Discussion of the leveling network geometry needed for the SIRGAS vertical reference system realization

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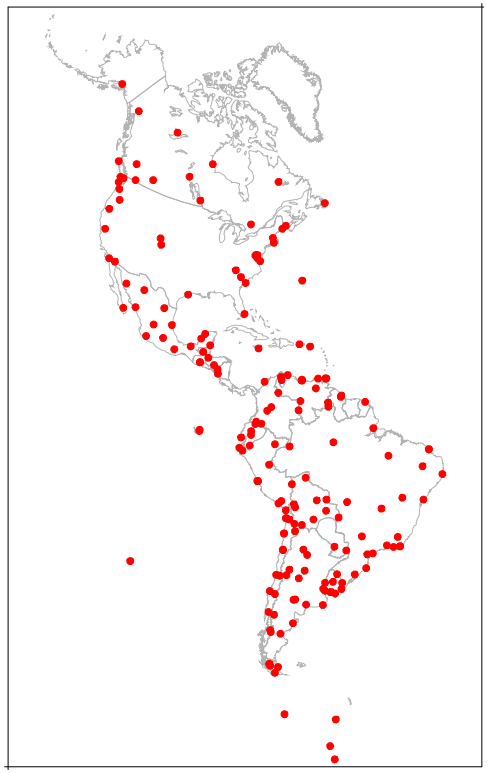
Background



1993: establishment of SIRGAS Project (South America Geocentric Reference System) , with the objective of unifying horizontal systems in South America (WG1: reference system; WG2: geocentric datum)

1995.4: first SIRGAS GPS Campaign (58 stations)

1997: results presented at IAG Assembly (Rio de Janeiro, Brazil); **efforts changed to Vertical Datum (WG3)**

1998-1999, WG3: scientific reports with general concepts and recommendations (e.g. ellipsoidal **&** physical heights)

2000.4: second SIRGAS GPS Campaign (186 stations at the three Americas and Caribe) incl. TGs, intl. connections

