Improved Analysis Strategy and Accessibility of the SIRGAS Reference Frame

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SIRGAS as a **reference system** is defined identical with **ITRS**

SIRGAS as a **reference frame** is a regional densification of the **ITRF**

Realizations:

- by means of episodic GPS campaigns:

  1) SIRGAS95 (ITRF94, epoch 1995.4)

  (58 stations over South America)

  2) SIRGAS2000 (ITRF2000, epoch 2000.4)

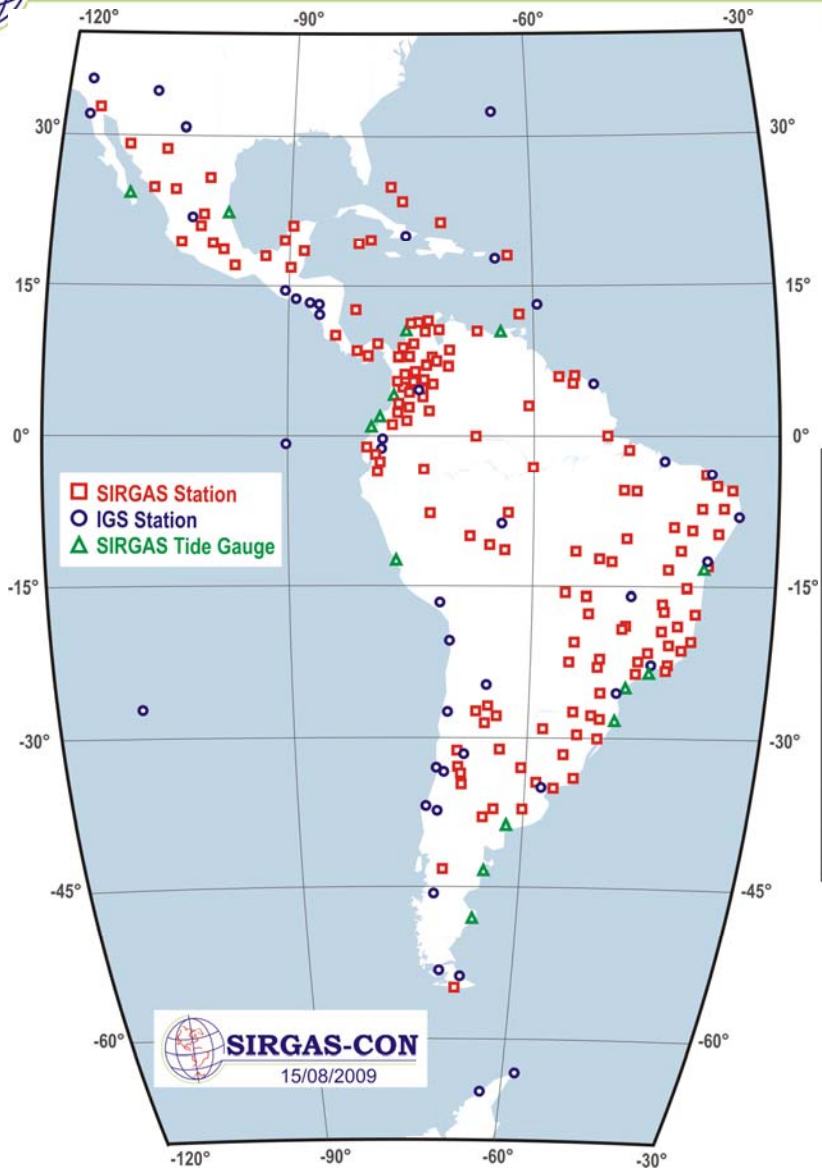
  (184 stations over North, Central, and South America)

- by means of continuously operating GNSS network:

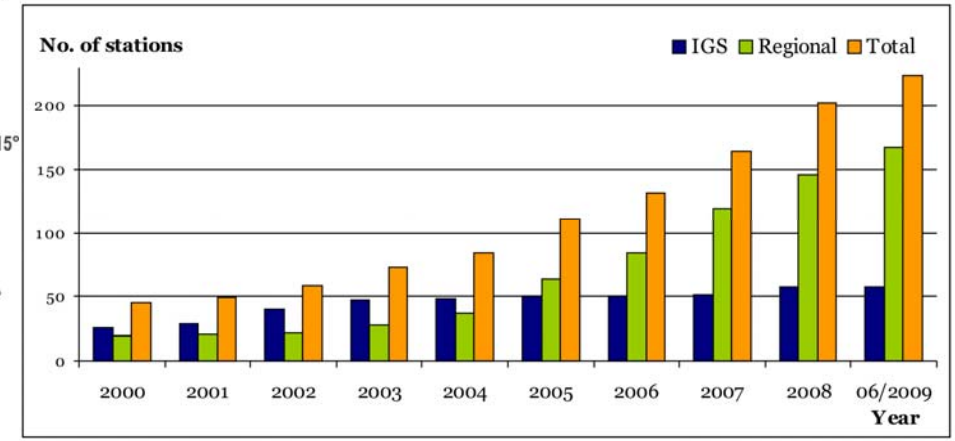
  3) SIRGAS-CON (since 1996)

  (200+ stations over Central and South America and the Caribbean)

SIRGAS Continuously Operating Network (SIRGAS-CON)



Number of continuously operating GNSS stations since SIRGAS2000



Improvement of the SIRGAS-CON structure

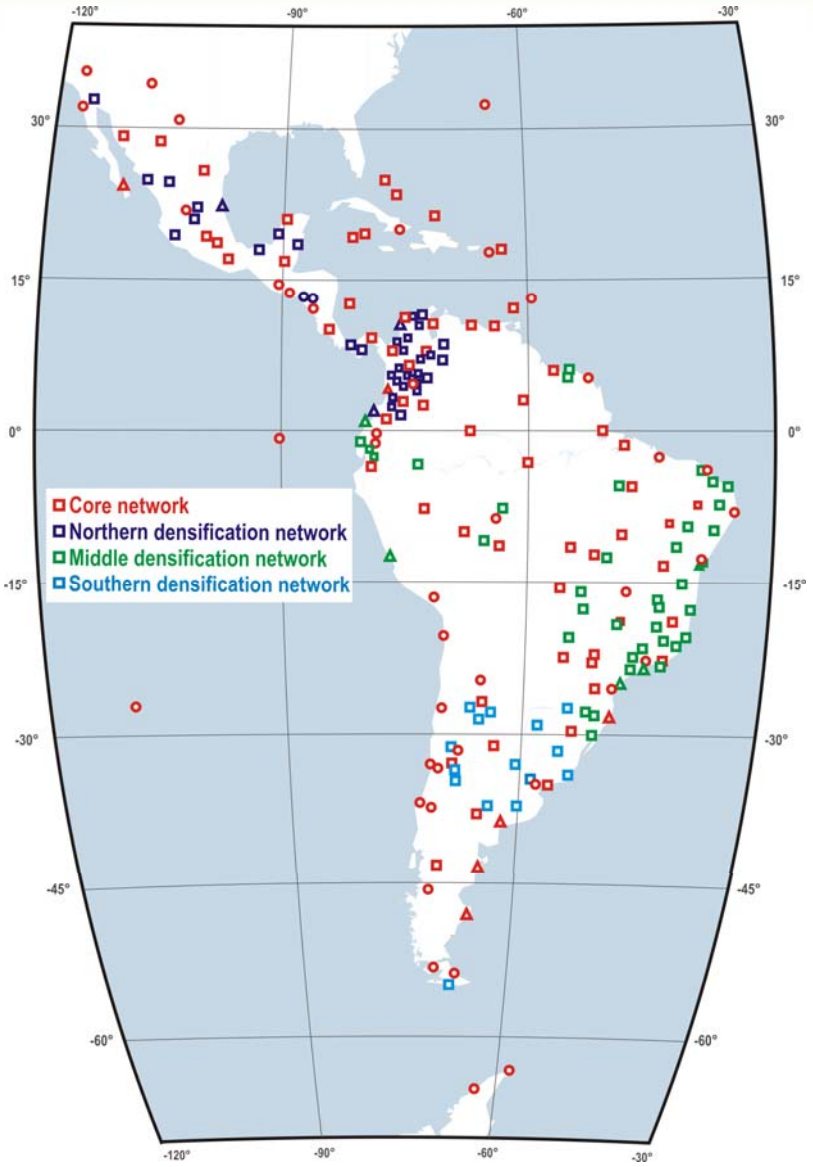
Concept

i) To establish a continental core network as the primary densification of ITRF in Latin America (stabile site locations to ensure long-term stability);

