

# Recent achievements and current challenges in the maintenance of the geodetic reference frame of the Americas

*J.A. Tarrío<sup>1</sup>, L. Sanchez<sup>2</sup>, Sonia Alves<sup>3</sup>, Alberto Silva<sup>3</sup>, Jesarella Inzunza<sup>1</sup>, Gustavo Caubarrère<sup>4</sup>, Alejandro Martínez<sup>5</sup>, Óscar Rodríguez<sup>6</sup>, Emilio Aleuy<sup>7</sup>, Hernán Guagni<sup>8</sup>, Guido González<sup>9</sup>*

*<sup>1</sup>Universidad de Santiago de Chile, Chile, <sup>2</sup>Technische Universität München - DGFI-TUM, Germany, <sup>3</sup>Instituto Brasileiro de Geografia e Estatística, Brasil, <sup>4</sup>Instituto Geográfico Militar, Uruguay, <sup>5</sup>Instituto Geográfico Militar, Ecuador, <sup>6</sup>Instituto Geográfico Agustín Codazzi, Colombia, <sup>7</sup>Instituto Geográfico Militar, Chile, <sup>8</sup>Instituto Geográfico Nacional, Argentina, <sup>9</sup>Instituto Nacional de Estadística y Geografía, Mexico*



## Outline

- What is SIRGAS?
- SIRGAS' objectives
- SIRGAS' Working Groups
- Recent achievements
- Current challenges
- Products

## What is SIRGAS?

SIRGAS is a non-profit organization based on the voluntary contribution of scientific organizations and the national geodetic, cartographic or geographic agencies of the member countries.

SIRGAS was established in 1993 with the purpose of replacing (or modernizing) the classical geodetic datums with a unified geocentric reference frame called SIRGAS: Geocentric Reference System for the Americas.

This purpose was extended in 1998 to also include the determination of a vertical reference system associated with the Earth's gravity field.

Currently, the main objective of the SIRGAS organization is to promote the growth, development, sustainability and proper use of the SIRGAS reference frame in Latin America.

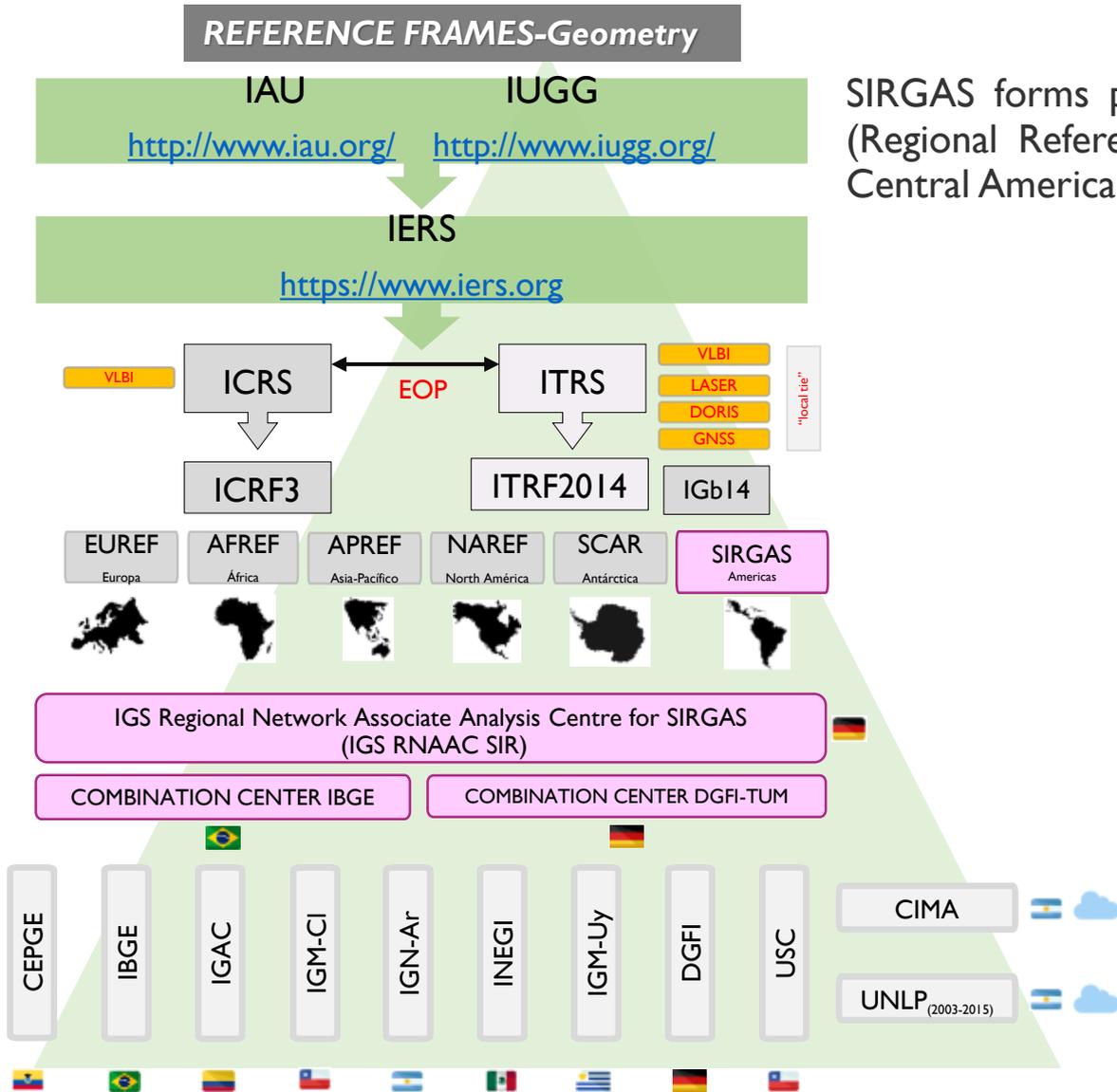
Source: [www.sirgas.org](http://www.sirgas.org)