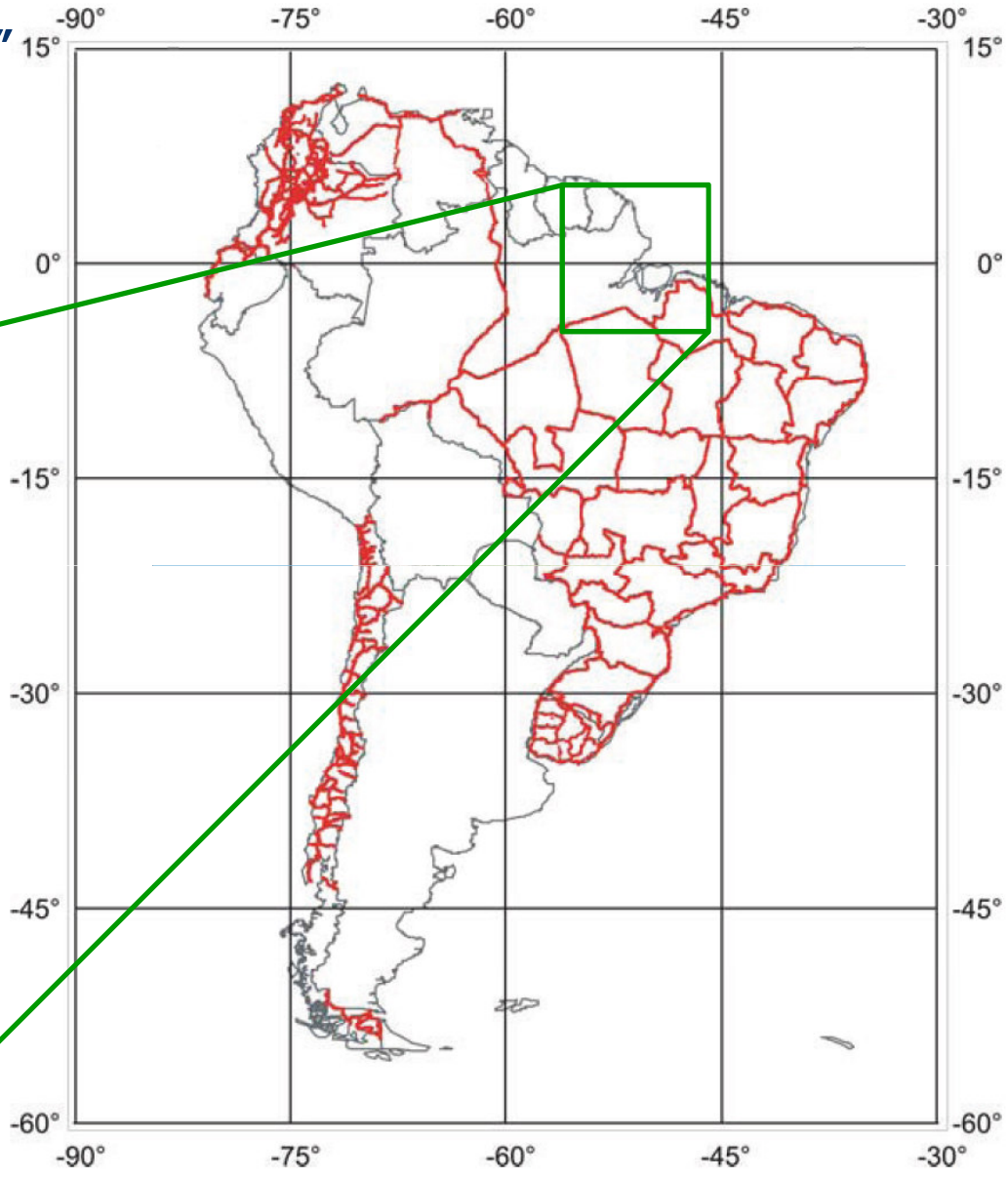
2001-2002, WG3: operational instructions and recommendations

2004-2005, WG3: new scientific report with specific recommendations (W_0 , gravity interpolation etc)

Challenges for a "continental" leveling network

- the Andes

- the Amazon River and forest



Challenges for a "continental" leveling network (cont.)