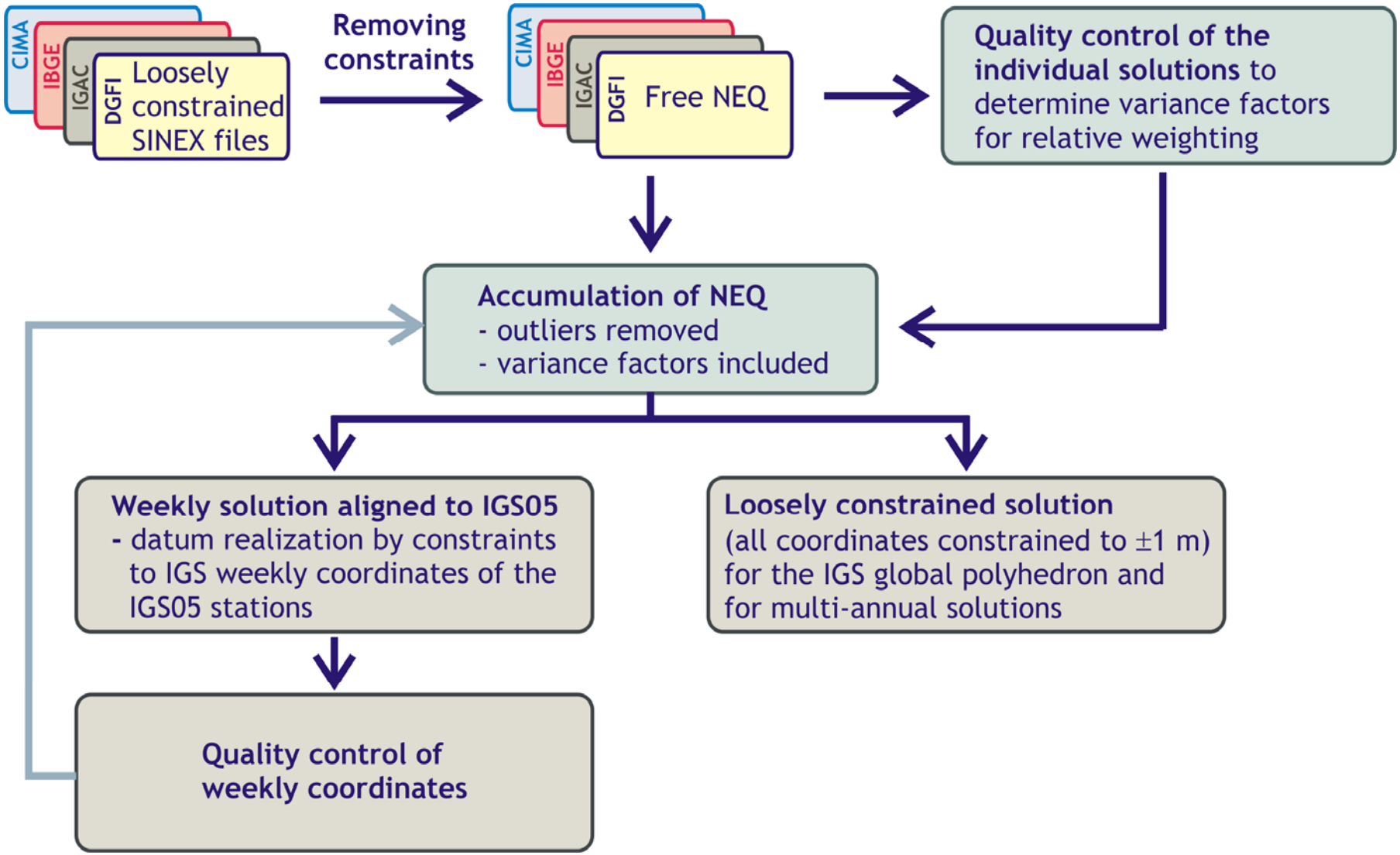
ii) To improve the density of the core network by means of densification networks (shall comprise all the national reference networks).

