

SIRGAS-CON-D and Local Processing Centers, a solution for the densification of the Reference Frame in Latin America and the Caribbean.

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Content

This contribution reports:

1. **Motivation**
2. An introduction about the Densification Network and the structure of the processing centers.
3. **Methodology used by the processing centers.**
4. First results about the last three years, from CIMA Regional PC.
5. **Conclusions.**

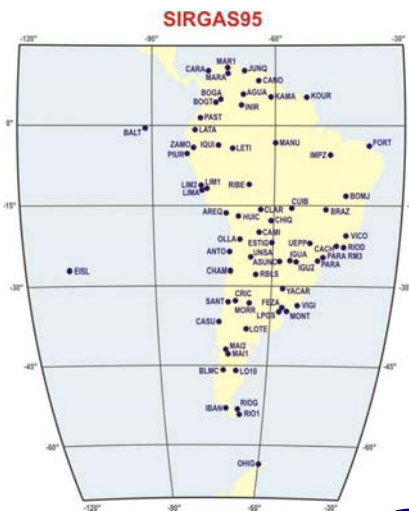


1-Motivation

1. The continuously increasing of SIRGAS regional station number.
2. The incorporation to SIRGAS of new processing centers in Latin American institutions. An excellent opportunity to distribute the hard work.

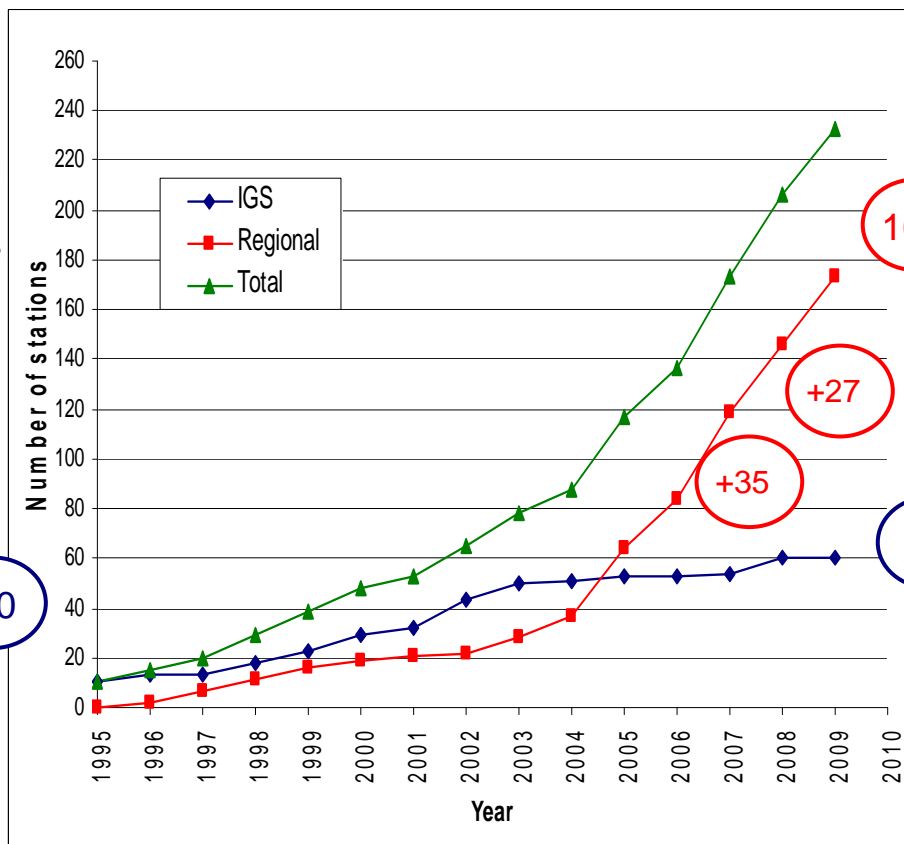
YEAR	New regional stations	New Processing Centers
2007	35	1 + 5 Experimental DGFI
2008	27	1+3+2 Experimental IBGE - IGAC - CIMA - INEG - GMA
July 2009	27	4 + 2E + 3Experimental ECU - LUZ - URY

