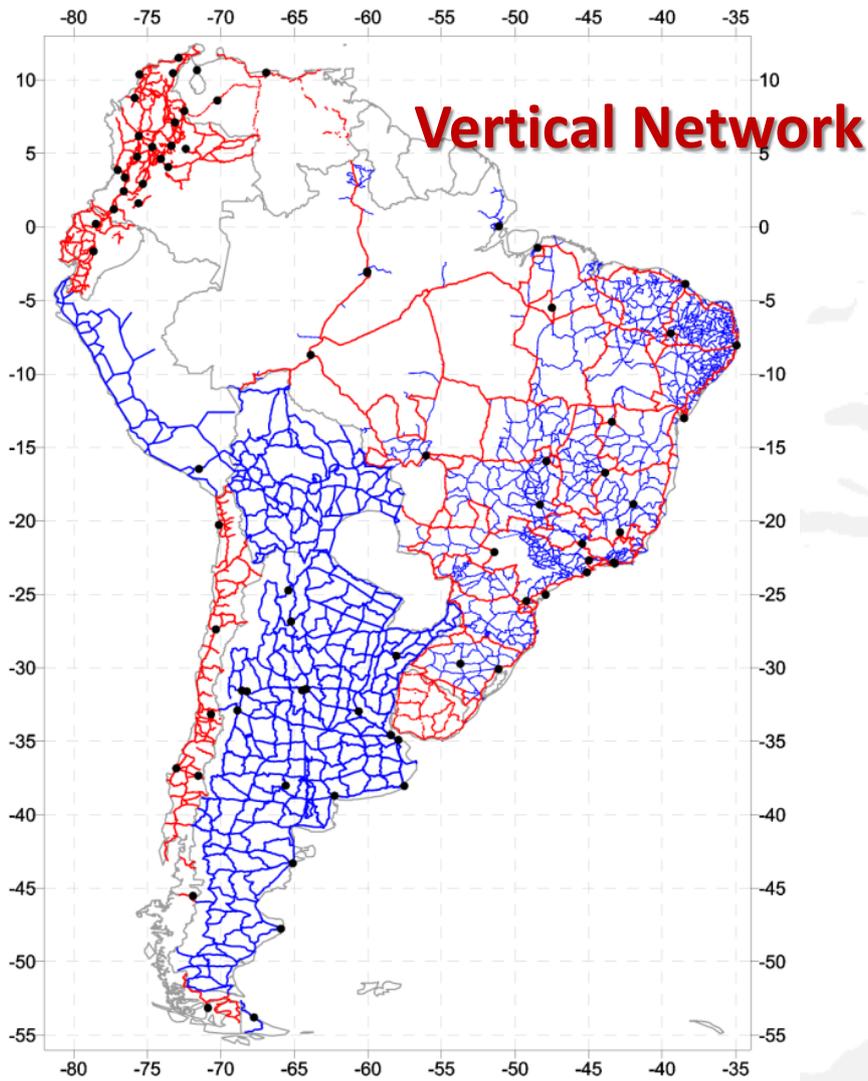




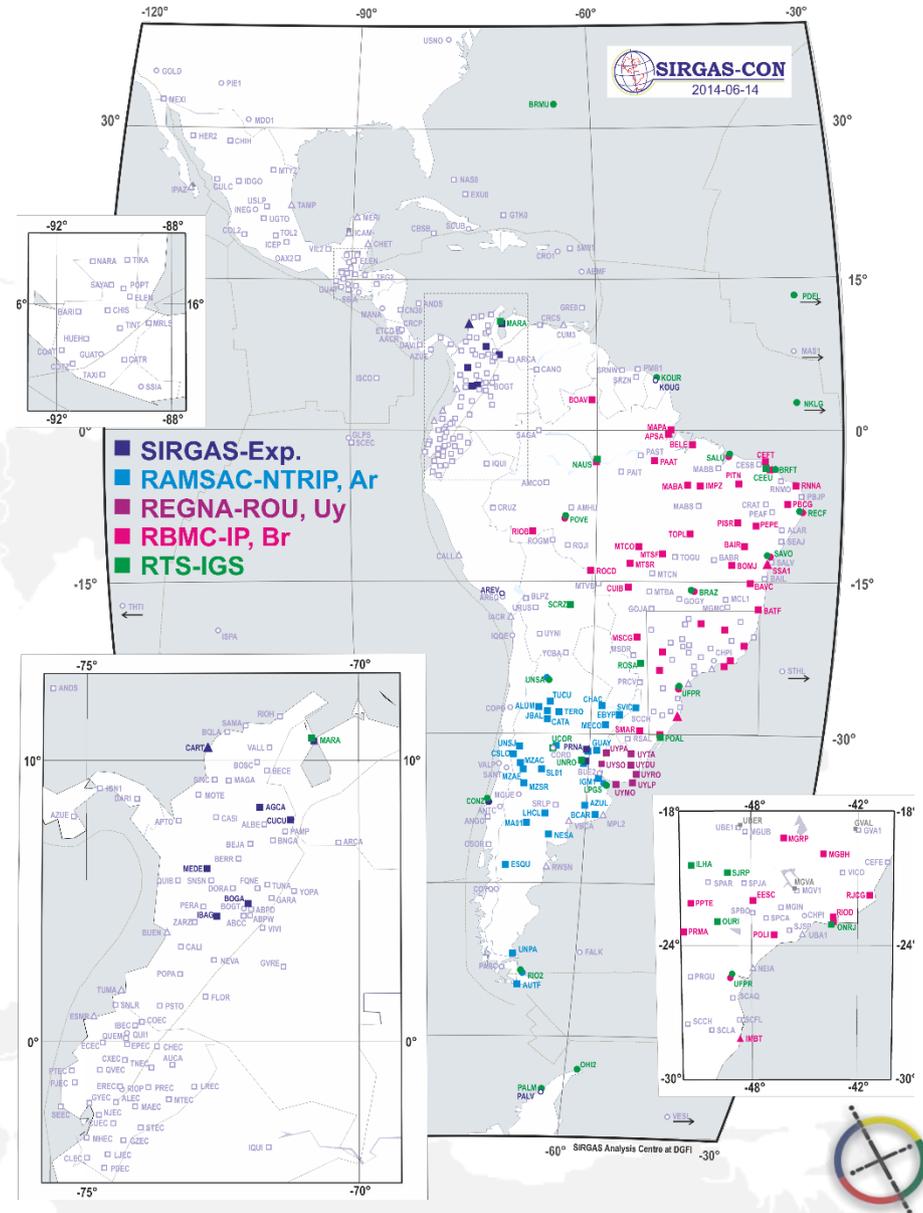
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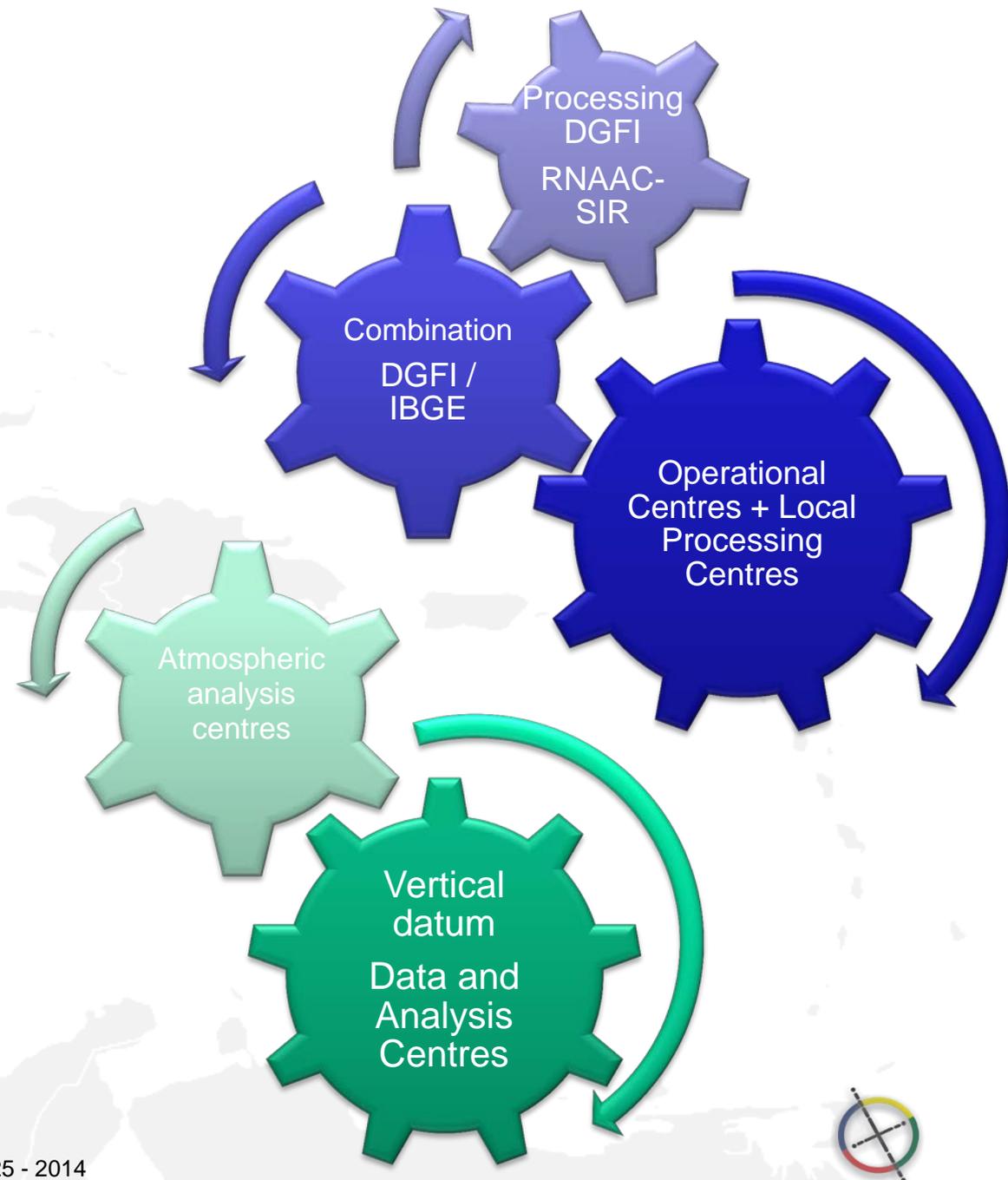
- dados já recebidos pelo GT-III
- dados em tratamento nos países de origem; autorizada a inclusão no mapa do GT-III
- estações da Rede SIRGAS-CON-C



