



VLBI

Technique-dependent Conventions

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- Chapter 2: Celestial Reference Frame
new realization until IAU General Assembly 2009
- Chapter 4: Conventional Terrestrial Reference System and Frame
 - Crust based TRF
- Chapter 5: Transformation between Celestial and Terrestrial Systems
 - IAU2000 Resolutions
- Chapter 7: Displacement of reference points
 - 7.1.4 Pole tide (mean pole representation)
 - 7.1.5 Atmospheric Loading (Reference pressure)
 - 7.2 Thermal deformation
 - Daily and Annual periods
20° C temp difference causes 2 mm peak-to-peak height variation
 - Reference Temperatures needed

- Chapter 9: Tropospheric Model
 - Vienna Mapping Function (VMF1)
- Chapter 11: General Relativistic Model for Propagation
 - Consensus Model
- Local ties

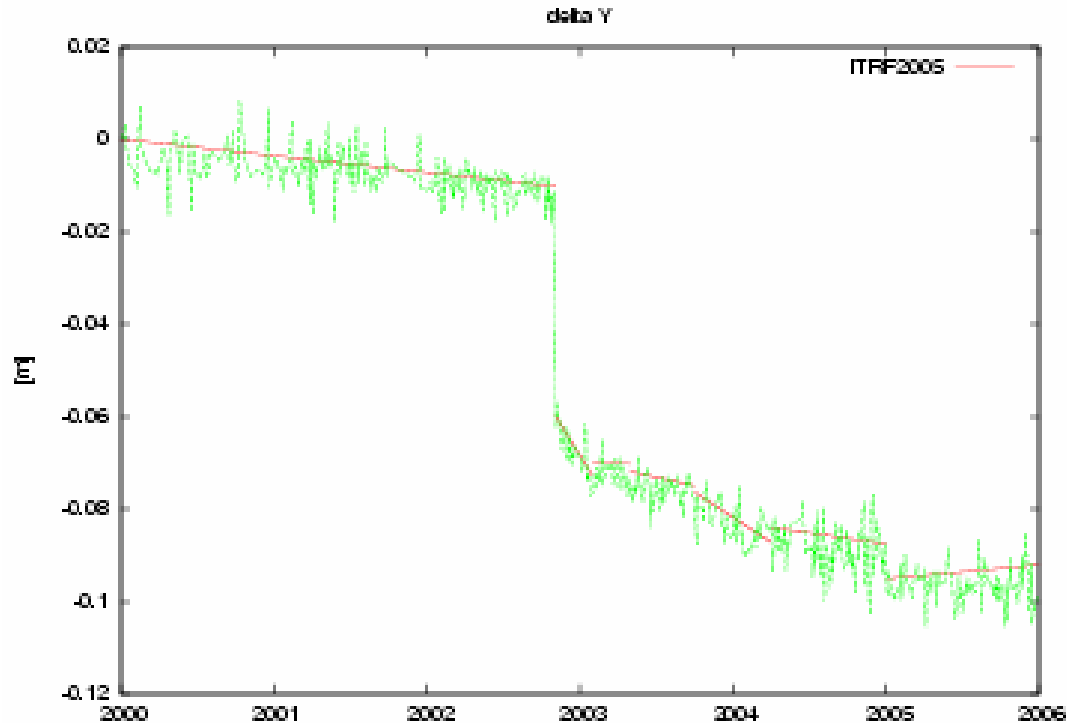
The general model connecting the instantaneous actual position of a point anchored on the Earth's crust at epoch t , $\vec{X}(t)$, and a regularized position $\vec{X}_R(t)$ is

$$\vec{X}(t) = \vec{X}_R(t) + \sum_i \Delta \vec{X}_i(t). \quad (11)$$

The purpose of the introduction of a regularized position is to remove high-frequency time variations (mainly geophysical ones) using conventional corrections $\Delta \vec{X}_i(t)$, in order to obtain a position with regular time variation. In this case, $\vec{X}_R$ can be estimated by using models and numerical values. The current model is linear (position at a reference epoch t_0 and velocity):

$$\vec{X}_R(t) = \vec{X}_0 + \dot{\vec{X}} \cdot (t - t_0). \quad (12)$$

Conventional treatment of non-linear motion ?