Increase of SIRGAS stations 1995 - 2009



Only 10 were continuous stations

10

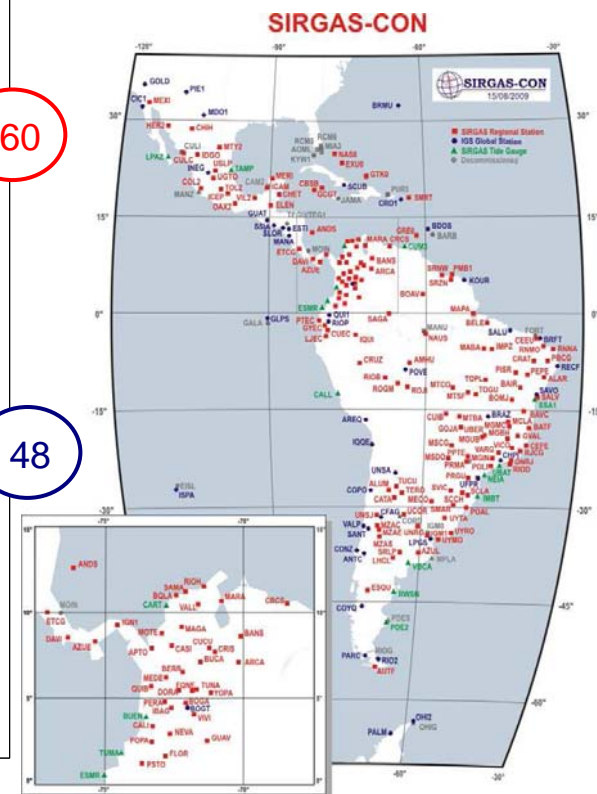


160

+27

+35

48



Geodetic Community
IGS

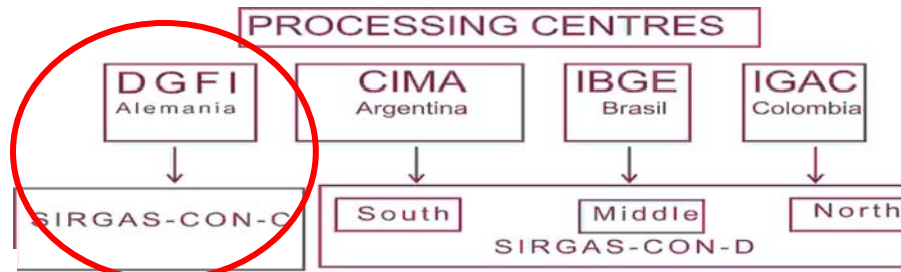
SIRGAS

Users' community
Countries - Regions

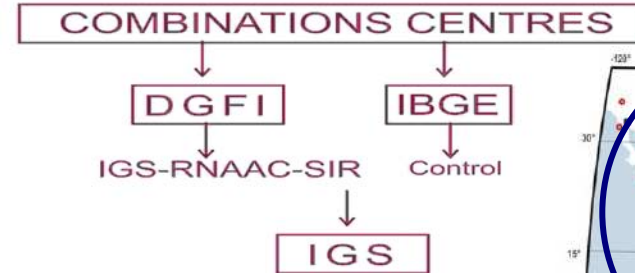
SIRGAS-CON. Structure of processing



before week 1495
(August 31, 2008)
DGFI official AC
4 Experimental AC

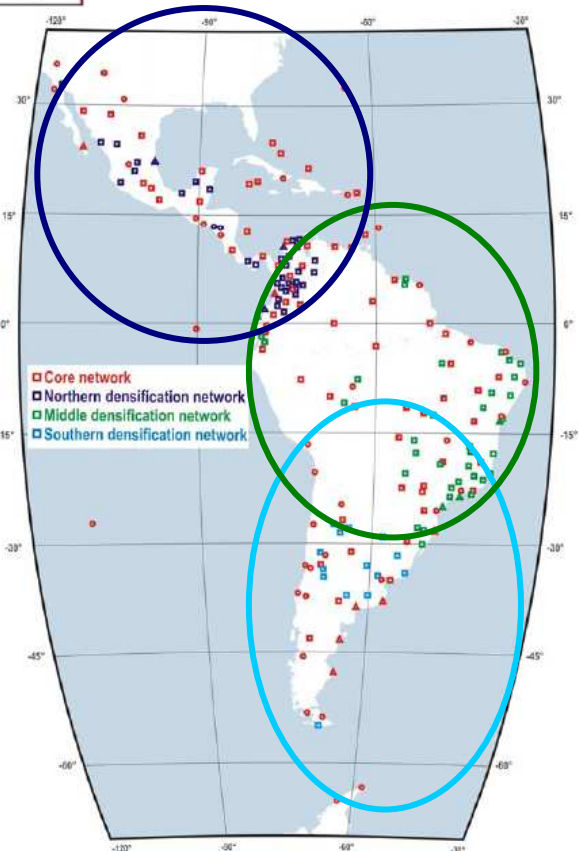
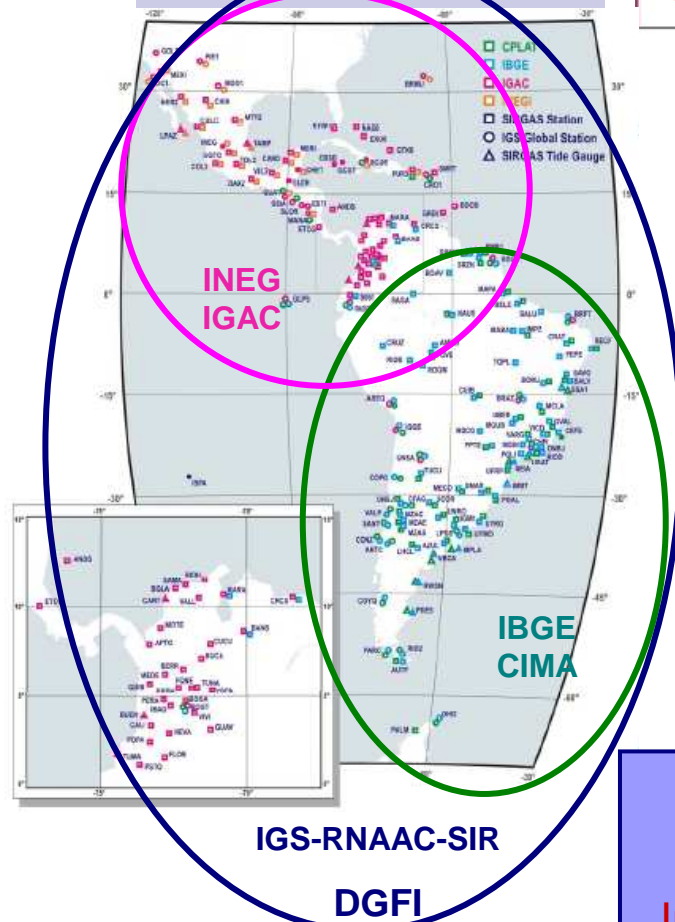


After week 1495
TODAY
3 LOCAL AC
1 AC and
IGS-RNACC-SIR



It was established
a new
ESTRUCTURE

+ 45 new
Stations
In the last 5
years



EXPERIMENTAL STAGE
(Quality and punctuality)

3- Methodology

