

Report: Work Line on Geodetic Reference Framework



William Martínez
President of SIRGAS



UN-GGIM: Américas

COMITÉ REGIONAL DE LAS
NACIONES UNIDAS SOBRE
LA GESTIÓN GLOBAL
DE INFORMACIÓN GEOESPACIAL
PARA LAS AMÉRICAS

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Vice President of SIRGAS



Victor Cioco
President WGI



Roberto Pérez Rodino
President WG II



UNIVERSIDAD
DEL ZULIA



Silvio R.C. de Freitas
President WG III





What is the SIRGAS?



Propósito para el número de estaciones GPS por país

Argentina	6	(2.71 M ² km ²)
Brasil	10	7.54
Bolivia	4	4.40
Chile	4	0.76
Colombia	4	1.44
Ecuador	3 (incl. papas)	0.28
Guayana	1	0.21
Guayana Franc.	1	0.09
Paraguay	2	0.41
Peru	4	1.29
Suriname	1	0.16
Uruguay	2	0.18
Venezuela	4	0.91
Países de las Islas	2	
en total	48	= 18 1002 km²

International Conference for Definition of the Geocentric Datum for South America

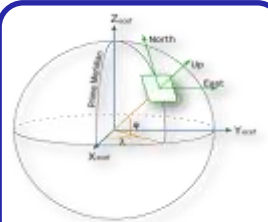
Celebrando
50
AÑOS | De Información
Geoespacial en México



SIRGAS 2018
SISTEMA
DE REFERENCIA GEOCÉNTRICO
PARA LAS AMÉRICAS



INEGI
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DE ESTADÍSTICA Y GEOGRAFÍA



SIRGAS stands for The Geocentric Reference System for the Americas.

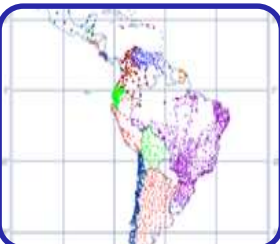
It is identical to the International Terrestrial Reference System (ITRS).



It is the definition, realization and maintenance of the 3D geocentric reference system. Its realization is a regional densification of the global International Terrestrial Reference Frame (ITRF).



It defines and maintains the gravity field-related vertical reference system in the Americas region.



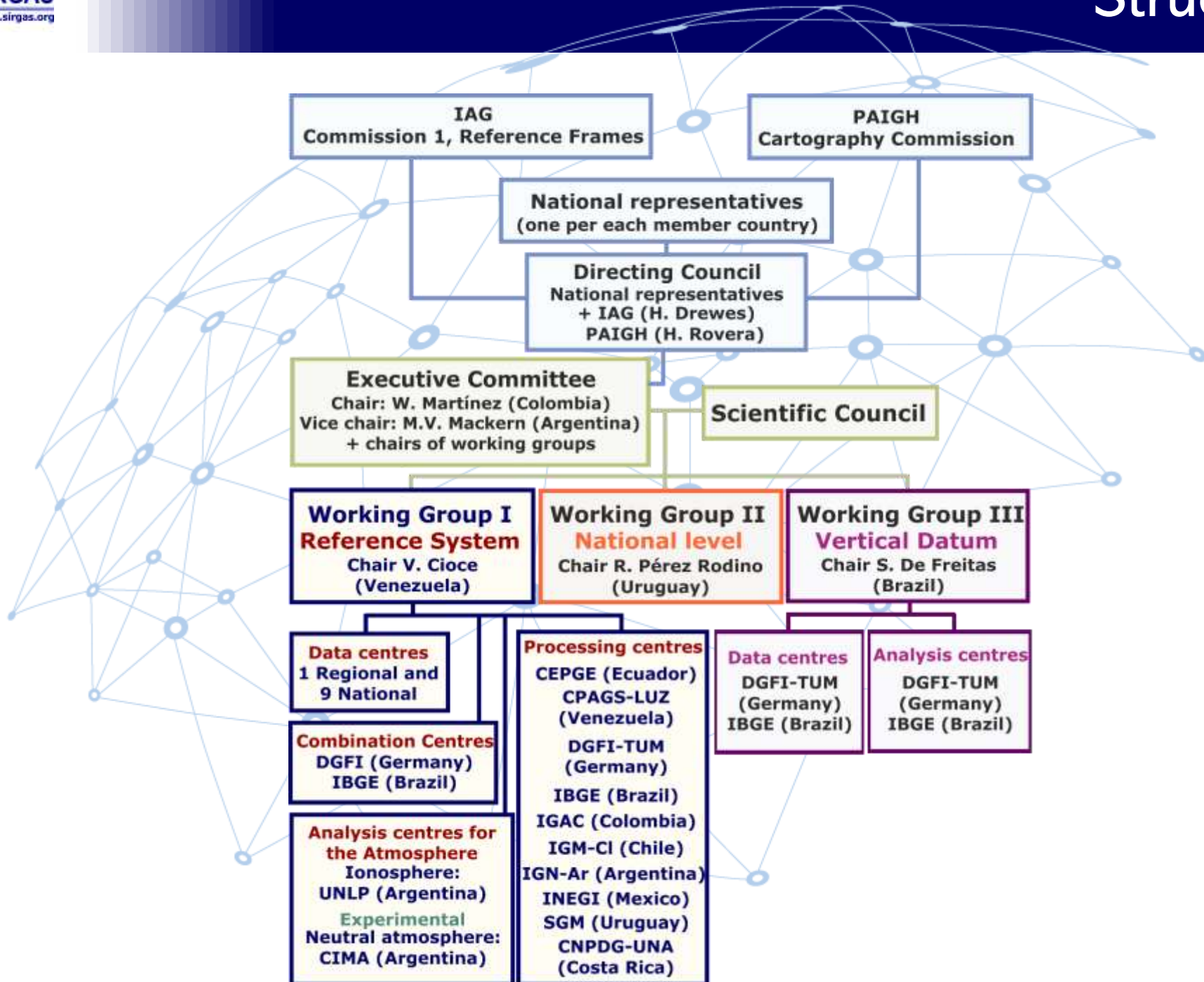
The extension of the SIRGAS frame is carried out by national densifications, which serve as local reference frames