## Real Time Network



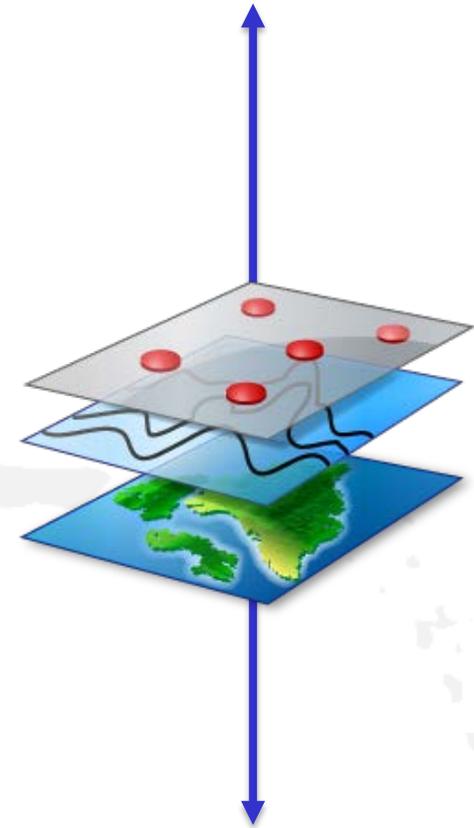
- More than 50 organizations install and operate the permanent stations (over 400) and **voluntarily** provide the tracking data for the weekly processing of the network.
- The Increasingly number of GNSS stations given by each country has led to define a Core Network (SIRGAS-C) and National Networks (SIRGAS-N)
- Each station is processed by three analysis centres.