1) SIRGAS-CON-Regional Network a contributions to the IGS

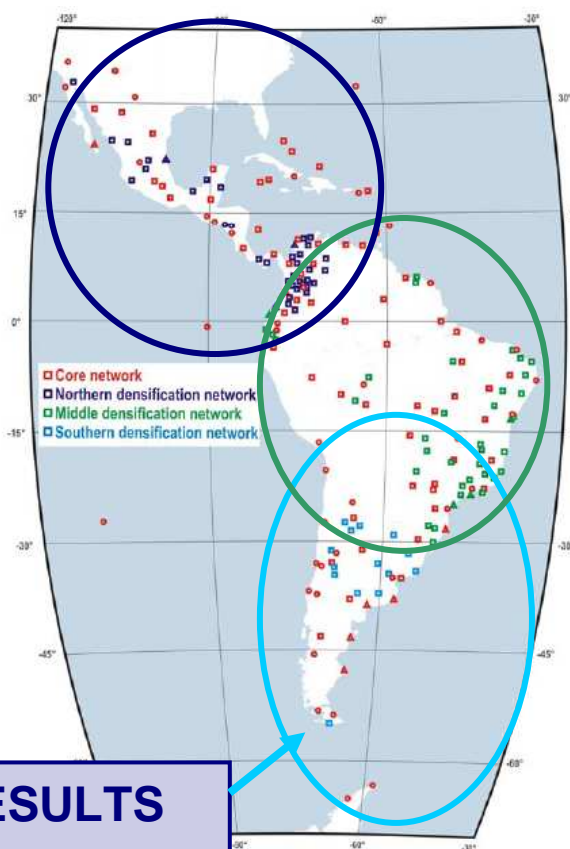
- Loosely constrained weekly solutions of the densification and core networks.
- Combinations calculated by IGS-RNACC-SIR at DGFI and are controlled by IBGE.

2) SIRGAS-CON-Regional Network as a densification of IGS05 in American countries.

- Loosely constrained weekly solutions from each SIRGAS densification network (including new station) are computed.
- Weekly solutions are aligned to IGS05. The strategy used is:
 - constraining reference coordinates ($W=1/(\pm 1E-05)$)
 - Fiduciales points: IGS05 stations with IGS weekly coordinates

Requirements:

- Punctuality and Precision.
- Consistency with the IGS global network.