At present there are 3 densifications networks (North, Middle and South).

Core and densifications networks are separately processed, and then combined by two combination centres (DGFI and IBGE).

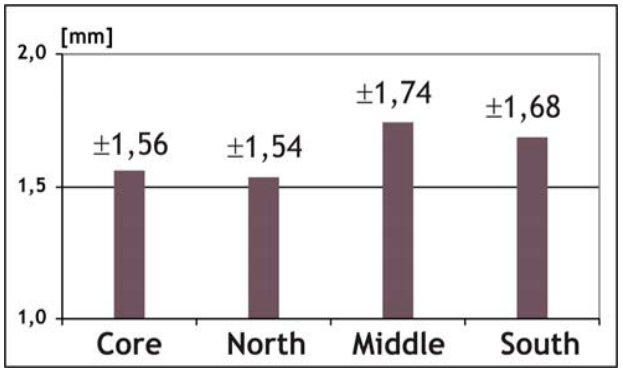


Analysis strategy for SIRGAS-CON

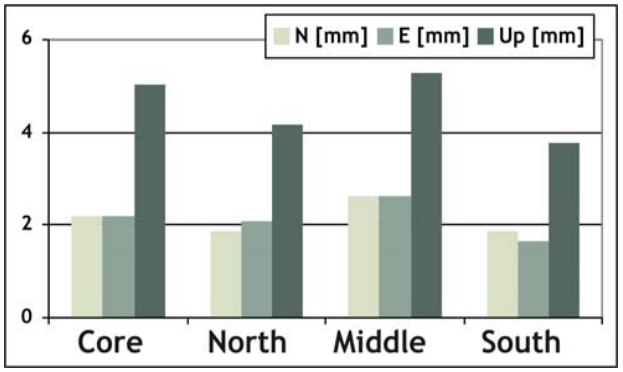


Quality control of the individual solutions

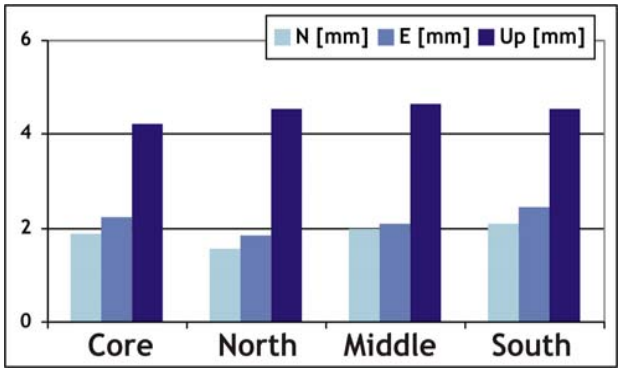
standard deviations after NNR+NNT wrt IGS05