- the Andes

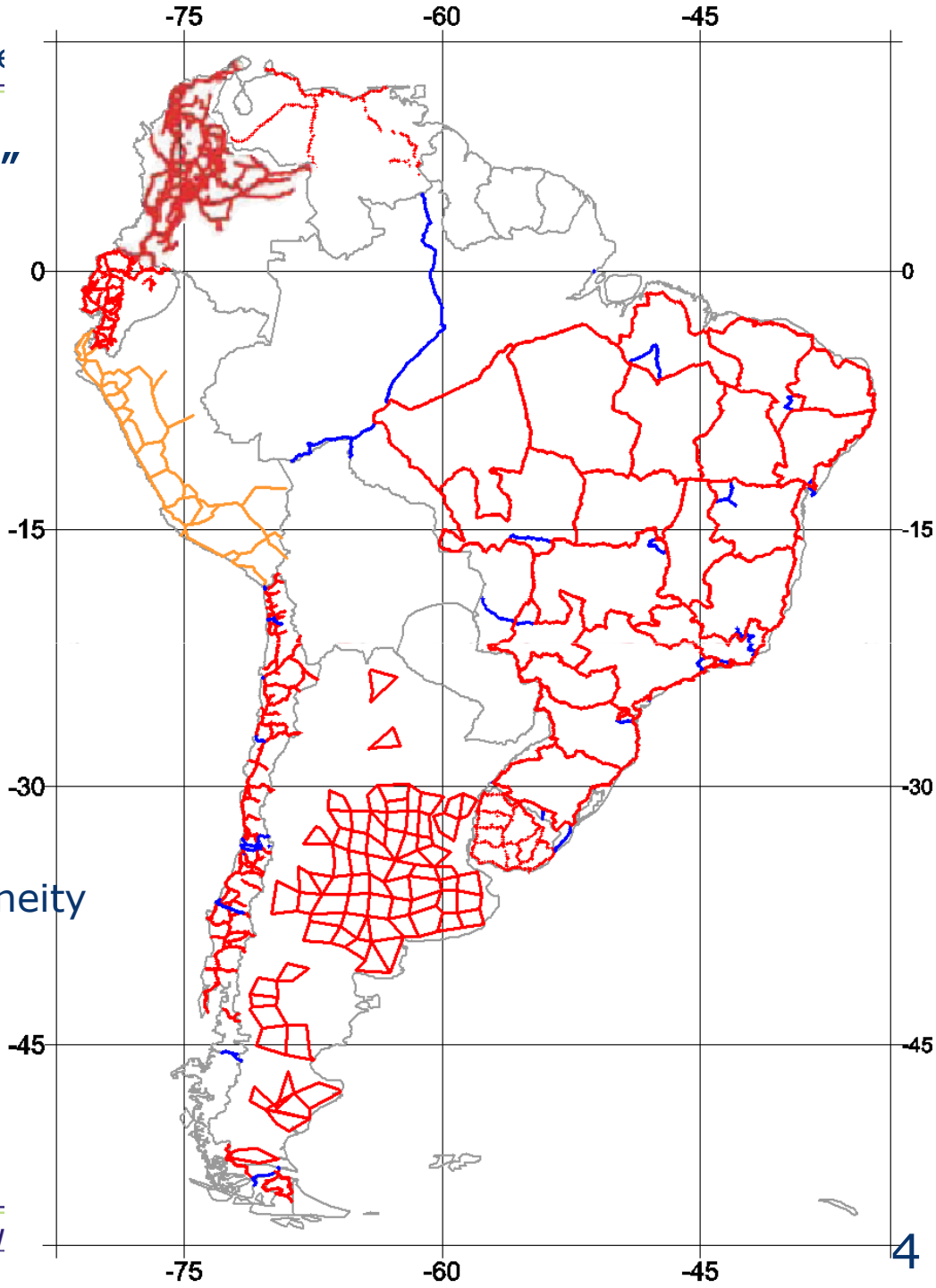
- the Amazon River and forest

- the lack of digital data

- the problem (3,5m +/- ?) in the long, open line connecting Venezuela and Brazil