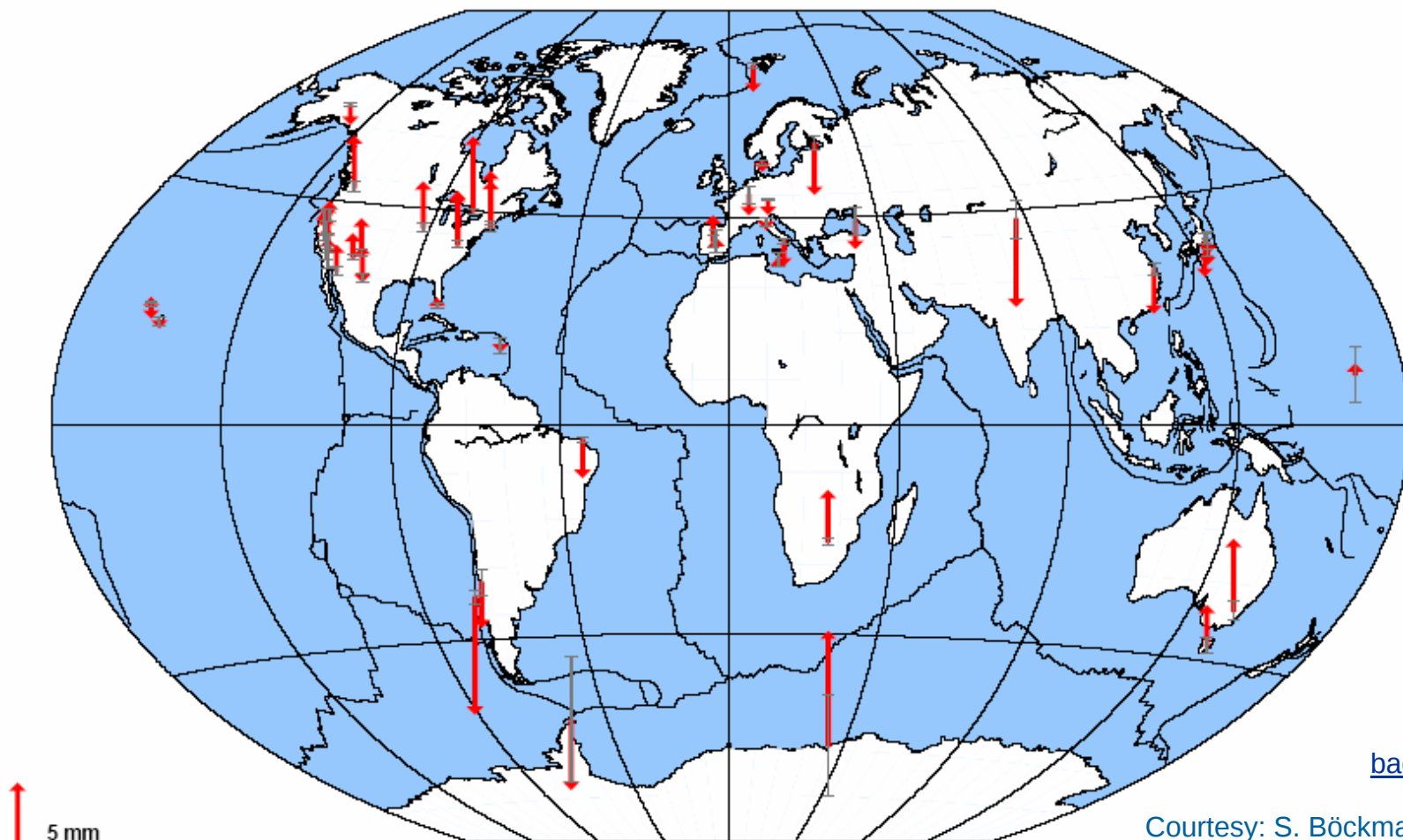


Proposal: Site models always
 Continuous Piece-wise linear

GIB - DGF

Height Offsets

Stations with more than 30 sessions