It is a member of the IAG Commission 1 (Reference Frames)

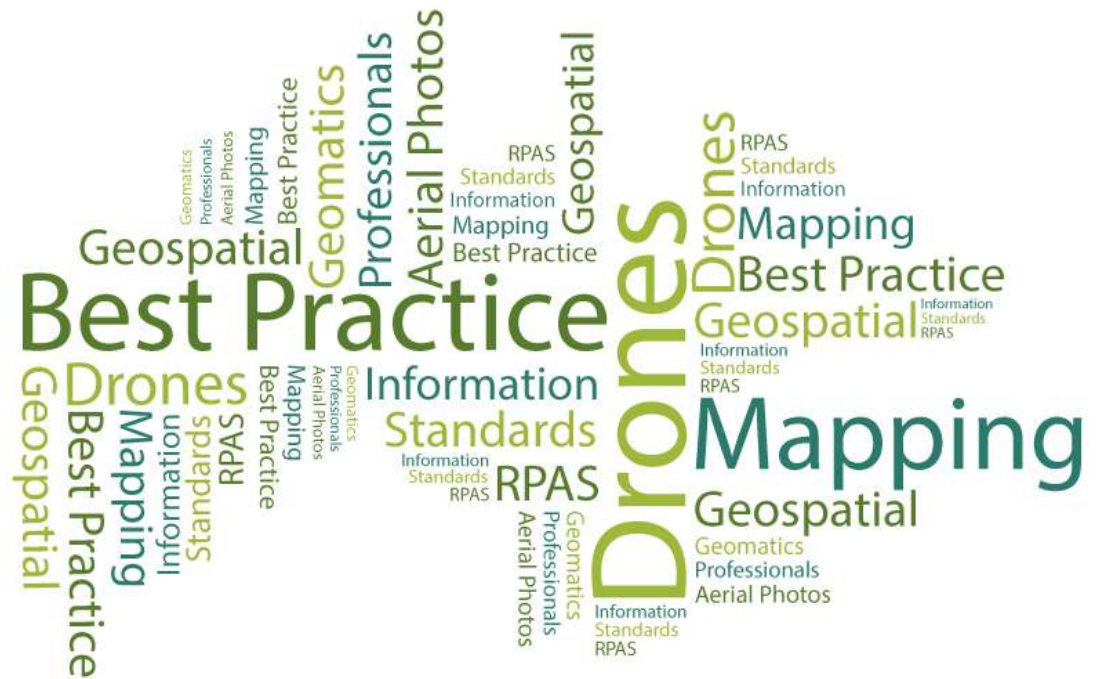


It is a Working Group of the Cartographic Commission of the Pan-American Institute of Geography and History (PAIGH)



SIRGAS provides the adequate support to develop and combine all scientific and practical activities related to precise geo-referencing and navigation, Earth sciences research, and multidisciplinary applications.

SIRGAS furnishes the fundamental layer for the geospatial data infrastructures in the region.





The experience of SIRGAS and its implementation in the Caribbean



W. Martinez



C. Brunini



L. Sánchez



H. Drewes



M.V. Mackern



S.R. De Freitas

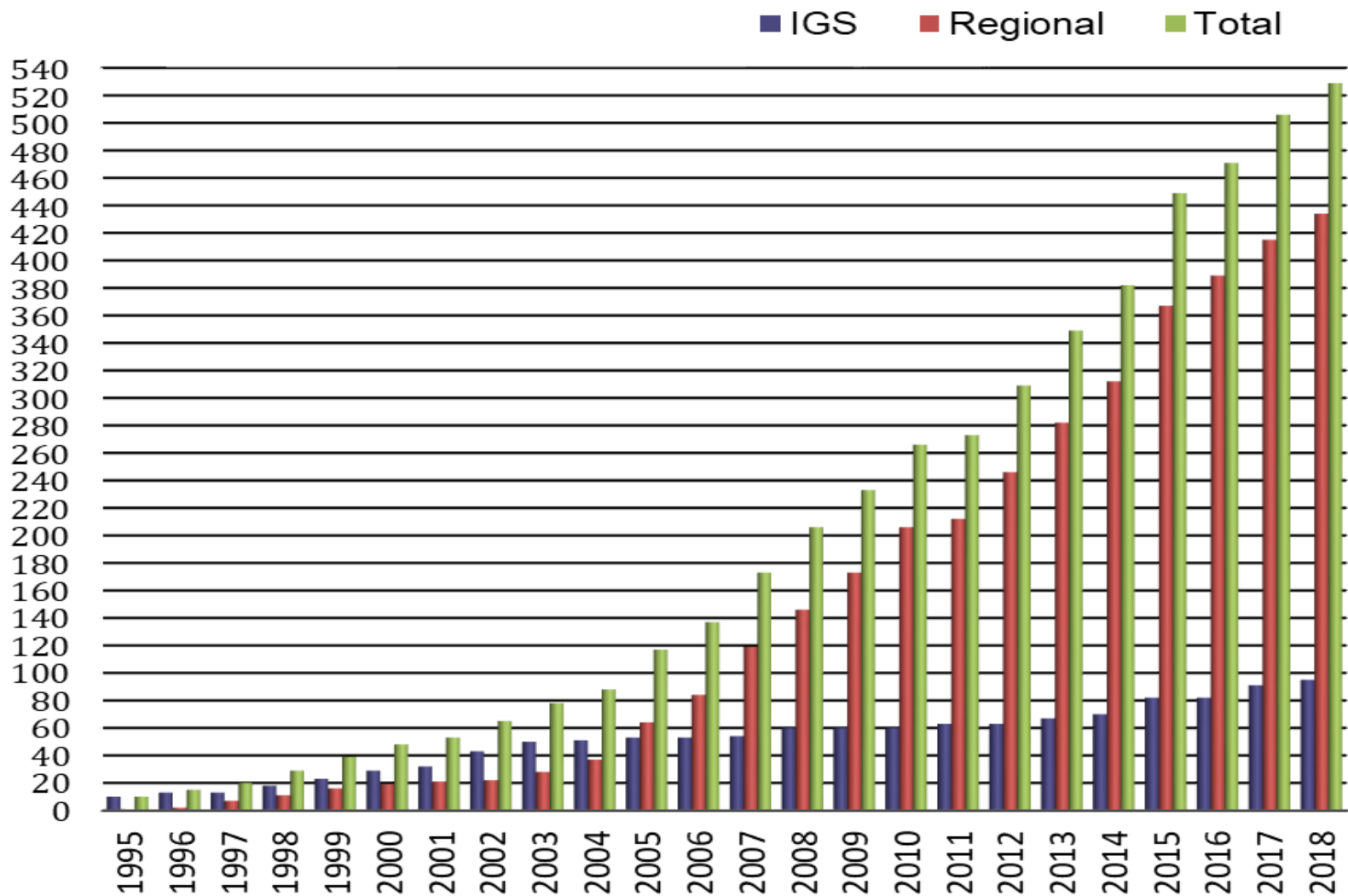
LAGF 2014 – UN-GGIM: AMERICAS. Mexico City - Mexico; September 22 - 25 - 2014