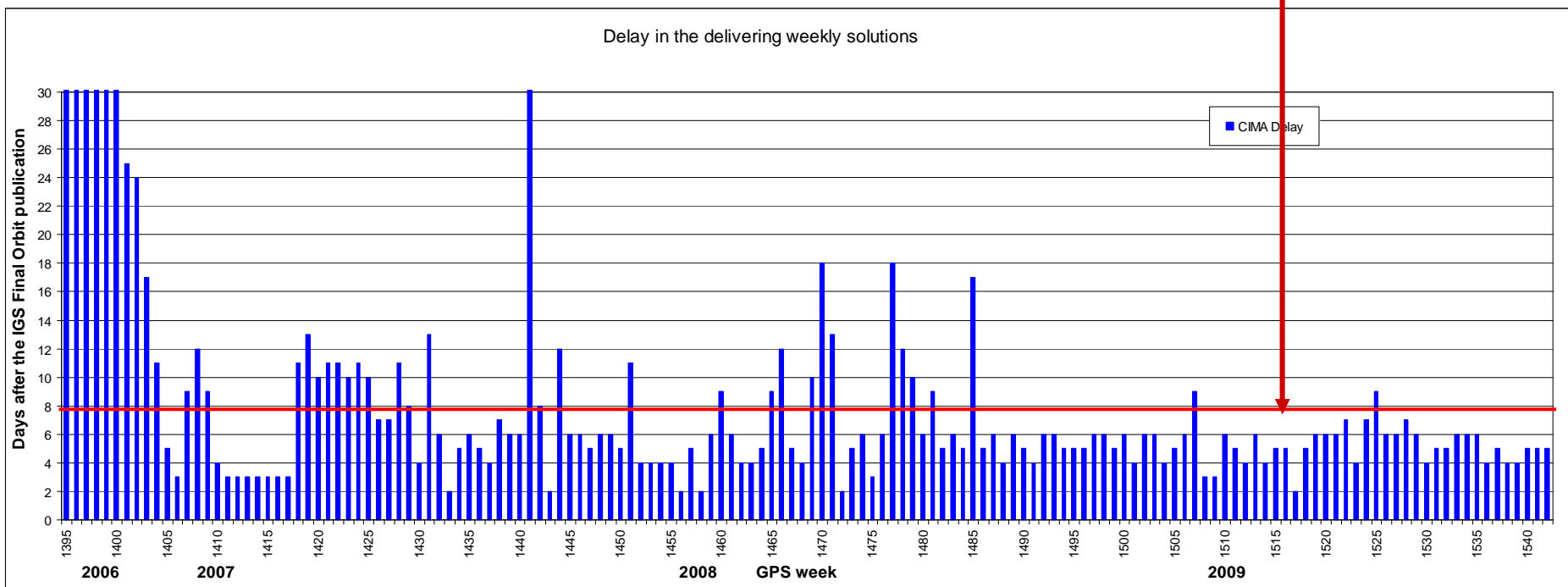


3. FIRST RESULTS

CIMA

SIRGAS-CON-D-South

4-First results. CIMA (Regional Processing Centre) Punctuality on delivering weekly solutions