repeatability of weekly station coordinates



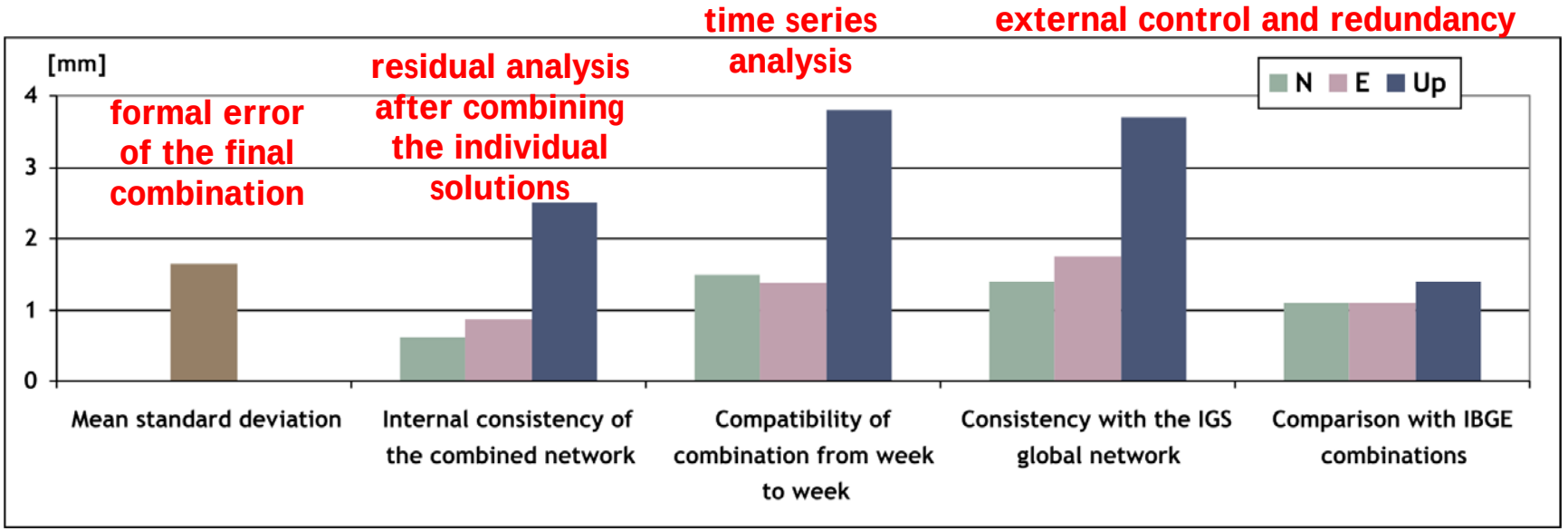
comparison to IGS weekly coordinates



Results from different criteria indicate that the quality of the individual solutions is similar:

- standard deviations after NNR+NNT wrt IGS05: ±1,6 mm;
- repeatability of weekly station coordinates: ±2 mm in N-E, ±4 mm in Up;
- comparison to IGS weekly coordinates: ±2 mm in N-E, ±4 mm in Up.