- the spatial and temporal heterogeneity of the data made available

- the lack of gravity over leveling lines

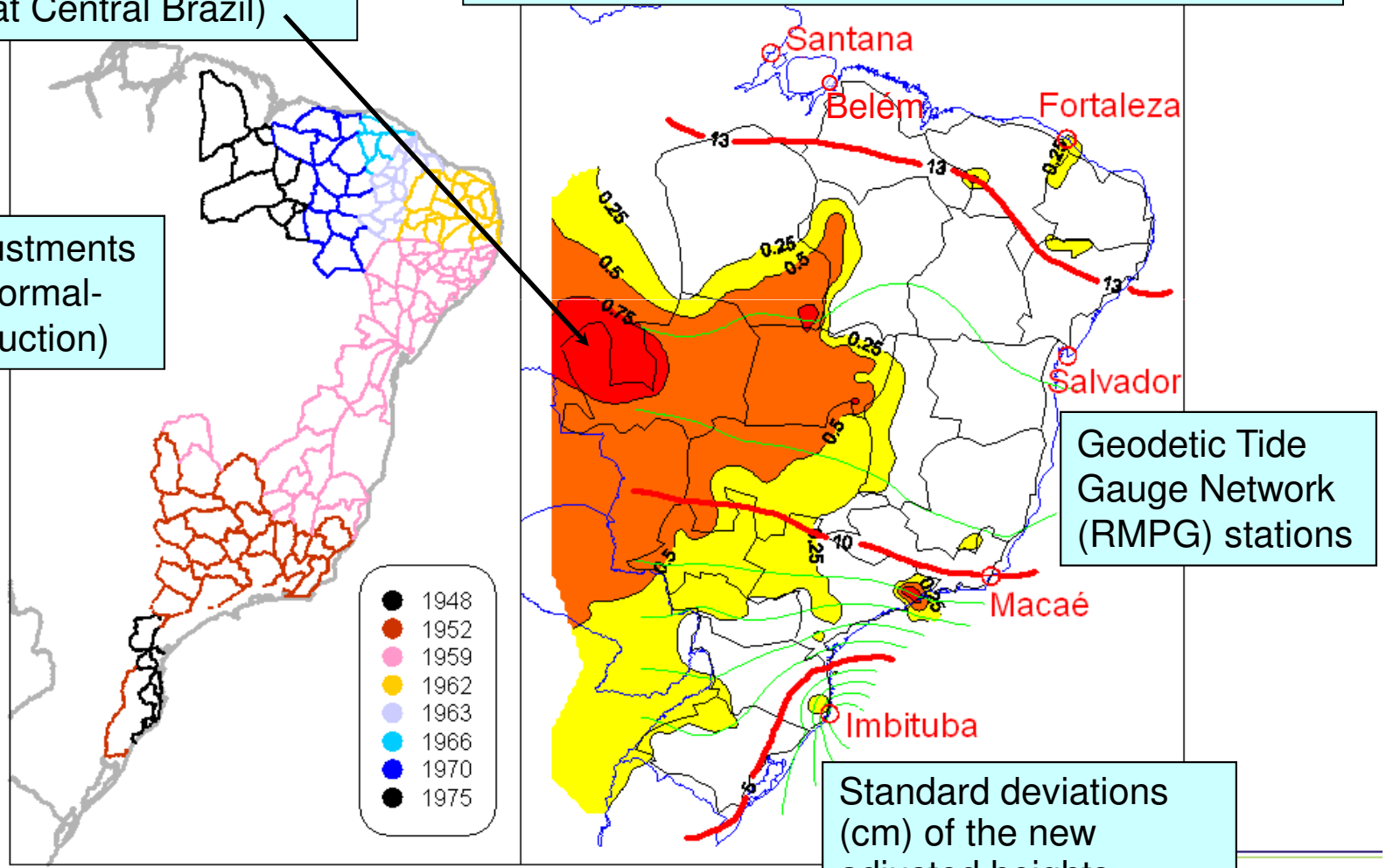


Case study: Brazilian Fundamental Vertical Network (RAAP)

Differences between new and "historical" heights (95 cm at Central Brazil)

Global Preliminary Altimetric Adjustment (AAGP, 1993), **INCLUDING** normal-orthometric reduction)

"Historical" adjustments (**INCLUDING** normal-orthometric reduction)