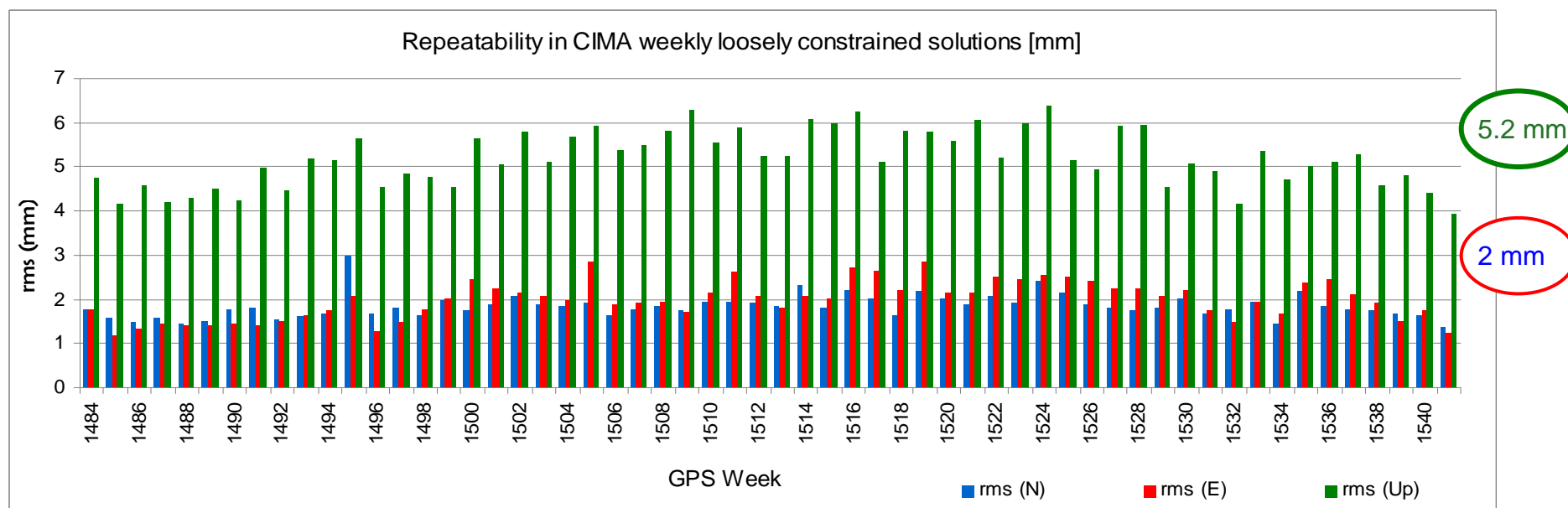
CIMA
Experimental Processing Centre

CIMA
SIRGAS-CON-D-South

4-First results. CIMA (Regional Processing Centre)- QUALITY

1) Evaluation of the daily coordinate repeatability

Mean values of RMS for daily coordinate repeatability in the CIMA loosely constrained weekly solutions.



2) Evaluation of the loosely constrained weekly solutions with respect to:

DGFI (36 Common stations)

IBGE (21 Common stations)

URY (31 Common stations)

Mean values of RMS after Helmert transformation between two groups of coordinates

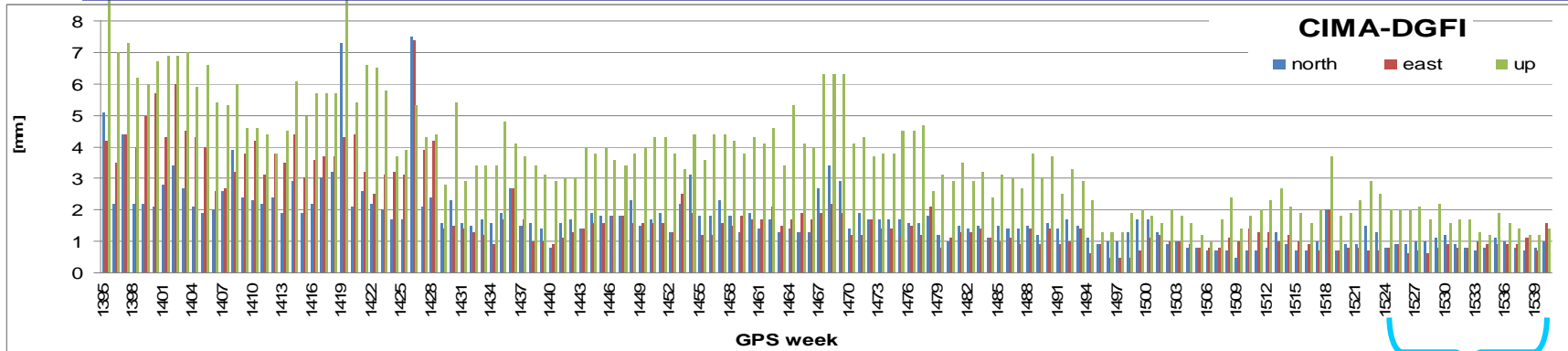
CIMA - DGFI

CIMA - IBGE and

CIMA - URY

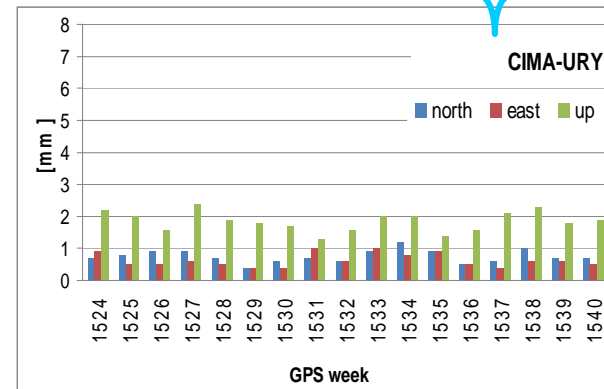


Agreement between the loosely constrained solutions calculated by CIMA, DGFI, IBGE and URY