- To be the backbone for all projects based on the generation and use of geo-referenced data.
- To provide the reference coordinates for the development of practical applications: engineering projects, digital administration of geographical data, spatial data infrastructures, etc.
- To be the platform for a wide range of scientific applications: monitoring of the global change.
- But, mainly, the SIRGAS is a strong, friendly and rigorous cooperation network that operates across the Americas and provides the spatial reference for everyone.



- SIRGAS data, standards and products are essential for the definition of regional, national and local Spatial Data Infrastructures.
- Usually, SIRGAS data and conventions are identified as:
  - 'framework data'
  - 'template data'
  - 'core data'
  - 'foundation data'
  - 'alignment data'
- ...they are different approaches to define the basis and reference for all the Geoinformation layers.



- SIRGAS “acts” through:
  - ✓ Newsletters (18, at present)
  - ✓ Scientific and/or technical publications (yearly organized in the SIRGAS Web site)
  - ✓ Presentations
  - ✓ Resolutions
  - ✓ Guidelines, and
  - ✓ Recommendations
- The organizational issues of SIRGAS are described in the statute (by-law) adopted by the Directing Council on October 22, 2002 and updated/modified on May 9, 2011



**SIRGAS** - GEOCENTRIC REFERENCE SYSTEM FOR THE AMERICAS

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

**SIRGAS: Geocentric Reference System for the Americas**  
Statute adopted by the SIRGAS Directing Council on May 9, 2011

SIRGAS is a non-profit organization that, according to its objectives and scope, has a Pan-American profile. Its performance aims at all countries of the Americas and it is regulated by the following articles.

**General Objectives**

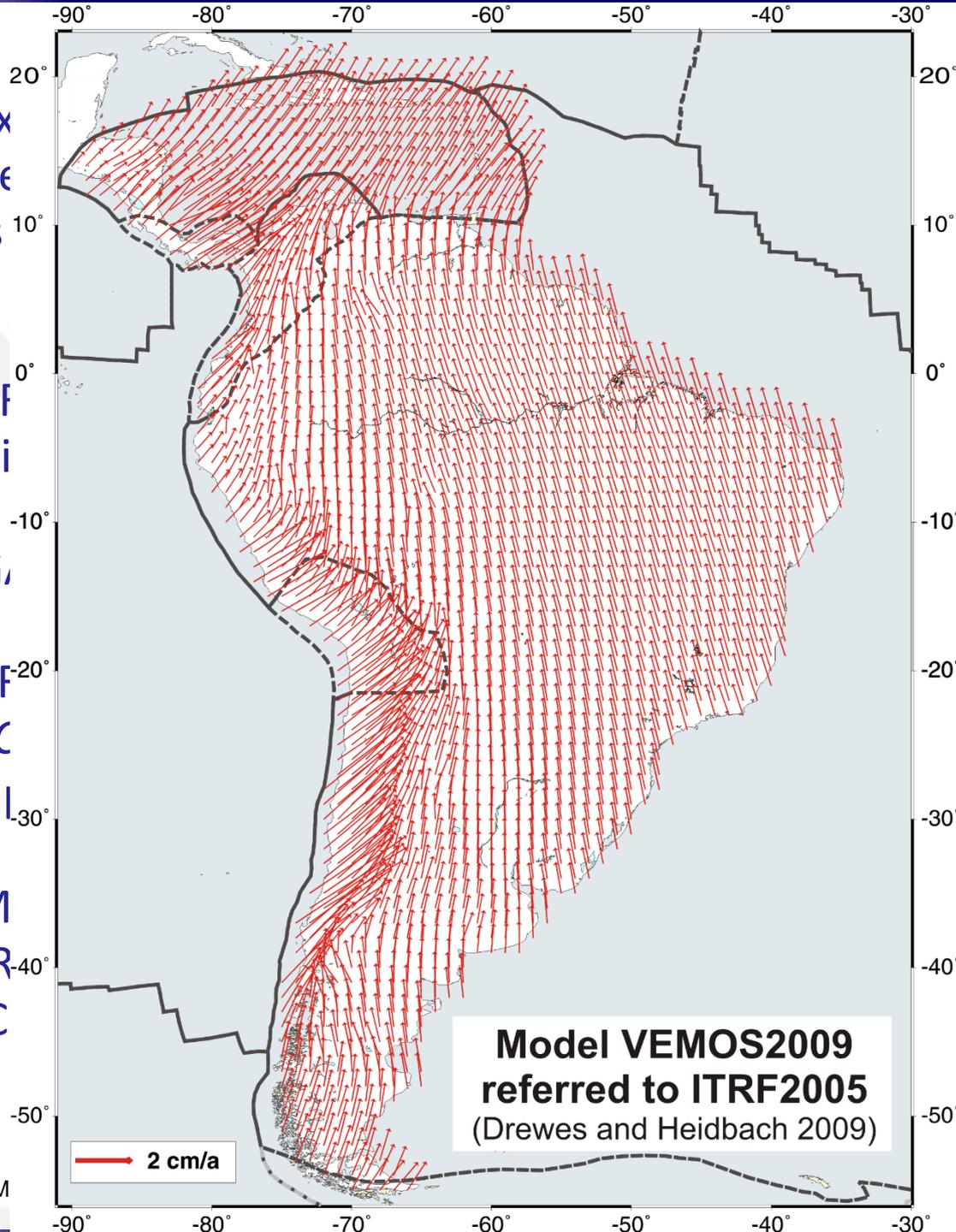
**Art. 1.** The main objective of SIRGAS is to define, realise, and maintain a tri-dimensional geocentric reference system for the Americas, including a unified gravity field-related vertical reference system with global consistency. This objective includes:

- a) Definition of a tri-dimensional geocentric reference system;
- b) Realisation and maintenance of a geocentric reference frame (network of stations with high-precise geocentric coordinates  $[X, Y, Z]$  and their variation with time  $[V_x, V_y, V_z]$ );
- c) Densification of the continental reference frame in the SIRGAS member countries, as well as the promotion and support of its utilization in practical and scientific applications;
- d) Definition and realisation of a unified vertical reference system based on the consistent combination of physical and geometric heights, including the determination of the reference frame variations with time.



- Since 1996 DGFI has been processing data from permanent GNSS stations located in the Caribbean.
- 2001: 7<sup>th</sup> United Nations Regional Cartographic Conference for the Americas. New York (January 22 – 26): Recommends that the member countries of the Americas integrate their national geodetic reference systems into a reference system compatible to SIRGAS.
- 2002: SIRGAS changes its denomination from South America to The Americas.
- 2006: Workshop of the WG-I. Rio de Janeiro - Brazil (August 16 - 18): To establish a scientific service oriented to the development of ionospheric models based on GNSS for Latin America and the Caribbean.
- 2006: Technical Meeting. Heredia - Costa Rica (November 27 – 28): Modernization of the existing height systems of Latin America and the Caribbean.

- 2007: SIRGAS Ex discussed the ne in the countries adoption.
- 2008 - 2009: SIF 2009, the Veloci
- 2009: First SIRG,
- 2010 – 2011: SIF para el Caribe, C Ionospheric Maj
- 2012: SIRGAS M presented in SIR hazards in the C



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- SIRGAS Meeting. Panama City. IGNTG and SIRGAS School on Reference Systems, Crustal Deformation and Ionosphere Monitoring. Main objective: The Caribbean and Central America.



