# THE SPATIAL REFERENCE FOR GEOMATICS IN THE AMERICAS


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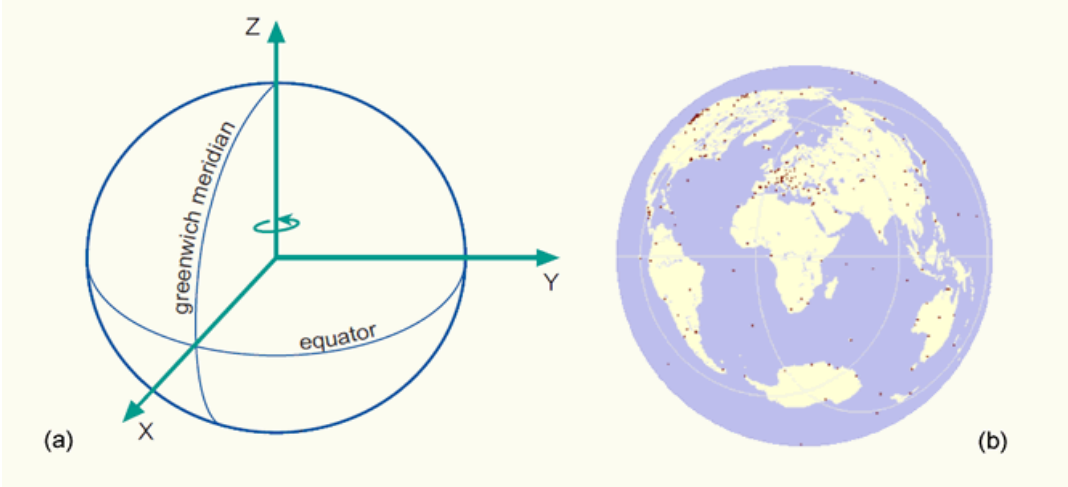
# SIRGAS stands for Geocentric Reference System for the Americas

✓ **IAG Sub Commission 1.3b:** Reference Frames / Regional Reference Frames / South and Central America

✓ **Working Group of the PAIGH Cartography Commission**

- SIRGAS as a reference system is defined as identical with the International Terrestrial Reference System (ITRS)
- SIRGAS as a reference frame is a regional densification of the International Terrestrial reference Frame (ITRF)




(a) The International Terrestrial Reference System (ITRS)

(b)The International Terrestrial Reference Frame (ITRF) visualized as a distributed set of ground control stations (represented by red points)

http://www.kartografie.nl

# THE BEGINNING

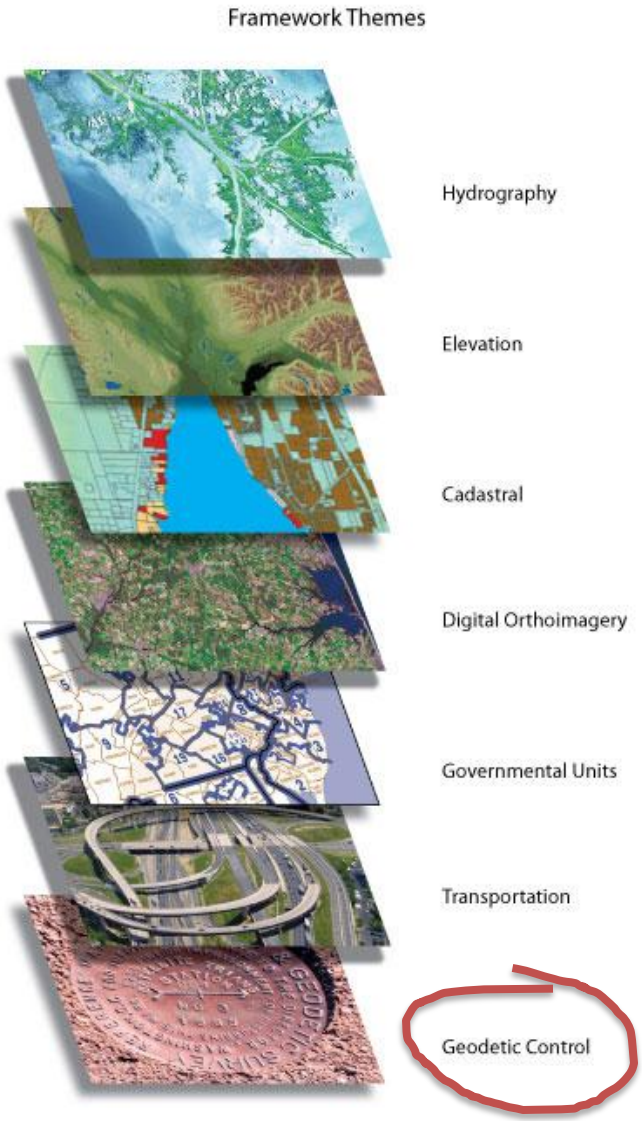
- SIRGAS was created during the International Conference for the Definition of a South American Geocentric Datum, held from October 4 to 7, 1993, in Asunción, Paraguay.