Source: Drewes 2019, The Role of the IAG Sub-commissions in Latin America



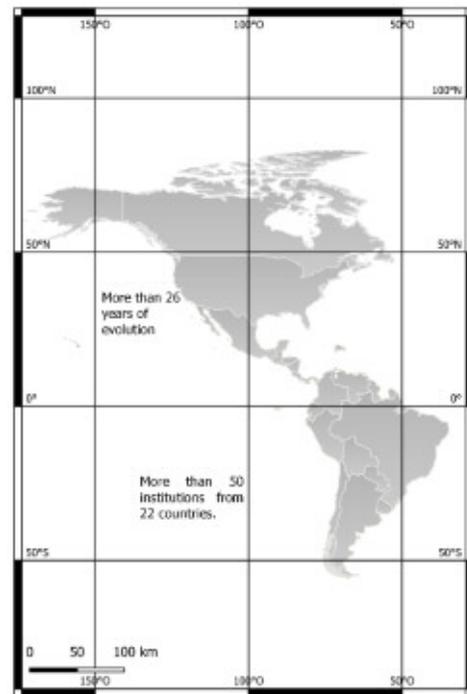
Rio de Janeiro, Brasil, 2019



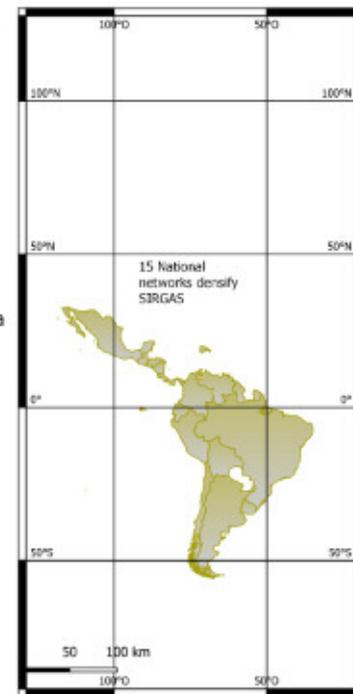
SIRGAS forms part of the [IAG Commission I](#) (Reference Frames), through the Sub-commission 1.3 (Regional Reference Frames), and it is responsible for the Regional Reference Frame for South and Central America (1.3b). SIRGAS is also a Working Group of the [Cartographic Commission of the PAIGH](#).