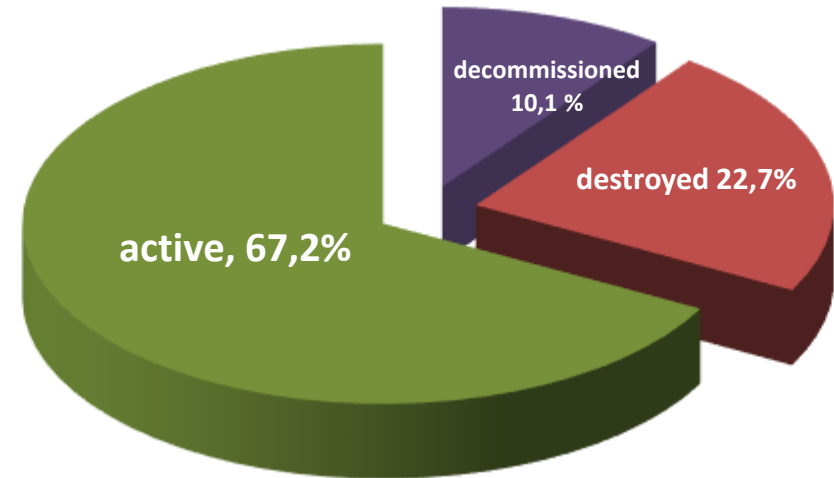
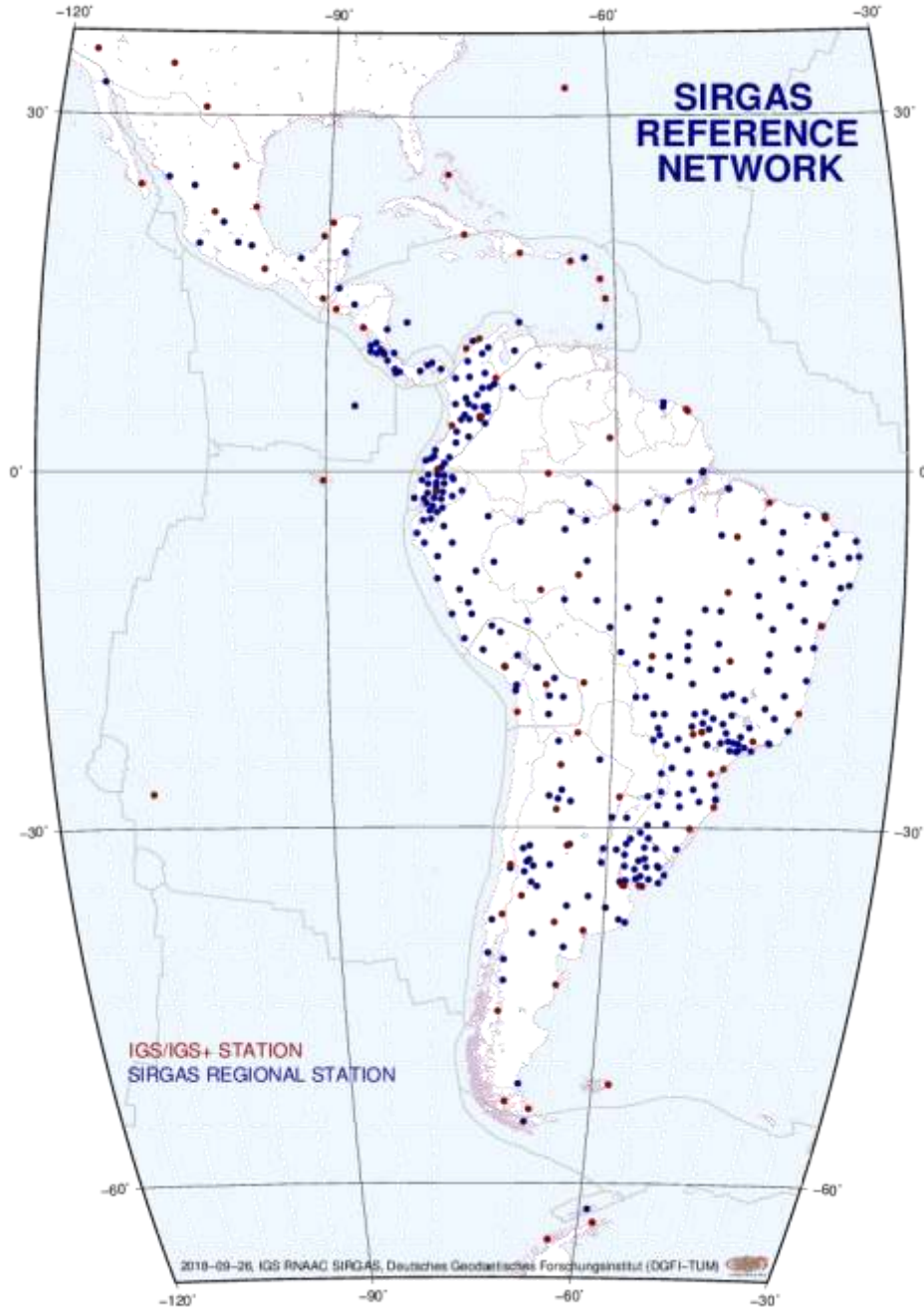