- The development of SIRGAS "Project" comprised the activities needed to the adoption on the continent of a reference network of accuracy compatible with the techniques of satellite positioning, especially those associated with the Global Positioning System (GPS).

# Spatial Data Infrastructures (SDI)

SIRGAS data are…

- The most basic theme in the SDI's of the Americas
- The basis for spatial data standardization
- The space-time link among data sets and information
- The common language for data sharing, interoperability and compatibility

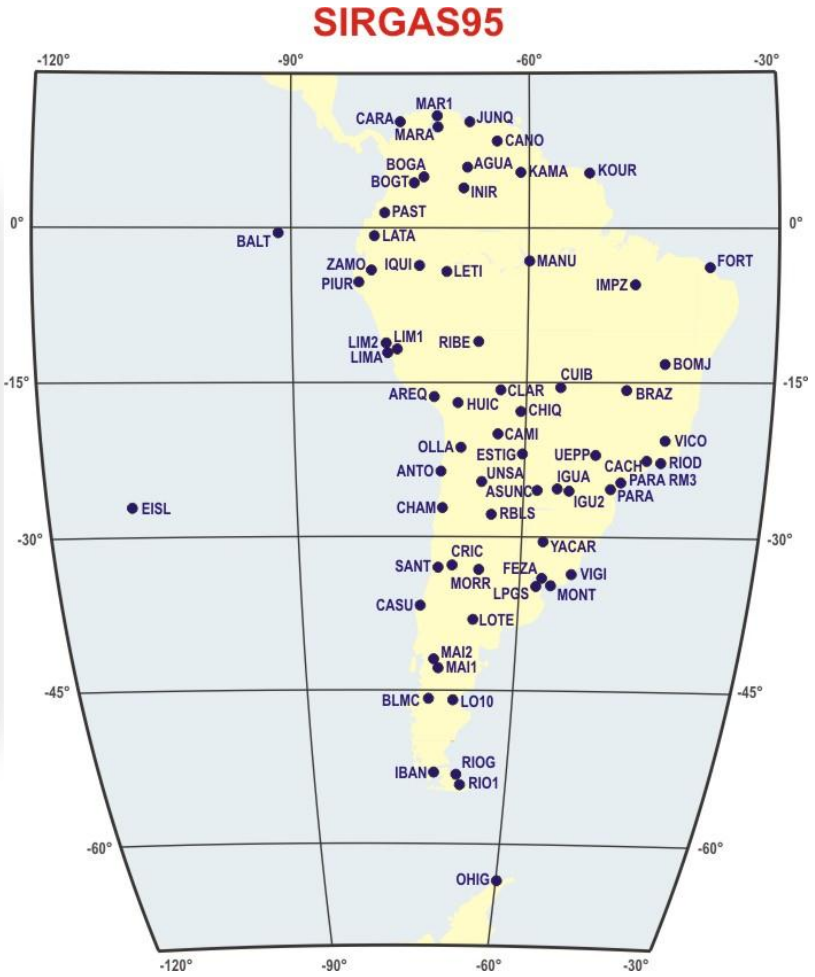



http://www.fgdc.gov/library/whitepapers-reports/

# THE FIRST CAMPAIGN: 1995

- Measurements from 00:00 (UT), may 26 to 24:00 (UT) June 04.
- 57 stations
- 30 institutions
- 11 countries
- 3 processing centres

| | |
|---|---|
| Argentina | 10 |
| Bolivia | 6 |
| Brasil | 11 |
| Chile | 7 |
| Colombia | 5 |
| Ecuador | 3 |
| Guiana Fr. | 1 |
| Paraguay | 2 |
| Perú | 4 |
| Uruguay | 3 |
| Venezuela | 5 |
| **Total** | **57** |