**SIRGAS coordinates the largest geodetic infrastructure in Americas**

- 22 members countries:
- Argentina
  - Bolivia
  - Brazil
  - Canadá
  - Chile
  - Colombia
  - Costa Rica
  - Dominican Republic
  - Ecuador
  - El Salvador
  - French Guyana
  - Guatemala
  - Guyana
  - Honduras
  - México
  - Nicaragua
  - Panamá
  - Paraguay
  - Perú
  - United States
  - Uruguay
  - Venezuela



- Adopted by 15 countries:
- Argentina
  - Bolivia
  - Brazil
  - Chile
  - Colombia
  - Costa Rica
  - Dominican Republic
  - Ecuador
  - El Salvador
  - French Guyana
  - Guatemala
  - México
  - Panamá
  - Perú
  - Uruguay
  - Venezuela



Source: SIRGAS-WG I Meeting. Tarrío et al. 2020

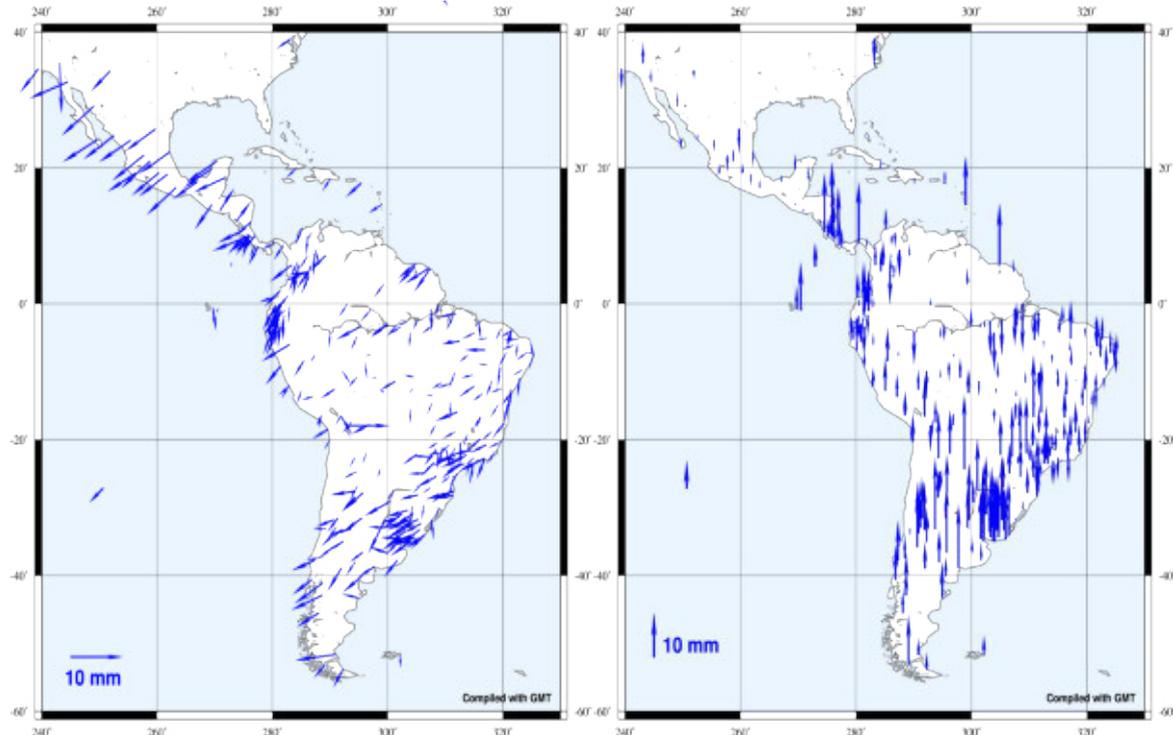