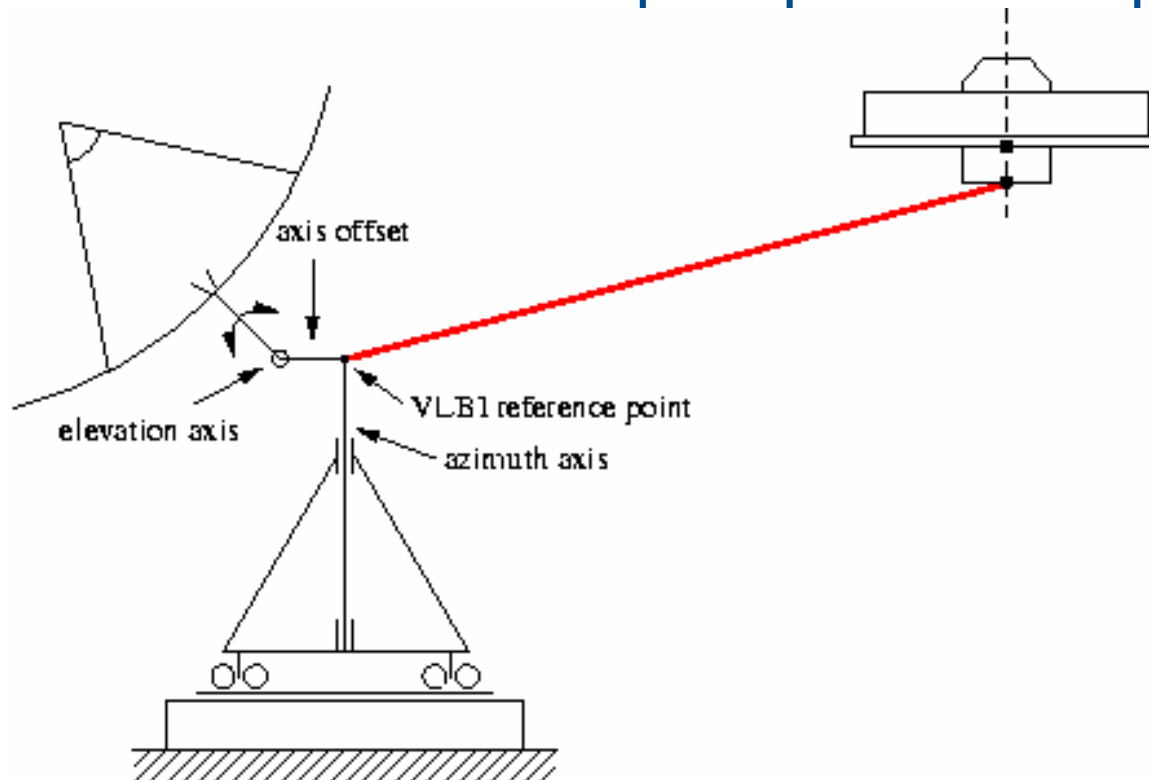


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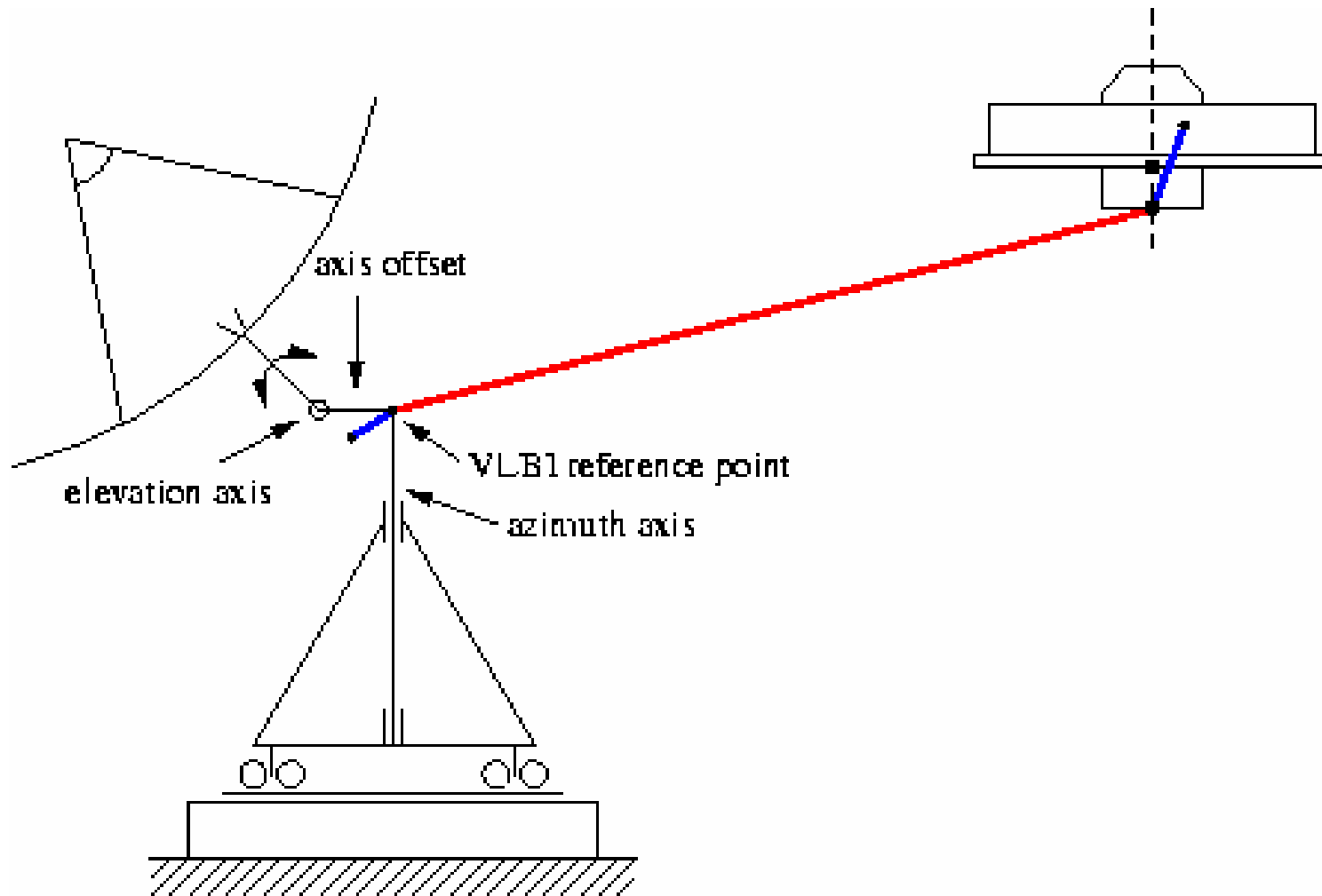
Courtesy: S. Böckmann

Proposal for a Chapter on Local Ties

- Local Tie is measured between two geometric points
- Local Tie is interpreted and used "as is" but does not include technique specific components