Geodetic Tide Gauge Network (RMPG) stations

Standard deviations (cm) of the new adjusted heights

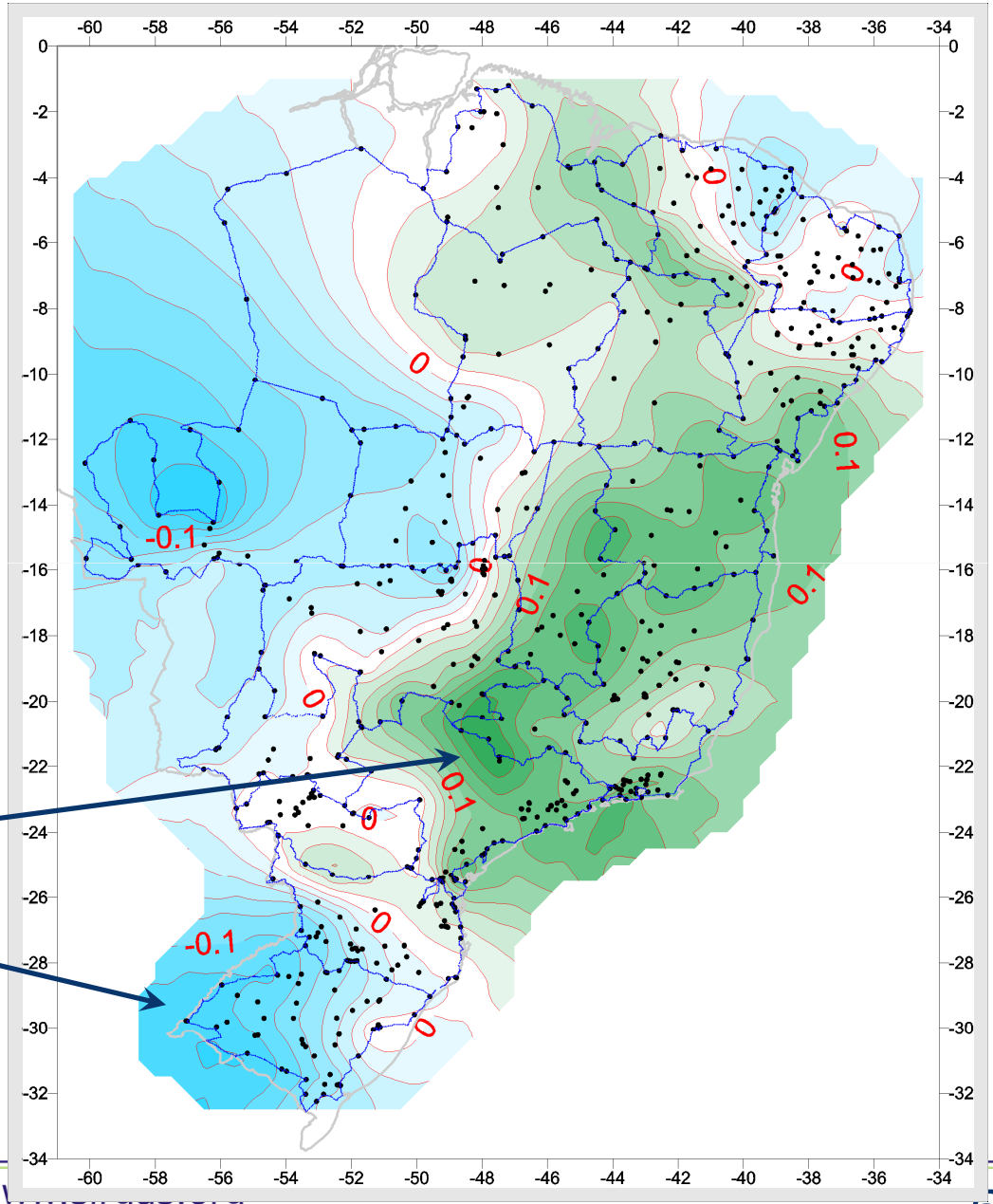
Case study: Brazilian Fundamental Vertical Network (RAAP) (cont.)

Effects of the partitioning strategy adopted in AAGP (1993)

Height differences between "partitioned-AAGP" and "full-AAGP" (m)