# Recent achievements

## a) Reprocessing of the SIRGAS reference network based on the ITRF2014 (IGS14 / IGB14)

### Motivation

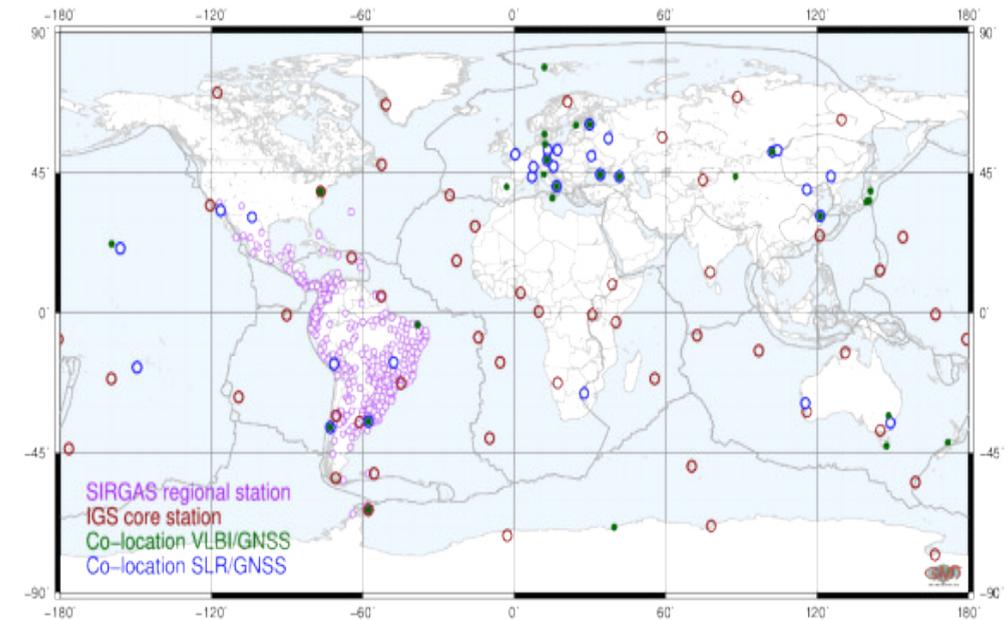
Need to update the SIRGAS reference frame to the new ITRF.



Changes (artificial) caused by the change from ITRF2008 to ITRF2014..  
Sanchez et a., 2020

### Currently Situation

Once the analysis of the time series is finished, the determination (adjustment) of weekly coordinates will begin in the IGB14 reference frame. A comprehensive multi-year solution will be calculated (2000.0 to 2020.5) and the results will be published on [www.sirgas.org](http://www.sirgas.org) and [ftp.sirgas.org](ftp://ftp.sirgas.org).