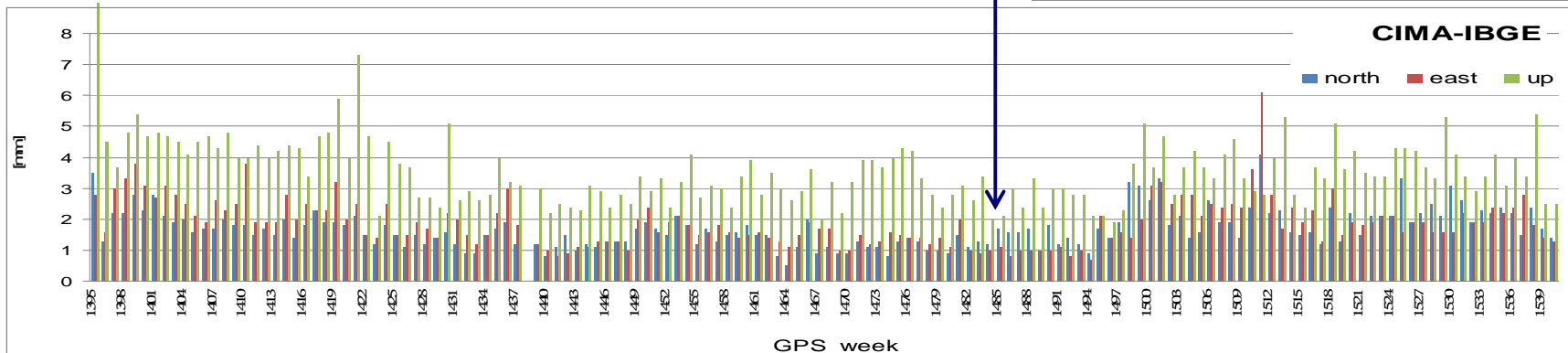


2 mm
<1 mm

CIMA and IBGE
Experimental Processing Centre



2 mm
<1 mm



<4 mm
<2 mm

Consistency with the IGS global network

Alignment of the weekly solution to the IGS05

Strategy: constraining reference coordinates (weight= 1/ $\pm 1e-05$)