## **Monitoring crustal deformation and the Ionosphere by GPS in the Caribbean**

Report on the project

### **Monitoring crustal deformation and the ionosphere by GPS in the Caribbean**

sponsored by the **International Union of Geodesy and Geophysics (IUGG)** through

the **International Association of Seismology and Physics of the Earth's Interior (IASPEI)**

the **International Association of Geodesy (IAG)**

the **International Association of Geomagnetism and Aeronomy (IAGA)**

*Prepared by Claudio Brunini, SIRGAS President (Buenos Aires, Argentina)  
and Laura Sánchez, SIRGAS Vice-president (Munich, Germany).*

*November 20, 2013*

## Positive reaction from the Caribbean countries:

- Types of coordinates.
- Geodetic reference systems and frames.
- Installation and maintenance of observation instruments (in particular of GNSS), real-time data dissemination (via Internet), and data archiving and management.
- Coordinates determination from GNSS (observation equations, uncertainties in GNSS positioning, controlling errors in GNSS positioning, adjustment of GNSS networks).
- Crustal deformation observation and modelling (geodynamic processes, plate tectonics, intra- and inter-plate crustal deformation, monitoring deformations by GPS).
- Ionosphere modelling and analysis (structure of the atmosphere, models of the ionosphere, observation techniques, analysis of the ionosphere).

The school was attended by 145 participants from 28 countries, among those from the Caribbean: Barbados, Colombia, Costa Rica, Dominican Republic, Guatemala, Honduras, Jamaica, Mexico, Monserrat-UK, Nicaragua, Panama, Puerto Rico, St. Lucia, Suriname, Trinidad and Tobago, Turks and Caicos Islands, USA, and Venezuela.



The purpose of the Dominican Republic, Puerto Rico, Suriname, Trinidad and Tobago, Jamaica, St. Lucia and Turks and Caicos Islands to join the IAG activities developed by SIRGAS.

Representatives of these countries started the necessary contacts to be integrated in different working and research groups.

Trinidad and Tobago and Dominican Republic are interested in hosting a similar school in order to disseminate these topics to those people who were not able to come to Panama.

Dominican Republic, Guyana, Nicaragua and Puerto Rico are now integrating their geodetic reference stations into the continental reference frame.

The willingness of the Dominican Republic to install a high-level GNSS processing centre.

It should be mentioned that Colombia and Venezuela participate actively in SIRGAS since 1993; Costa Rica, Guatemala, Honduras, Mexico, Nicaragua and Panama joined SIRGAS in 2003, and Guyana joined SIRGAS in 2011.

At present, SIRGAS processing centres in the Caribbean region are located in Mexico (INEGI), Costa Rica (UNA), Colombia (IGAC) and Venezuela (LUZ)

The SIRGAS Symposium 2014 will be held in La Paz (November 24-26)

The SIRGAS Symposium 2015 will be held in Dominican Republic

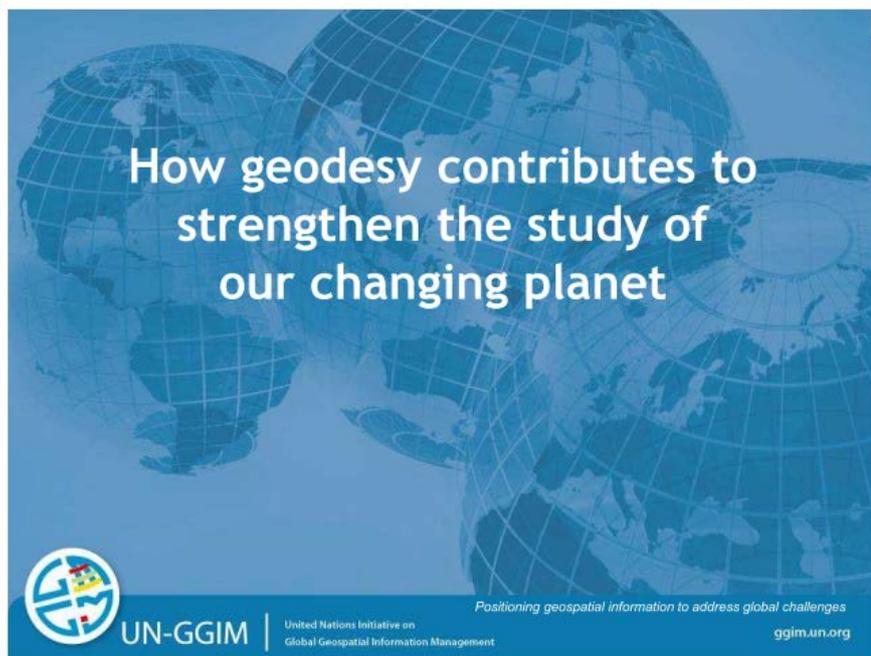


[http://commons.wikimedia.org/wiki/File:Caribbean\\_general\\_map.png](http://commons.wikimedia.org/wiki/File:Caribbean_general_map.png)