Quality control of the combined solution

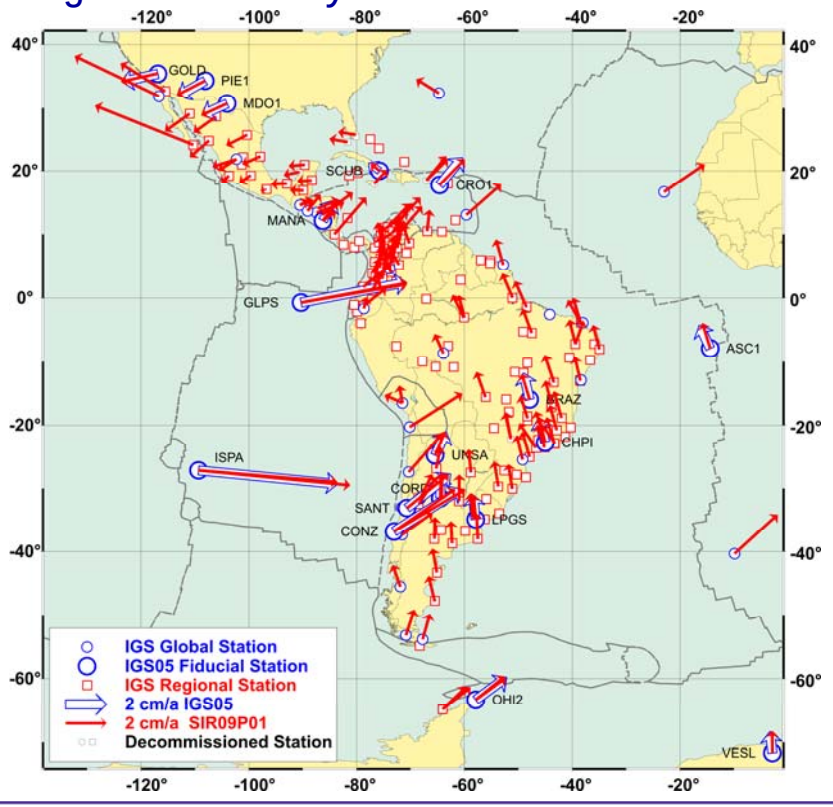


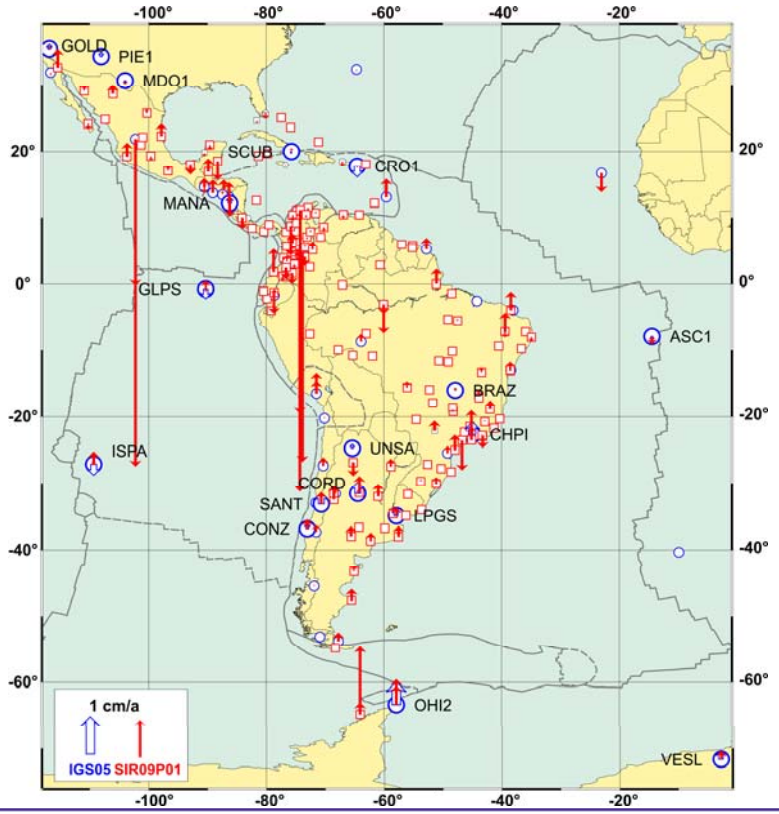
The quality of the individual solutions is maintained after combination:

- internal consistency: ±0,8 mm in N-E and ±2,5 mm in Up;
- external consistency: ±1,5 mm in N-E and ±3,7 mm in Up.