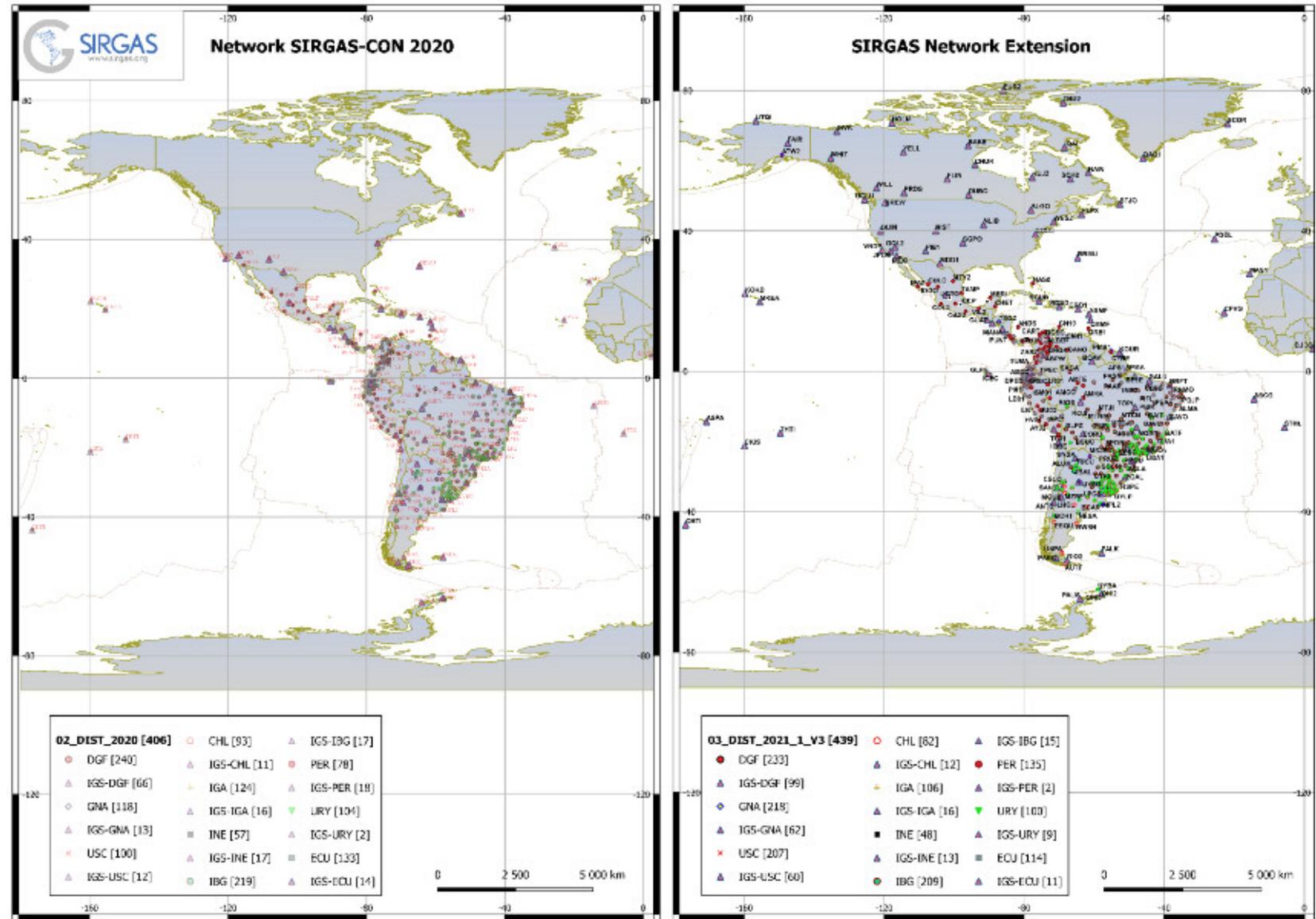
Stations included in the reprocessing of the SIRGAS network using the IGS14 / IGB14 (ITRF2014) as a reference framework. Sanchez et a., 2020

More details in [Sánchez L. \(2020\). SIRGAS Regional Network Associate Analysis Centre Technical Report 2019.](#)  
Villiger A., Dach R. (eds.) *International GNSS Service: Technical Report 2019*, 125-136, 10.7892/BORIS.144003.

# Recent achievements

## b) Extension of the SIRGAS network

At the request of NGS(National Geodetic Survey) and to help support GRFA activities (Geodetic Reference Frame for Americas) working group, established in the framework of the Regional Committee of the United Nations on Global Geospatial Information Management for the Americas (UN-GGIM: Americas), since GPS week 2151, the SIRGAS network was extended to North América