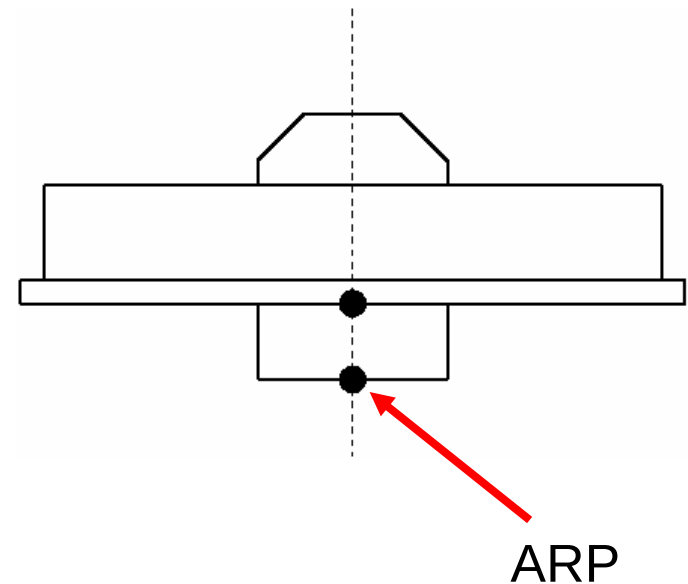
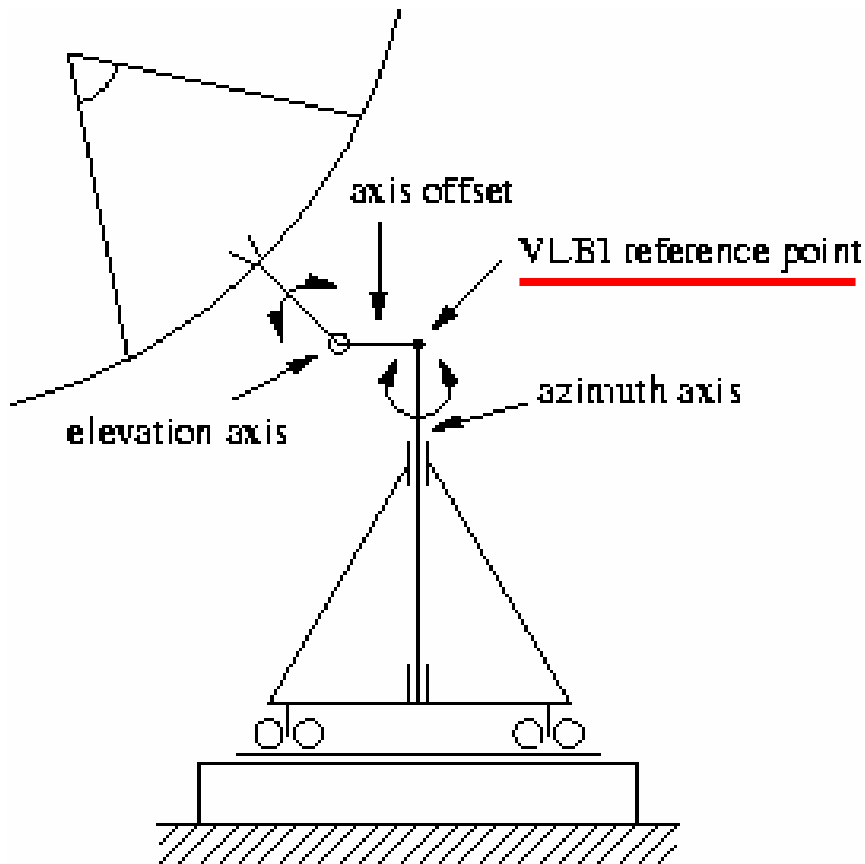


Local tie = geometric tie + technique-specific parts (2)



Geometric tie between

- GPS: Antenna Reference Point (ARP) at reference temperature
- VLBI: mean reference point at reference temperature as point of projection of secondary axis onto primary axis



SLR: as VLBI

DORIS: similar to GPS

- GPS
 - Phase center offset
 - Radom effects
 - Local multipath
 - Thermal expansion of tower
- VLBI
 - Thermal expansion
 - Gravitational sag
 - Tumbling of reference point
- SLR
 - ??
- DORIS
 - ??



Conventions

- VLBI needs reference temperature and reference pressure values for each site (or gridded)
- Proposal for Chapter on Local Ties

Local Ties

- Only speak of geometrical tie unless the techniques provide technique-specific parts