Achievements 2017 - 2018

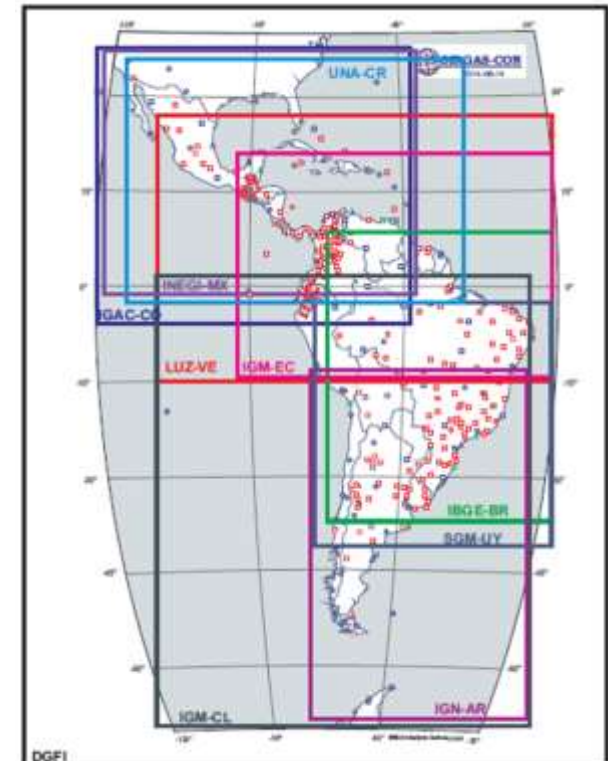
It allows the availability of a highly accurate reference frame, consistent with the ITRF

A 411 CORS stations network (October 2018)

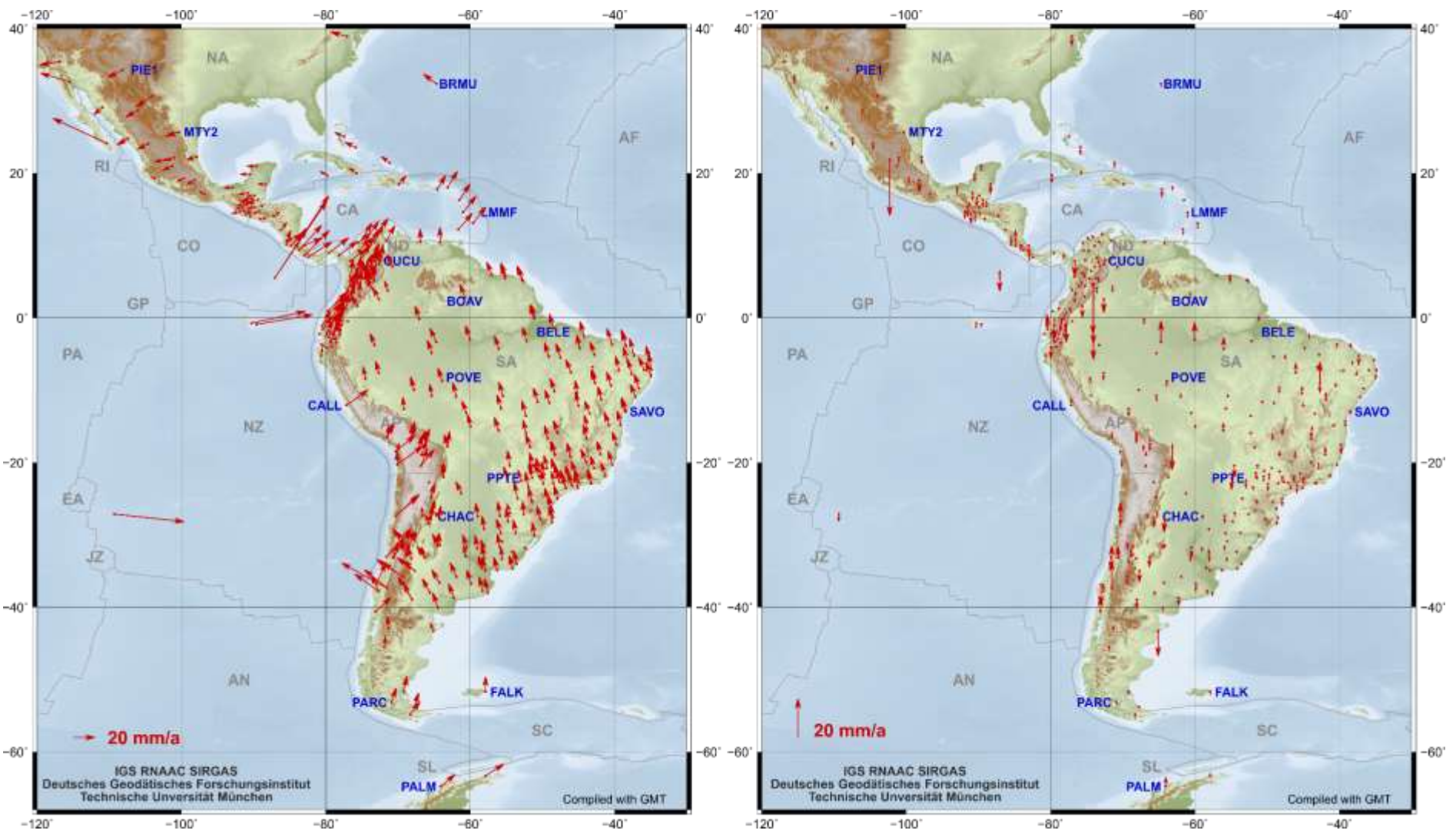




The reference frame is maintained by a weekly rigorous processing and adjustment method followed by the operating, processing and combination centers.