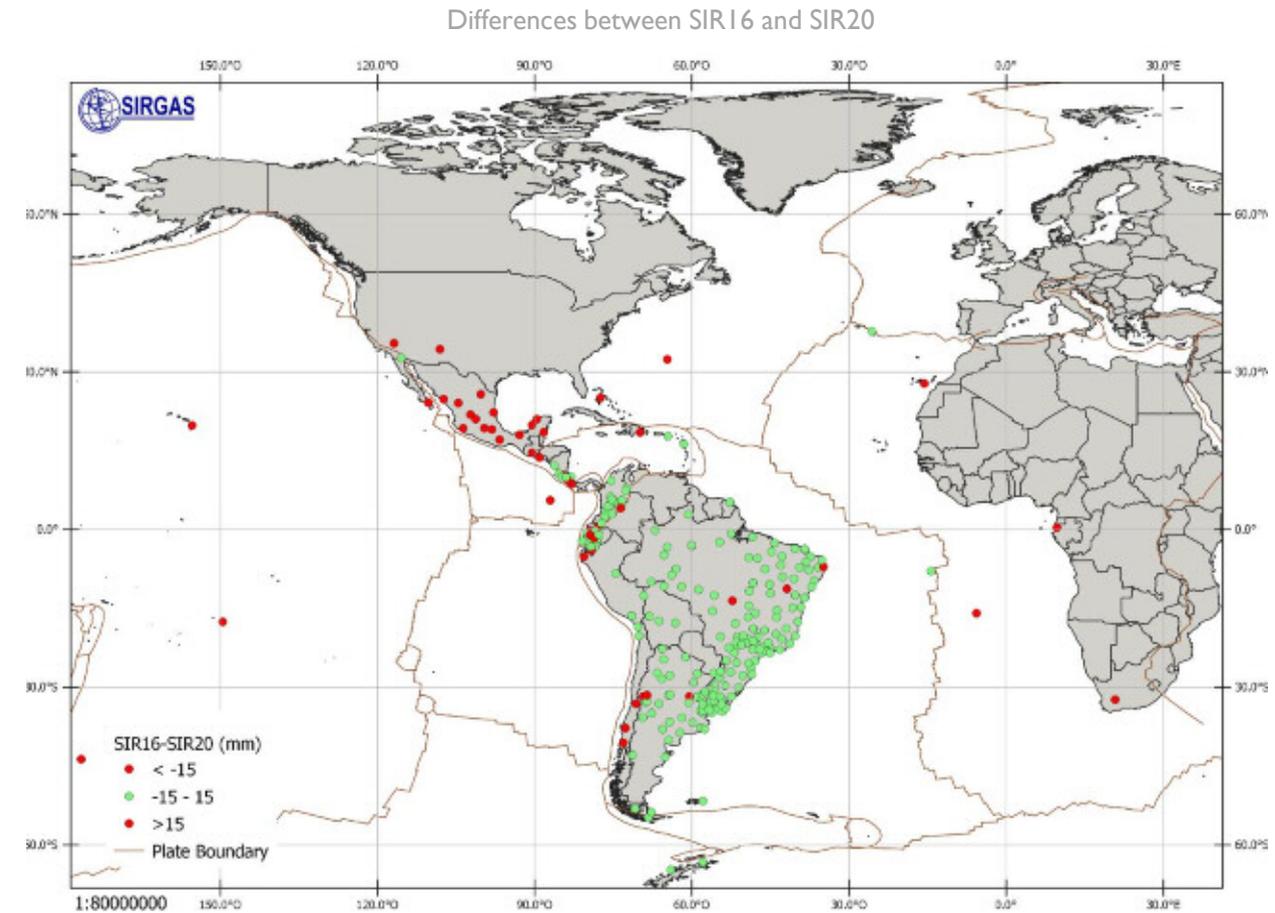


Source: SIRGAS-WG I Meeting, Tarrío et al. 2020

# Current challenges

## Main challenges in SIRGAS today

- To make the participation of the countries bigger in the CARIGEO area
- Add more stations to the SIRGASCON network and implement 3 or more analysis center: PER, CRI
- Calculation of transformation parameters between different realization of SIRGAS (Ongoing effort between WG 1 and WG 2)
- To continue with the training courses by WG 1, WG 2 and WG 3