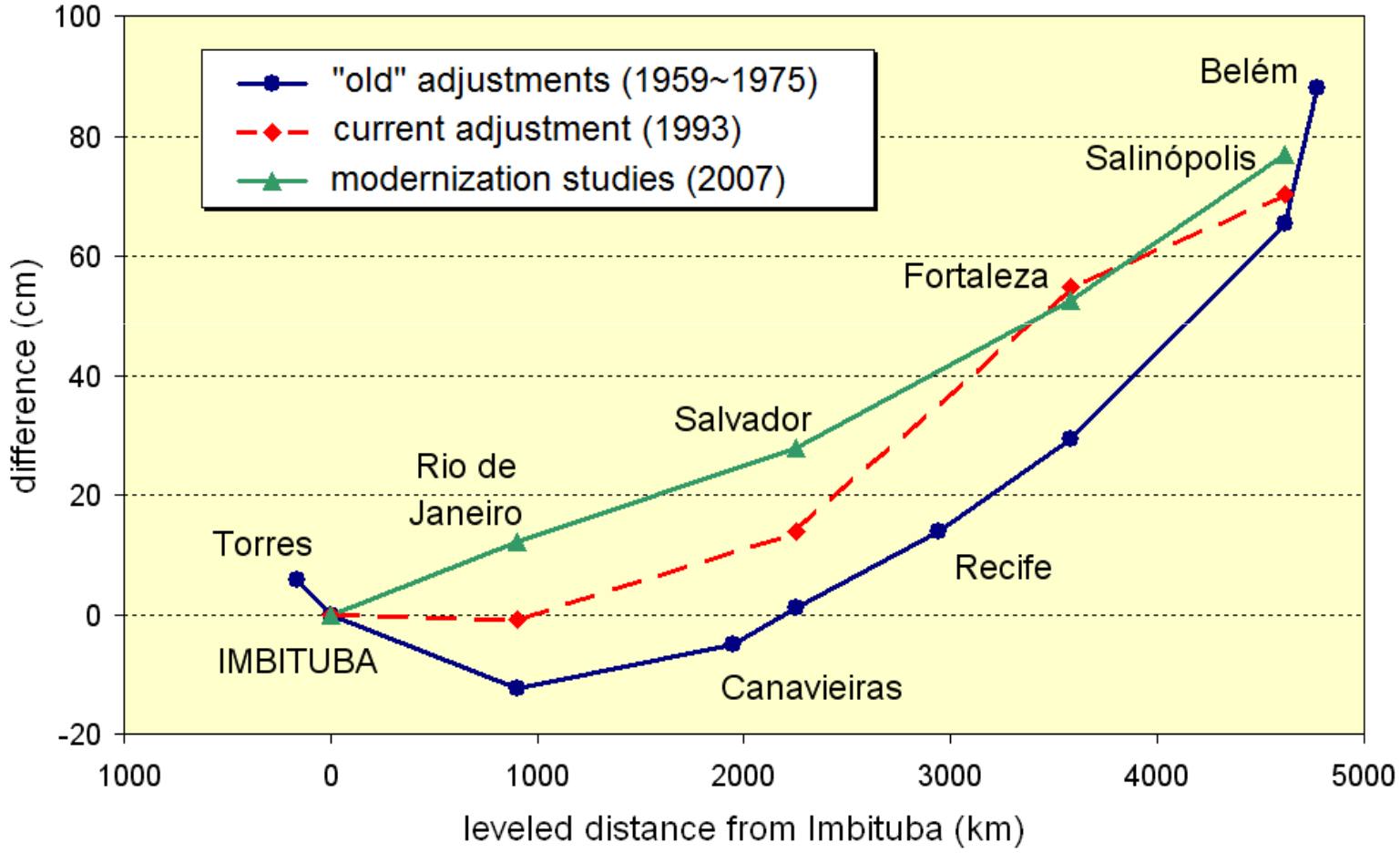
ranging from +17 cm

to –15 cm

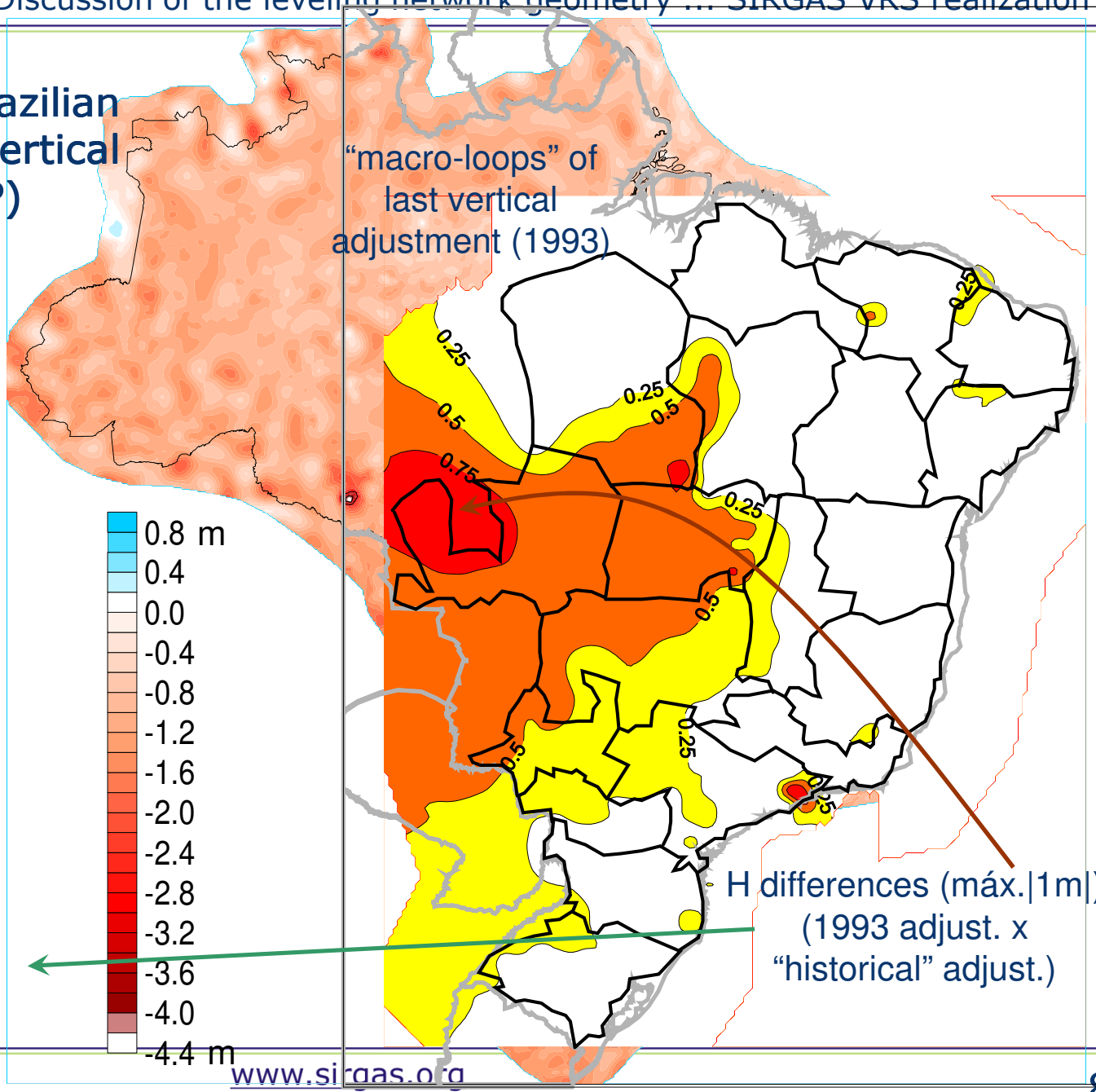


Case study: Brazilian Fundamental Vertical Network (RAAP) (cont.)

Differences between height values referred to Imbituba and to local MSL



Case study: Brazilian Fundamental Vertical Network (RAAP) (cont.)



Discussions

- care must be taken regarding the selection of leveling lines to be sent to SIRGAS/WG-3 – in principle, the selection should be done after the integration of the information from all the countries

- monument stability? :: it seems that few (if any) deep BMs were established

- there are some investigations under development by different members of WG-3 regarding GNSS-gravity integration and use of zenith cameras

- Brazilian case study: to include new gravity information; to check for the data considered in EGM-96, MapGeo2004 and EGM2008

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