SIR09P01: Latest multi-annual solution for SIRGAS-CON

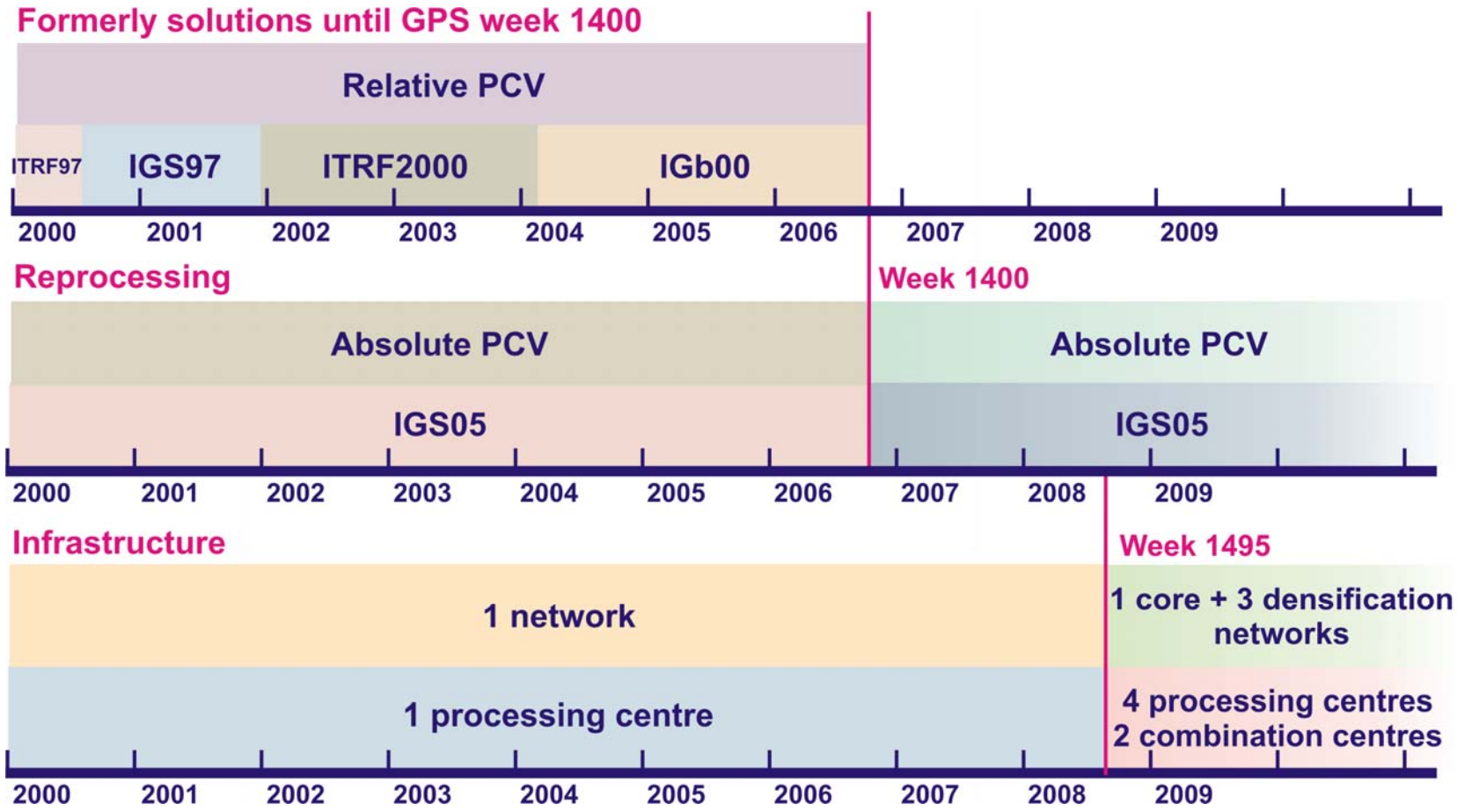
- Comprises from January 2000 to December 2008;
- Stations operating less than two years are excluded;
- Constrained solution by NNR+NNT to IGS05 stations: IGS05, epoch 2005.0;
- Precision of positions at reference epoch: ± 0,5 mm (hor), ± 0,9 mm (up);
- Precision of velocities: ± 0,8 mm/a.
- SIRGAS loosely constrained solutions contribute to the IAG Working Group on Dense Regional Velocity Fields.





SIR09P01: Latest multi-annual solution for SIRGAS-CON

Timetable and infrastructure used to generate the loosely constrained weekly solutions included in the multi-annual solution SIR09P01.



Present weaknesses

1. Not all SIRGAS-CON stations are included in the same number of individual solutions, i.e., they are unequally weighted in the weekly combinations;
2. Since there are not enough Local Processing Centres, the required redundancy (each station processed by at least three processing centres) is not fulfilled;
3. All the four operative Processing Centres apply the Bernese Software, it is desirable to use other software for control.

Short-term objectives related with SIRGAS-CON

1. The SIRGAS-CON-D sub-networks shall correspond to the national reference frames, i.e., as an optimum there shall be as many sub-networks as countries in the region;
2. The goal is that each country processes the observational data of its own stations following the SIRGAS processing guidelines, which are defined in accordance with the IERS and IGS standards and conventions;
3. It is necessary to have more operative processing centres. At present, there are five experimental centres, which after satisfying a training period of one year will become official SIRGAS processing centres. They are: IGN (Argentina), INEGI (Mexico), IGM (Ecuador), LUZ (Venezuela), and SGM (Uruguay);
4. The density of the SIRGAS-CON stations shall be improved, specially in Central America, Peru, Paraguay, and Bolivia.