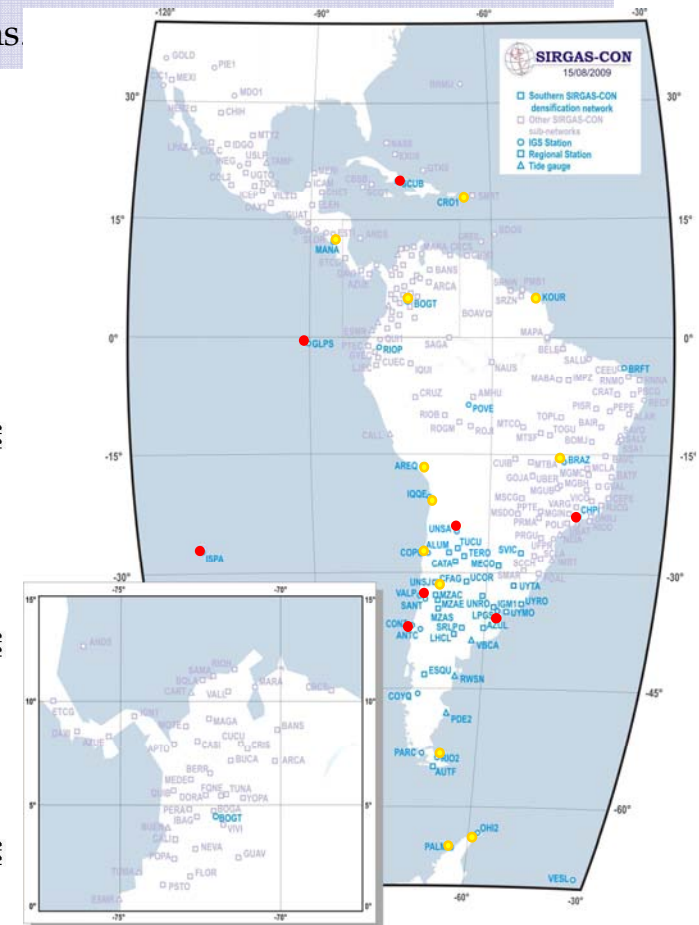
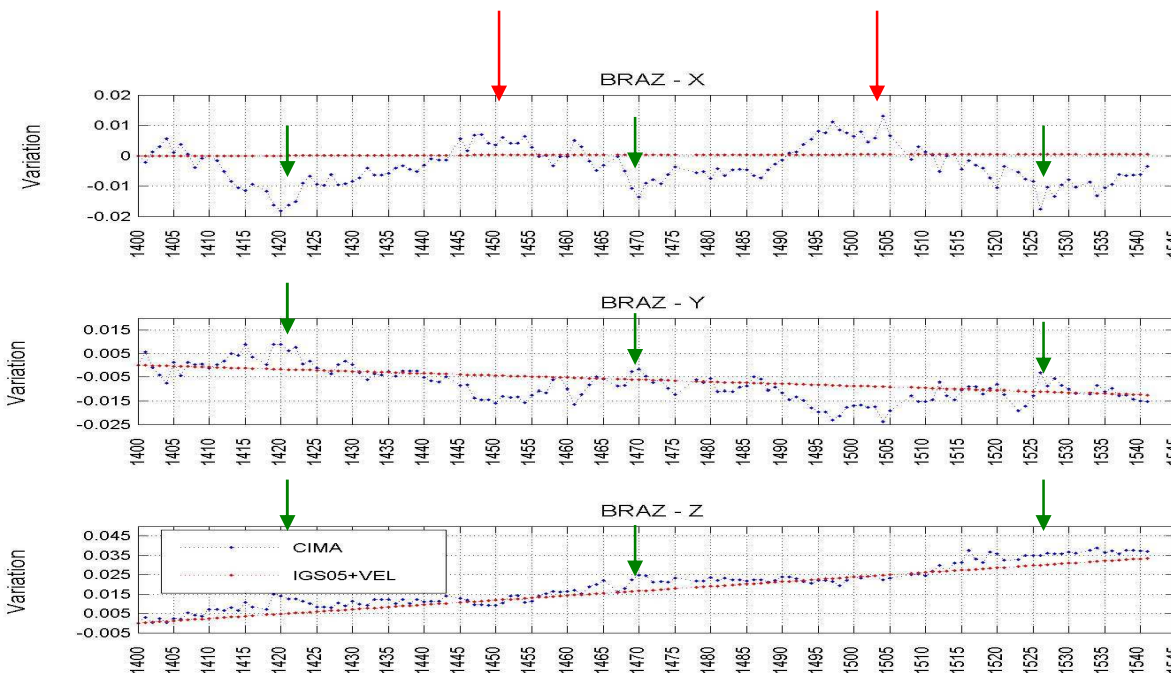
Fiduciales points: IGS weekly coordinates from IGS05 stations (igsPwww.snx).

CHPI, CONZ, GLPS, ISPA, LPGS, SANT, SCUB, UNSA

Control points:

AREQ, BOGT, BRAZ, CFAG, COPO, CRO1, IQQE, KOUR, MANA, OHI2, PALM Y RIO2 . They appear in IGS weekly solutions