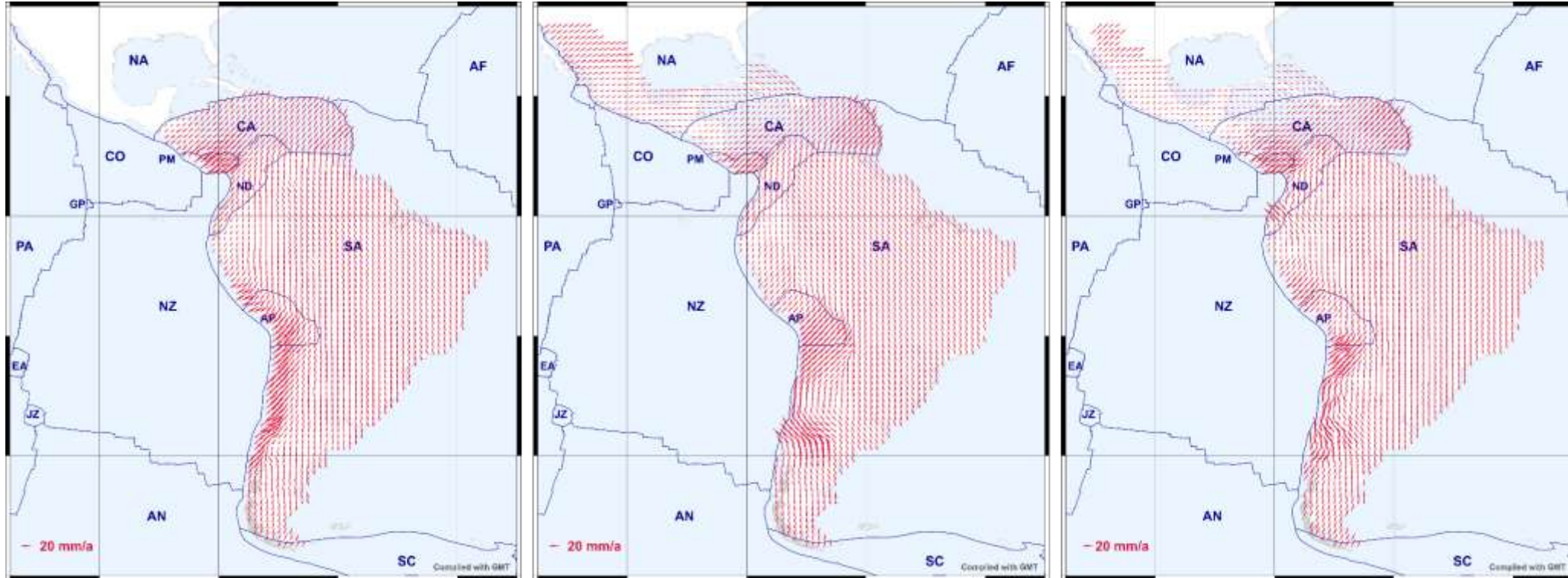
- 10 processing centers
- 2 combination centers
 - Weekly positions
 - multi-year solutions
- Each station is processed by 3 centers



SIR17P01

± 1.2 mm horizontal

± 2.5 mm vertical

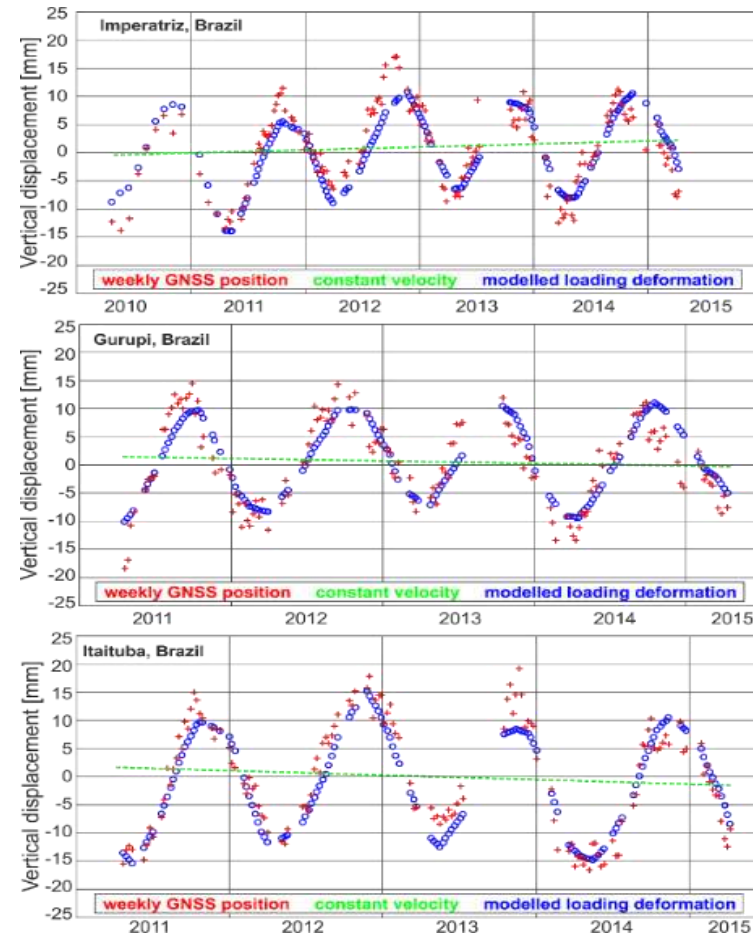
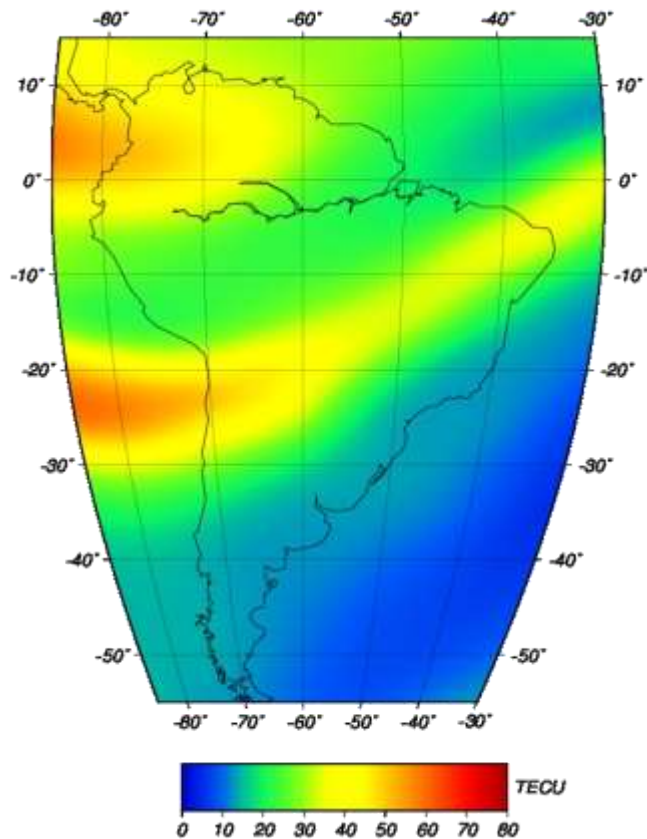