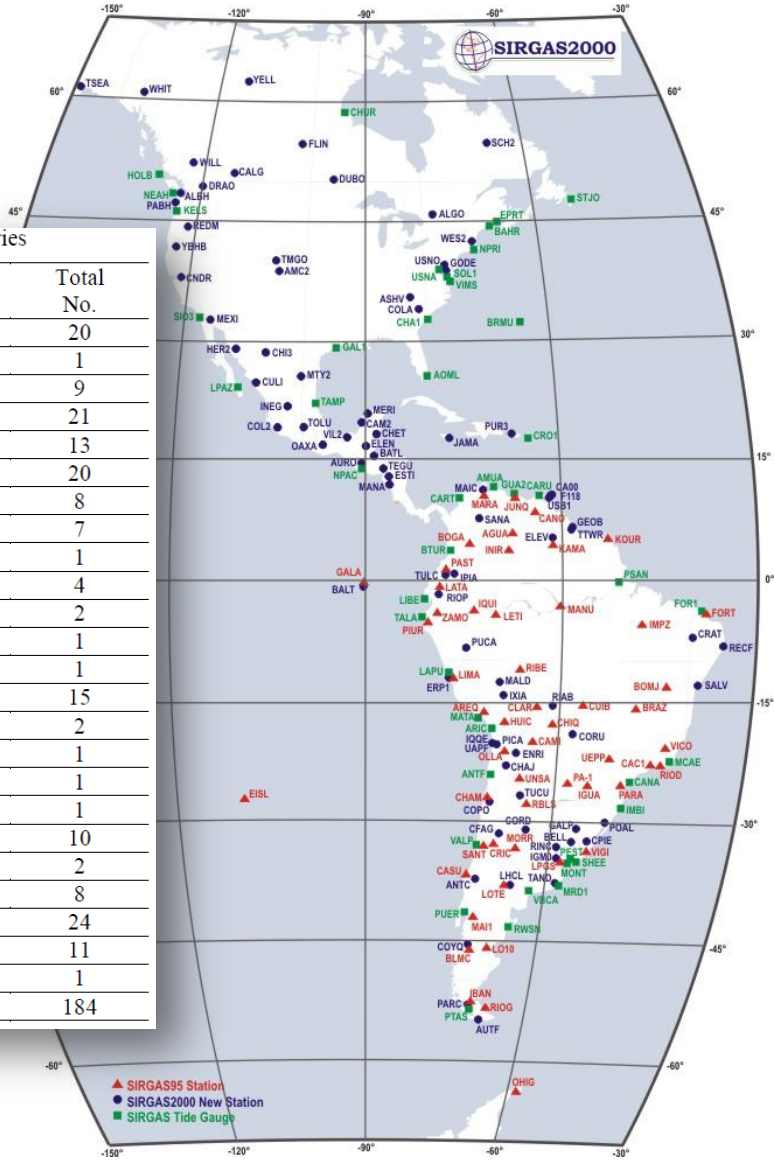

"***An extremely well executed project***", Wolfgang Torge, XXI IUGG General Assembly, Boulder.

# THE SECOND CAMPAIGN: 2000

- Measurements from 00:00 (UT), May 10 to 24:00 (UT), May 19.
- 184 stations
- 25 countries
- The SIRGAS 95 campaign stations were re-occupied as well as national tide gauges and international connecting points

Table 1. Distribution and types of stations in the countries

| Country (Island) | SIRGAS 1995 | New Site | Tide Gauge | Total No. |
|---|---|---|---|---|
| Argentina | 10 | 7 | 3 | 20 |
| Bermuda | - | - | 1 | 1 |
| Bolivia | 6 | 3 | - | 9 |
| Brazil | 11 | 5 | 5 | 21 |
| Canada | - | 10 | 3 | 13 |
| Chile | 7 | 8 | 5 | 20 |
| Colombia | 5 | 2 | 1 | 8 |
| Ecuador | 3 | 3 | 1 | 7 |
| Fr. Guiana | 1 | - | - | 1 |
| Guatemala | - | 3 | 1 | 4 |
| Guyana | - | 2 | - | 2 |
| Honduras | - | 1 | - | 1 |
| Jamaica | - | 1 | - | 1 |
| Mexico | - | 13 | 2 | 15 |
| Nicaragua | - | 2 | - | 2 |
| Paraguay | 1 | - | - | 1 |
| Puerto Rico | - | 1 | - | 1 |
| Saint Croix | - | - | 1 | 1 |
| Peru | 4 | 3 | 3 | 10 |
| Trinidad&Tobago | - | 2 | - | 2 |
| Uruguay | 2 | 4 | 2 | 8 |
| USA | - | 12 | 12 | 24 |
| Venezuela | 5 | 3 | 3 | 11 |
| Antarctica | 1 | - | - | 1 |
| Sum | 56 | 85 | 43 | 184 |