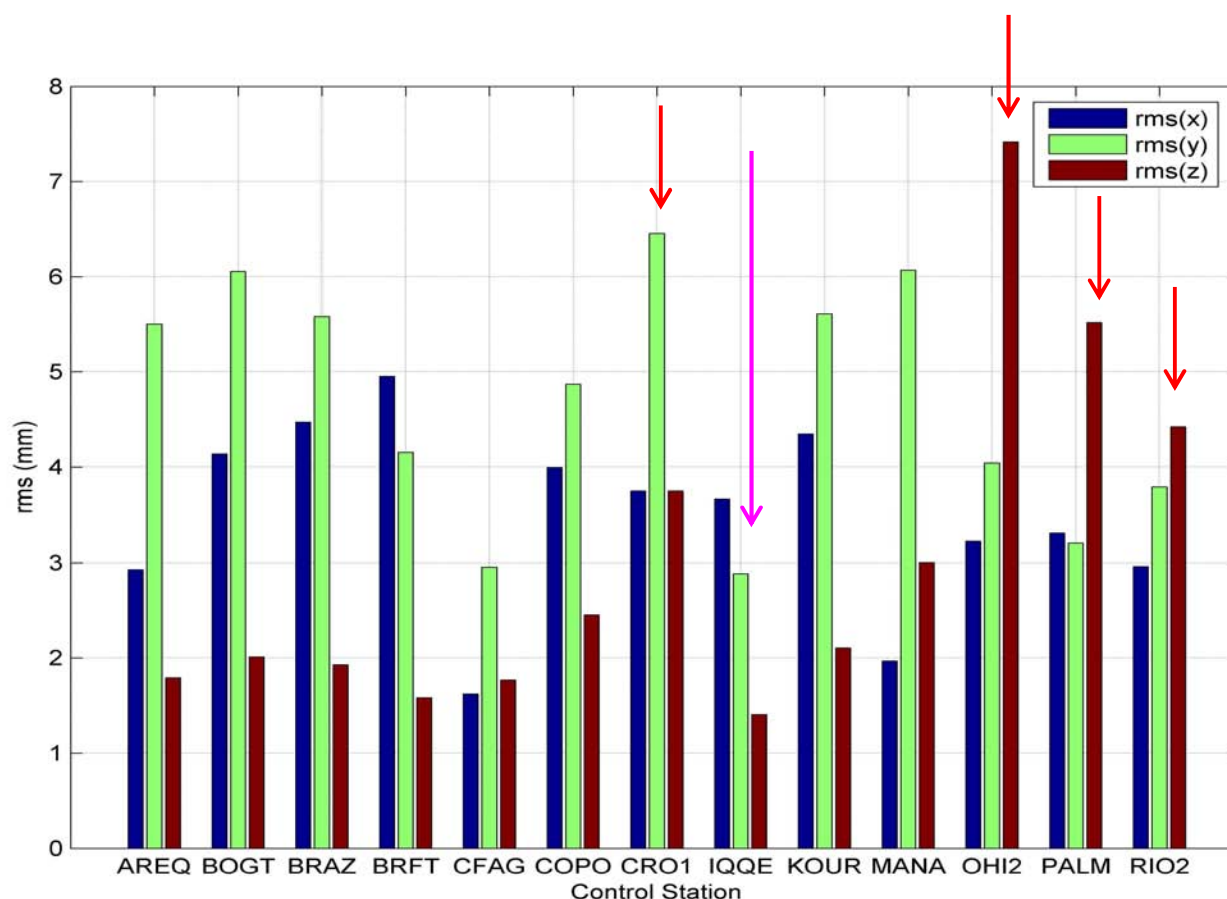
BRAZ has a Strong seasonal variation. Not Used as Fiducial point



Control point: Coordinate agreement

SIRGAS-CON-D-South (CIMA) wrt IGS weekly solutions

RMS of the differences between the weekly coordinates of the IGS and the coordinates obtained in the weekly solutions aligned with IGS weekly calculated by CIMA. Analyzed period: 147 weeks (10/2006 to 8/2009)



* **OHI2, CRO1, PALM**
and **RIO2** Edges of the
network
Deformation is larger

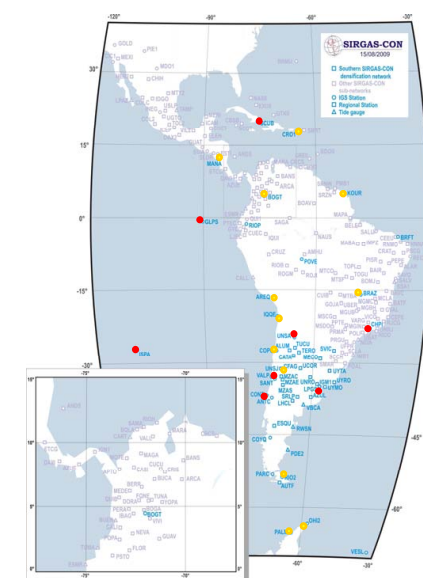
* **IQQE**
has a short period

Mean rms x = 3.5 mm
Mean rms y = 4.7 mm
Mean rms z = 2.9 mm

Average value= 3.7 mm

Concluding remarks

- The continuously increasing number of SIRGAS-CON stations creates the need to divide the network in several sub-networks that are individually processed and then combined in a consistent solution.
- For that purpose it was necessary to establish new processing and combination centers with the involvement of Latin American institutions.
- Five experimental processing center (INEGI, IGAC, IBGE, IGM-A and CIMA) and two combination centers (DGFI and IBGE) were established.
- After one year period of training and validation, three experimental centers (IGAC, IBGE and CIMA) and both combination centers (DGFI and IBGE) became official after demonstrate high quality, punctuality and continuity standards.
- Five experimental centers are now in process of being validated.
- Thanks to this capacity building process, in the near future every SIRGAS country will have an in-house processing centre.



SIRGAS-CON-D and Local Processing Centres, a solution from the densification of the Reference Frame in Latin America and the Caribbean.

Thank you for your attention!!

Muchas gracias !!!



CIMA

Centre of processing Ingeniería-Mendoza-Argentina



Universidad Juan A. Maza
Facultad de Ingeniería



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