Left: VEMOS2009 (Drewes H., Heidbach O., 2012); Center: VEMOS2015 (Sánchez L., Drewes H., 2016); Right: VEMOS2017 (Drewes H., Sánchez L., 2017)

New goals:

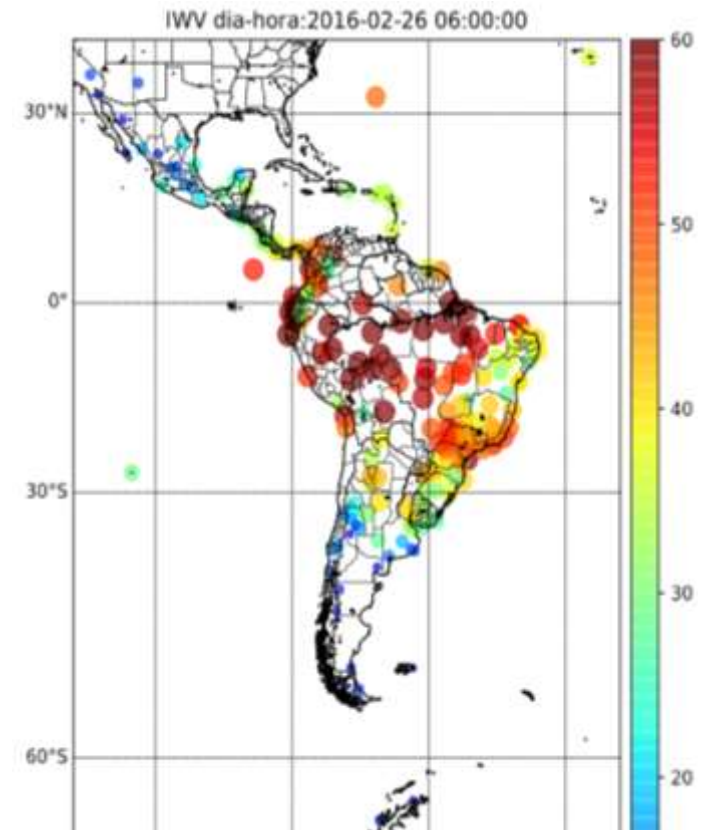
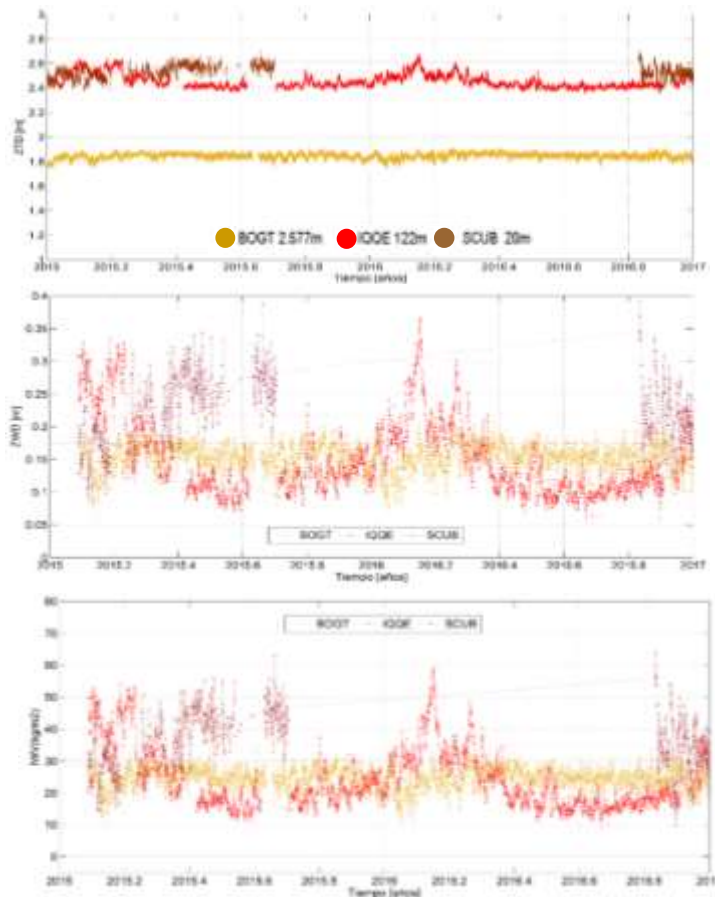
- To advance in the GGOS - GGRF direction
- To improve the deformation models
- To get involved in other geodetic techniques (e.g. VLBI, SLR, DORIS)

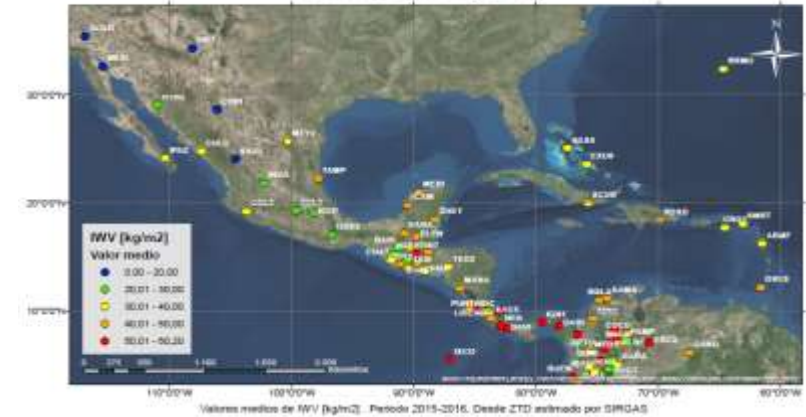
The Universidad Nacional de La Plata (Argentina), official SIRGAS Analysis Centre for the Ionosphere, produces hourly maps of vertical total electron content (vTEC) for the SIRGAS region.