“To invite the Caribbean countries to participate actively in geodetic and geophysical initiatives going on in the Central and South American region, in order to enable the use the acquired data for practice and science in their countries, and to promote geosciences.

This includes capacity building activities providing the basis for profound education and sustainable development as well as the establishment of international and interdisciplinary contacts to participate in research projects at regional and global scales” (Brunini and Sanchez, 2013).



[http://ggim.un.org/ggim\\_committee.html](http://ggim.un.org/ggim_committee.html)

## UN-GGIM endorses draft resolution on GGRF

The United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) backed a draft resolution on the Global Geodetic

Reference Frame (GGRF). During its recent meeting at the UN Headquarters in New York, the Committee recognised that there is a growing requirement for more accurate measuring of the changing planet, down to millimetres. It is also considering how to enhance intergovernmental cooperation that will lead to geospatial data interoperability as no single country can maintain the GGRF alone. The committee felt that more member states can work towards increased open sharing of geodetic data, standards and conventions. The UN member states also elected a new bureau. Dr Vanessa Lawrence from the United Kingdom, Dr Li Pengde from China and Dr Eduardo Sojo from Mexico have been announced as co-chairs. Sultan Mohamed Alya from Ethiopia has been announced as the Rapporteur.



Courtesy: UN-GGIM Bureau

<http://geospatialworld.net/uploads/magazine/Geospatial-World-September-2014.pdf>



## SIRGAS



Fosters the participation of the region on the international geodetic front

Provides concrete solutions for the geodetic-based problems of the region

International scientific and technological vanguard in the field of geodesy

Agenda 2010 – 2020: Territorial management, disaster effects mitigation and global climate change processes”



The Pan American Institute of Geography and History (PAIGH)  
The Geocentric Reference System for the Americas (SIRGAS)  
The Permanent Committee on Spatial Data Infrastructure for the Americas (PC-IDEA)  
The CAF/PAIGH Geospatial Network for Latin America and the Caribbean (GeoSUR)

**2013-2015 JOINT ACTION PLAN  
TO EXPEDITE THE DEVELOPMENT  
OF SPATIAL DATA  
INFRASTRUCTURE OF THE AMERICAS**

Santiago Borrero, Secretary General, PAIGH  
Claudio Brunini, President, SIRGAS  
Luiz Paulo Souto Fortes, President, PC-IDEA  
Eric van Praag, Regional Coordinator, GeoSUR



The mission of the PC-IDEA is to promote the development of SDI in the Americas and that of GeoSUR is to facilitate access to and management of geospatial information

SIRGAS mission is to coordinate the efforts of more than fifty institutions in 20 countries to provide products, data, knowledge and services to georeference SDI in the Americas



**UN-GGIM: Américas**  
COMITÉ REGIONAL DE LAS  
NACIONES UNIDAS SOBRE  
LA GESTIÓN GLOBAL  
DE INFORMACIÓN GEOESPACIAL  
PARA LAS AMÉRICAS



**SIRGAS**

To guarantee the alignment of the spatial information layers, it is essential their georeferencing with regard to a single reference frame. It means, to SIRGAS and its national definitions.

Agenda 2010 – 2020:  
Territorial management,  
disaster effects mitigation  
and global climate  
change processes”



## For the institutions

- Improvement of the available infrastructure
- Strengthening of a cooperation network to solve common and particular problems
- Increased credibility
- New answers to old questions: ¿where?, ¿how accurate?
- Easier formulation of common enterprises

## For the people

- Friendship
- Professional relations across the continent
- Better knowledge and technical experiences
- To keep in the “main stream” of geoscience and related issues

Thank you very much