Source: Tarrío et al. 2020 SIRGAS-WG 1 Meeting

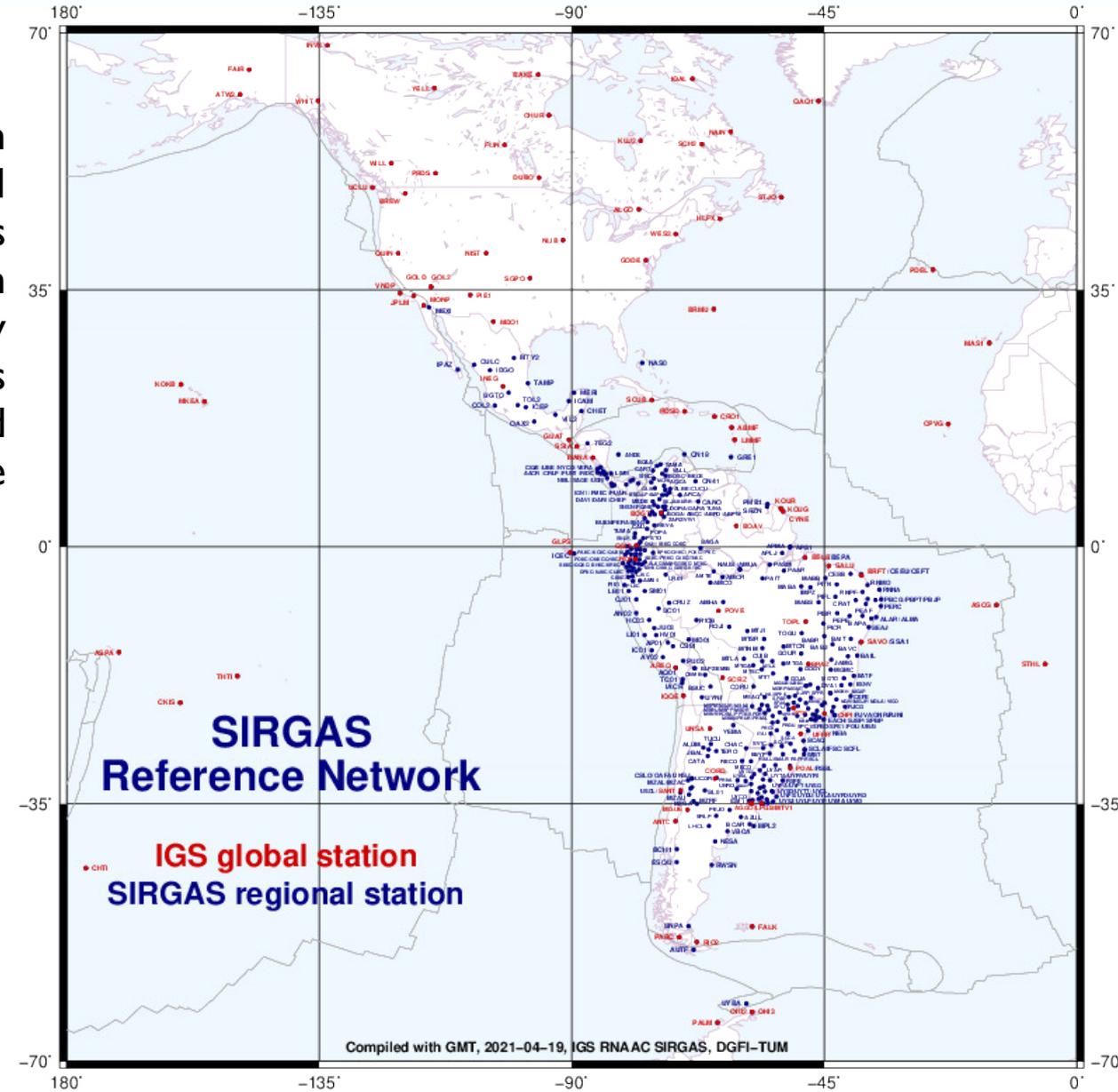
# Products

SIRGAS-CON is a network of GNSS stations with continuous operation distributed over Latin America, with high precision ITRF (International Terrestrial Reference Frame) coordinates. The operability of SIRGAS-CON is possible thanks to the voluntary contribution of more than 50 Latin American organizations that guarantee the reliability and long-term stability of the network through redundancy and the application of precise guidelines that ensure the quality of GNSS measurements, scientific processing data and the coordinates obtained for each reference station. SIRGAS provides the following products:

- Weekly station positions
- Station positions and velocities (multi-year solutions)
- Continuous velocity model VEMOS (Velocity Model for SIRGAS)
- Tropospheric delays
- Regional ionospheric maps
- Real time Caster Services

Station: ...  
 Author: ...  
 File: ...  
 Comment: ...  
 Reference Frame: ...  
 Reference Epoch: ...