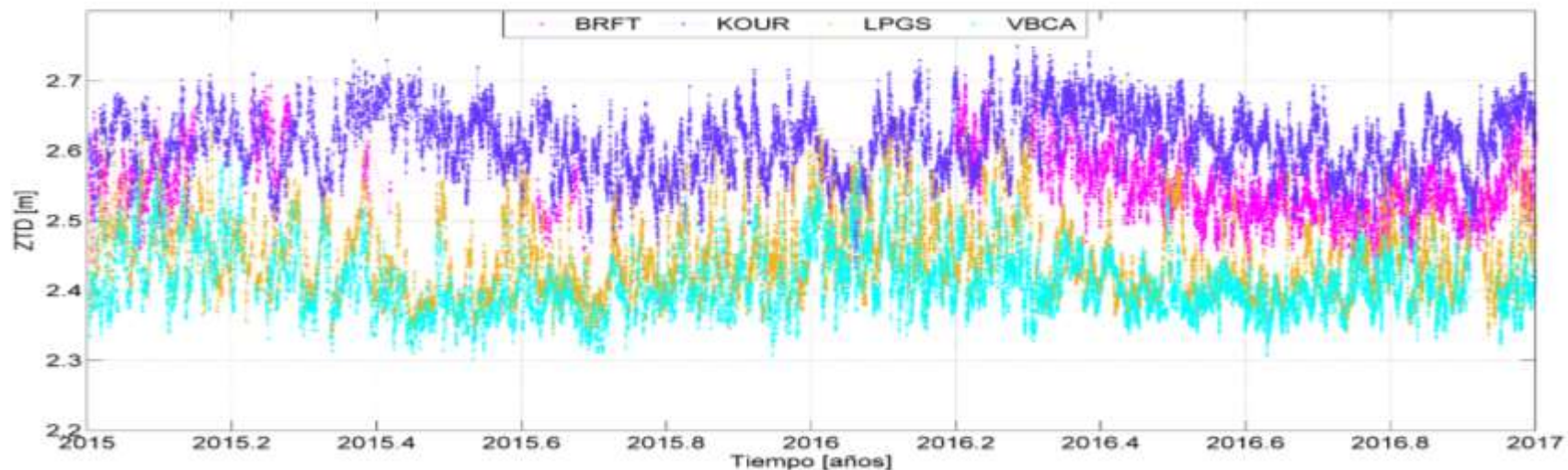
At the Neutral Atmosphere Processing Center CIMA, have been computed:

- ZTD, ZWD and IWV series (2014-2018) at 6h and 1h intervals
- Mean monthly IWV and ZTD values per station
- Four IWV daily maps





- To improve the computation models
- To provide concrete and useful products
- To measure and understand variables associated to climate change.



- Training and support to the implementation of national casters.
- Tests and development of the PPP technique in post-processing and real time.
- Workshop on Real Time: 2017

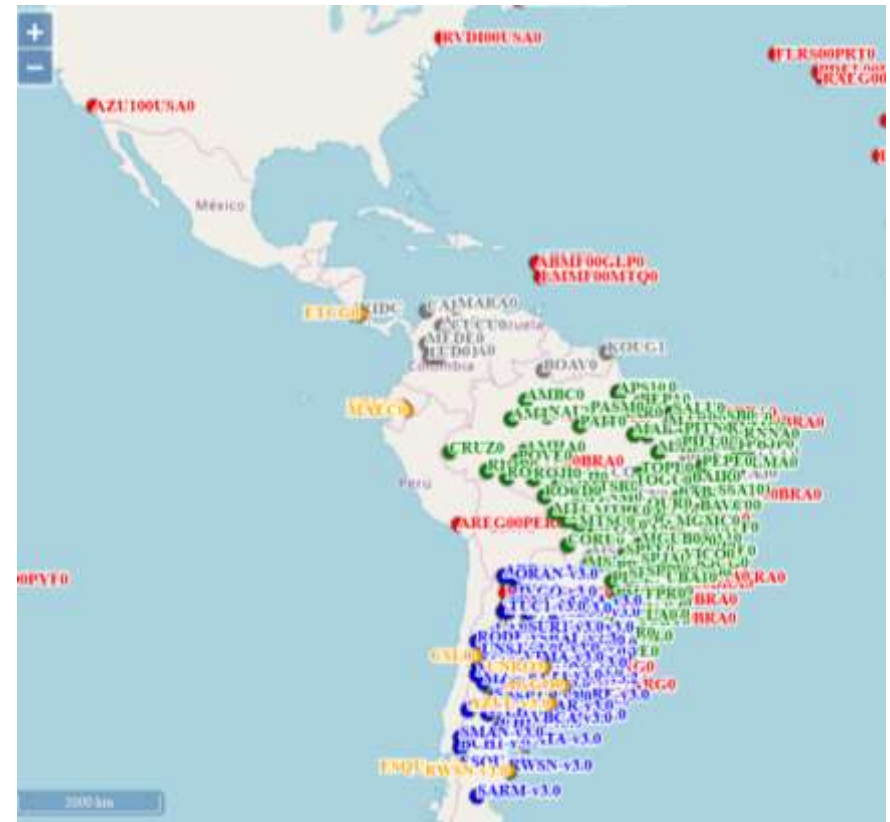


Tabla de Casters consultados

Caster	IP:Puerto	Contacto
SIRGAS Experimental	http://200.3.123.65:2101	http://www.fceia.unr.edu.ar/gps/
REGNA-SGM (Uy)	http://201.217.132.178:2101	http://www.sgm.gub.uy/
RAMSAC-NTRIP (Ar)	http://ntrip.ign.gob.ar:2101	http://www.ign.gob.ar/NuestrasActividades/Geodesia/RamsacNtrip/
IBGE - IP (Br)	http://gps-ntrip.ibge.gov.br:2101	http://www.ibge.gov.br/home/geociencias/geodesia/rbmc/ntrip/
IGS-RT	http://www.igs-ip.net:2101	http://register.rtcn-ntrip.org/cgi-bin/registration.cgi

Workshop on GNSS observations processing with Bernese 5.2.