# MEMBERS

International Association of Geodesy (IAG)

Pan American Institute of Geography and Histrory (PAIGH)

Argentina
Bolivia
Brazil
Canada
Chile
Colombia
Costa Rica
Ecuador
El Salvador
Guatemala
Guyana
Honduras
Mexico
Nicaragua
Panama
Paraguay
Peru
Uruguay
Venezuela

# CENTRES

## 9 processing centres

CEPGE-Ec

CIMA-Ar

CPAGS-Ve

IBGE-Br

IGAC-Co

SGM-Uy

DGFI-De

IGN-Ar

INEGI-Mx

Officially since 2011-01-01

## 2 combination centres

IBGE-Br

DGFI-De

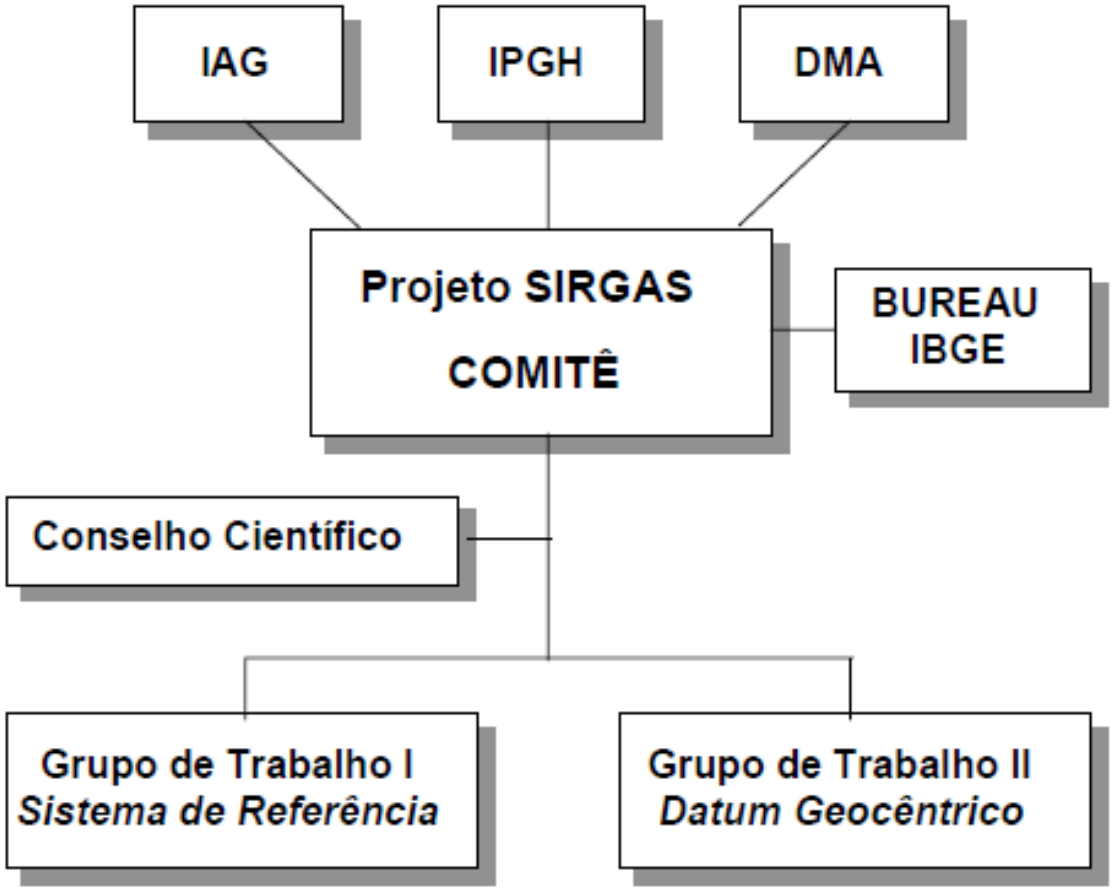
- Each station is processed by 3 centres
- 2 independent combinations
- Weekly coordinates:

$\sigma = \pm 1{,}7$ mm in N-E

$\sigma = \pm 3{,}7$ mm in h

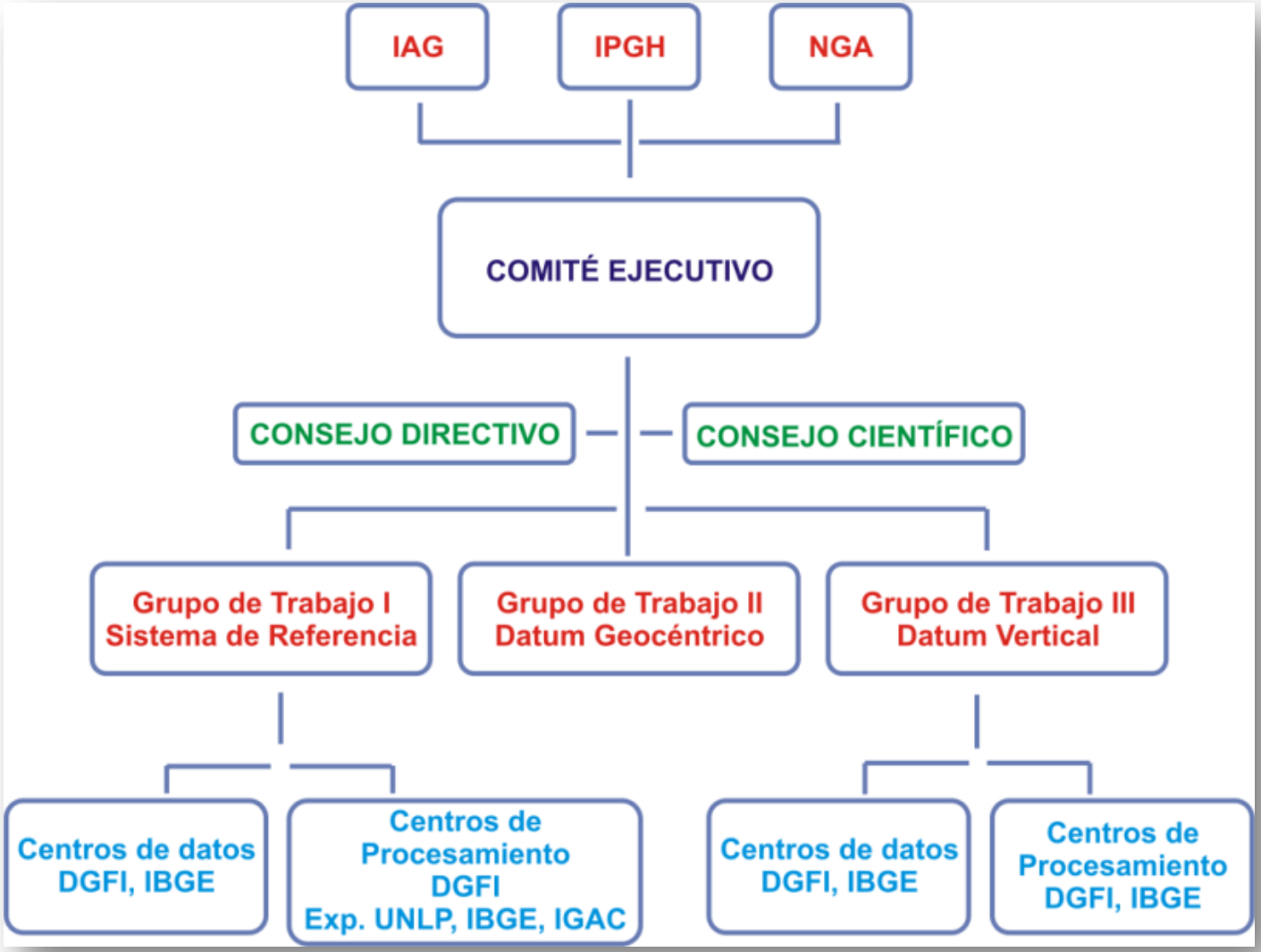
# STRUCTURE

**1993 – 1997**

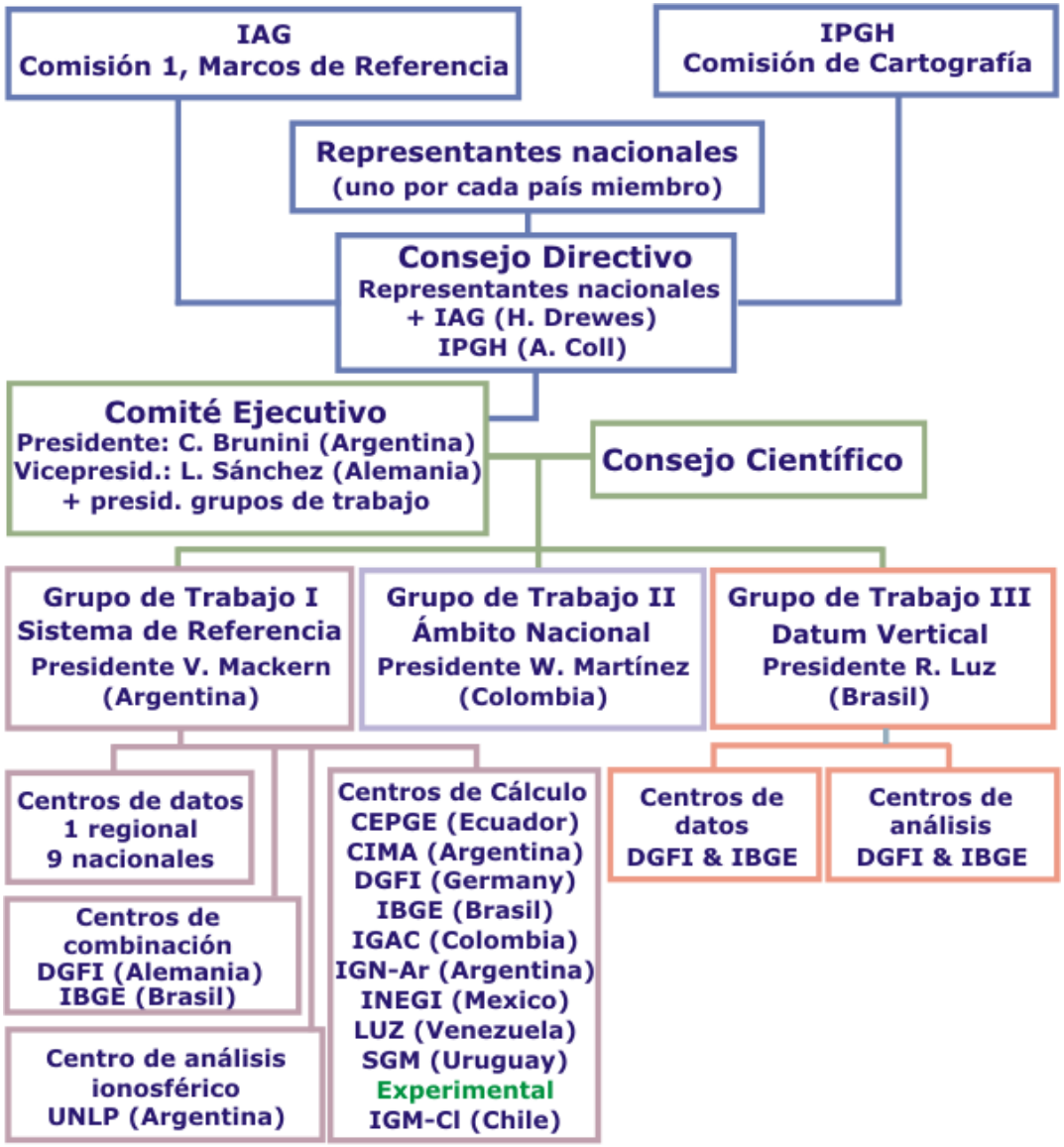


# STRUCTURE

**1997 -2011**



# CURRENT STRUCTURE



# CAPACITY BUILDING

- Specialized courses for the establishment of the SIRGAS analysis centres

- Instituto Geográfico Militar de Ecuador, December 2008 and February 2011.CEPGE-IGM
- Servicio Geográfico Militar del Uruguay, March 2009




- SIRGAS Schools on Reference Systems

- First: Bogotá, July 2009, IGAC, 120 participants, 12 countries.
- Second: Lima, November 2010, IGN, 122 participants, 13 countries.
- Third: Heredia, August 2011, ETCG, 116 participants, 18 countries

- SIRGAS Chapter in Advanced Course of Satellite Positioning: AECID

- Universidad Politécnica de Madrid, November 2009
- Montevideo , May 2010
- Universidad Politécnica de Madrid, November 2010

# Conclusions

- The establishment of a structure (institutional framework) is a good approximation to solve the coordination issues
- The establishment of specific working groups is a good way to face both, the technical and policies problems
- Is important understand the capacity building as a key element for the consolidation for a sustainable regional geodetic framework
- Link the work of SIRGAS, using PC-IDEA as a platform of cooperation and collaboration, with the work of the other regions and countries

# Thank you very much !

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