ID	STATION NAME	X(m)	Y(m)	Z(m)	CODE	STATUS	END
1	ANAO	486286.01	68406.6971	6.08958	-825204.27145	0.00216	109793.68125 0.00055 A 1 2013-05-26 2017-01-20
2	ABCC	419398.01	179439.0211	0.00030	-811732.32449	0.00080	32004.53147 0.00022 A 1 2013-07-26 2017-01-04
3	ABRP	571286.01	291705.74268	0.00023	-530744.94917	0.00095	174664.78017 0.00020 A 1 2013-08-17 2017-01-20
4	ABRP	571286.01	291705.74635	0.00044	-530744.59474	0.00075	174664.78017 0.00045 A 2 2013-01-29 2016-01-21
5	ABRP	419428.01	174260.24861	0.00032	-811331.49889	0.00072	484791.49039 0.00032 A 1 2013-08-17 2017-01-20
6	ABRP	419428.01	174260.25054	0.00042	-811331.64968	0.00059	52021.54978 0.00034 A 1 2013-08-17 2017-01-20
7	ABRP	419780.01	170254.04814	0.00050	-805479.54114	0.00133	92429.50049 0.00048 A 1 2013-08-17 2017-01-20
8	ABRP	419780.01	170254.04814	0.00053	-805479.54114	0.00043	-107364.87330 2.00034 A 1 2013-08-17 2017-01-20
9	ABRP	419428.01	174260.24861	0.00048	-811331.49889	0.00034	85540.53171 0.00060 A 1 2013-08-17 2017-01-20
10	ABRP	419428.01	174260.24861	0.00048	-811331.49889	0.00048	-24334.52339 0.00112 A 2 2013-08-17 2016-08-09
11	ABRP	419428.01	174260.24861	0.00048	-811331.49889	0.00048	-24334.52339 0.00048 A 1 2013-08-17 2016-08-09
12	ABRP	419428.01	174260.24861	0.00048	-811331.49889	0.00048	-24334.52339 0.00048 A 2 2013-08-17 2016-08-09
13	ABRP	419428.01	174260.24861	0.00048	-811331.49889	0.00048	-24334.52339 0.00048 A 1 2013-08-17 2016-08-09
14	ABRP	419428.01	174260.24861	0.00048	-811331.49889	0.00048	-24334.52339 0.00048 A 2 2013-08-17 2016-08-09
15	ABRP	419428.01	174260.24861	0.00048	-811331.49889	0.00048	-24334.52339 0.00048 A 1 2013-08-17 2016-08-09
16	ABRP	419428.01	174260.24861	0.00048	-811331.49889	0.00048	-24334.52339 0.00048 A 2 2013-08-17 2016-08-09
17	ABRP	419428.01	174260.24861	0.00048	-811331.49889	0.00048	-24334.52339 0.00048 A 1 2013-08-17 2016-08-09
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22	ABRP	419428.01	174260.24861	0.00048	-811331.49889	0.00048	-24334.52339 0.00048 A 2 2013-08-17 2016-08-09
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24	ABRP	419428.01	174260.24861	0.00048	-811331.49889	0.00048	-24334.52339 0.00048 A 2 2013-08-17 2016-08-09
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26	ABRP	419428.01	174260.24861	0.00048	-811331.49889	0.00048	-24334.52339 0.00048 A 2 2013-08-17 2016-08-09
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28	ABRP	419428.01	174260.24861	0.00048	-811331.49889	0.00048	-24334.52339 0.00048 A 2 2013-08-17 2016-08-09
29	ABRP	419428.01	174260.24861	0.00048	-811331.49889	0.00048	-24334.52339 0.00048 A 1 2013-08-17 2016-08-09
30	ABRP	419428.01	174260.24861	0.00048	-811331.49889	0.00048	-24334.52339 0.00048 A 2 2013-08-17 2016-08-09



Source: www.sirgas.org

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**Thank you**  
**Muchas gracias**  
**Muito obrigado**

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*<sup>1</sup>Universidad de Santiago de Chile, Chile, <sup>2</sup>Deutsches Geodätisches Forschungsinstitut, Germany, <sup>3</sup>Instituto Brasileiro de Geografia e Estatística, Brasil, <sup>4</sup>Instituto Geográfico Militar, Uruguay, <sup>5</sup>Instituto Geográfico Militar, Ecuador  
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