Universidad de Santiago de Chile

July 17 - 20, 2018

Dr. María Virginia Mackern



Instituto Geográfico Nacional, Argentina.

September 3 - 8, 2018

27 people from Argentina, Bolivia, Chile, Costa Rica, Ecuador, Mexico, Peru and Uruguay.

Dr. Demián Gómez, Ing. Agrim. Hernán Guagni and Dr. Robert Smalley Jr.



SIRGAS WG III Workshop, Aguascalientes, October 5 -17, 2018

- Altimetric networks unification under the IHRF (*International Height Reference Frame*) perspective
- Processing and analysis of height and gravity measurements
- Venue: INEGI, Aguascalientes, México

Silvio R.C.de Freitas (Brazil), Roberto Teixeira Luz (Brazil), José Luis Carrión (Ecuador) and Hernán Guagni (Argentina).

Software provided by: Hermann Drewes, Laura Sánchez y Roberto Teixeira Luz.

Coountry	
ARGENTINA	1
BRAZIL	3
CHILE	2
COLOMBIA	7
COSTA RICA	2
ECUADOR	4
EL SALVADOR	1
MEXICO	7
PARAGUAY	2
REP. DOMINICANA	1
URUGUAY	1
VENEZUELA	1
SLOVAKIA	1
	33

- SIRGAS WG III President is member of the IAG's "Working Group on the Strategy for the Realization of the International Height Reference System (IHRIS)".
- IHRIS and IHRF realization leads to new approaches and strategies in SIRGAS



Main SIRGAS protocols

- Physical heights (geopotential numbers);
- Connected to the Geometric component of SIRGAS;
- Integration of the vertical national networks;
- Referred to a global reference level W_0 of IHRIS/IAG;
- Associated to a reference epoch.
- Linked to GGRF stations.

<http://geoweb2.inegi.org.mx/sirgas2018/>



SIRGAS2018 SISTEMA
DE REFERENCIA GEOCÉNTRICO
PARA LAS AMÉRICAS

Aguascalientes, México

- Discussion SIRGAS in the practice. 8/10/2018;
- Symposium SIRGAS 2018
October 9 – 12 (97 people / 20 countries)
- Workshop on Vertical Reference Systems (33 people / 13 countries)



**INSTITUTO NACIONAL
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- 413 CORS stations: data access, continuity, communications, distribution;
 - Data sharing is critical for unification;
 - On the Restructuration of SIRGAS;
 - A professional and effective communication strategy, specially with decision makers
- Joint events: 2019 GGOS / 2020 IASPEI / FIG 2020.



Sistema de Referencia Geocéntrico para las Américas (SIRGAS)

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SIRGAS: Geocentric Reference System for the Americas

SIRGAS is the Geocentric Reference System for the Americas. Its definition corresponds to the **International Terrestrial Reference System (ITRS)** [\[1\]](#) and it is realized by a regional densification of the **International Terrestrial Reference Frame (ITRF)** [\[2\]](#) in **Latin America**. Besides the geometrical reference system, SIRGAS includes the definition and realization of a **vertical reference system**, based on ellipsoidal heights as geometrical component and geopotential numbers (referred to a global conventional W_0 value) as physical component.

SIRGAS was created in 1993 during the International Conference for the Definition of a South American Geocentric Reference System held in Asuncion, Paraguay. This conference was promoted and supported by the **International Association of Geodesy (IAG)** [\[3\]](#), the **Pan-American Institute for Geography and History (PAIGH)** [\[4\]](#), and the **US Defense Mapping Agency (DMA)**, 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, since the SIRGAS2000 GPS campaign was extended to North- and Central America, and the United Nations Organization, through its **7th Cartographic Conference for The Americas** (New York, January 22 – 27, 2001), recommend to adopt SIRGAS as official reference system in all American countries.

SIRGAS forms part of the **IAG Commission 1** [\[5\]](#) (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** [\[6\]](#).

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The activities, resolutions, and challenges of SIRGAS are described in the different **Newsletters** generated during the SIRGAS **Symposia**.



Sistema de Referencia Geocéntrico para las Américas (SIRGAS)

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SIRGAS: guías, orientações, guidelines

[Guías para la instalación de estaciones SIRGAS-CON](#)

[Orientações para instalação de estações SIRGAS-CON \(em espanhol\)](#)

[Guidelines for the installation of SIRGAS-CON stations](#)

[Procedimiento para inscribir una nueva estación en la red SIRGAS-CON](#)

[Procedimento para se tornar uma estação SIRGAS-CON \(em espanhol\)](#)

[Procedure for becoming a SIRGAS-CON station](#)

[Guía para la coordinación de la red SIRGAS de Operación Continua \(SIRGAS-CON\)](#)

[Orientações para a Coordenação da Rede de Monitoramento Contínuo do SIRGAS \(SIRGAS-CON\) \(em espanhol\)](#)

[Guidelines for the Coordination of the SIRGAS Continuously Operating Network \(SIRGAS-CON\)](#)

[Guía para los Centros de Análisis SIRGAS](#)

[Orientações para os centros de análise SIRGAS \(em espanhol\)](#)

[Guidelines for SIRGAS Analysis Centers](#)

Recomendaciones, recomendações, recommendations

[IGS site guidelines](#)

[Monumentation of permanent GNSS stations – UNAVCO](#)

[Physical Site Specifications: Geodetic Site Monumentation](#) (W.L. Combrinck and M. Schmidt)

[NOAA/NGS Guidelines for establishing and operating CORS](#)

[EUREF-EPN guidelines](#)

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[Privacy Policy](#)

[Imprint](#)

- To get the contact list for data and processing centers;
- To prepare a SIRGAS official invitation letter for each country;
- To assess the capacity building needs and evaluate the possible actions;
 - To use the www.sirgas.org Website;
- To start working in the WG's, specially WGI





Thank you, very much.
We hope to see you in SIRGAS -November
2019-
Rio de Janeiro