



Recent IERS Site Survey of Multiple Co-located Geodetic Techniques by NGS

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Outline

- Relation between national datums and ITRF
- Need for co-location site surveys
- GGAO survey by NGS
- Future activities

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National datums and the ITRF

- 2-D Horizontal datum?
 - 3-D Geometric Reference System!
- Many countries adopt a frame tied to ITRF
 - USA:



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Reliance on IERS

- National Geodetic Authorities:
 - Define national reference systems (datums)
 - Have resources
 - Rely on IERS to provide the ITRF
- IERS
 - Updates the ITRF
 - Is a voluntary international organization

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Resources vs. Reliance

- My recent pitch to NGS policy makers:

“It is the duty of those agencies with both resources and a reliance on ITRF to apply some of those resources to the improvement and maintenance of the ITRF”

- Currently in NGS policy debate for 2010

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Co-location Site Surveys

- ITRF realizations are the combination of four space geodetic techniques
 - VLBI, SLR, GNSS, DORIS
 - Each contributes differently to ITRF
 - **Co-locating these techniques allows for their combination.**
 - Examples of co-location:
 - Space (SLR reflectors on GNSS satellites)
 - Ground (GNSS antennas near VLBI antennas)

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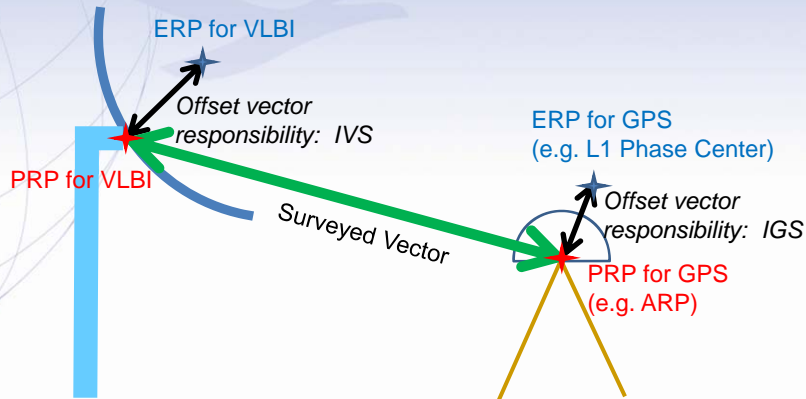
Ground co-location

- Antennas “near” one another is not enough
- Must know 3-D geometric vector from ERP to ERP*
 - * Electronic Reference Point
- Co-location surveys only yield PRP to PRP*
 - * Physical Reference Point

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ERP (✦) vs PRP (✦)

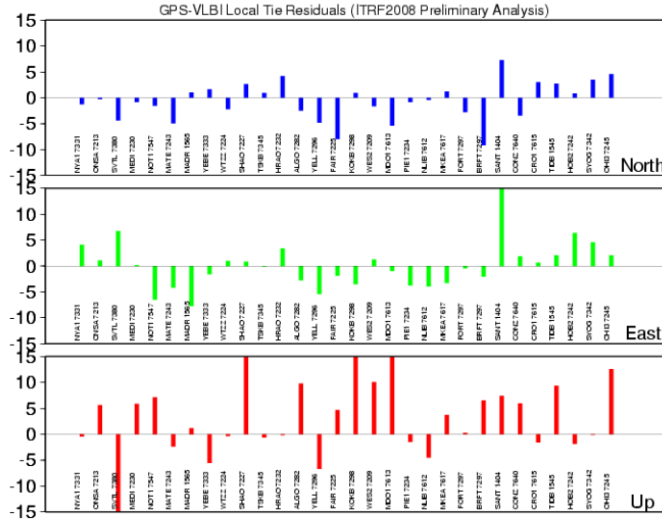


Note: PRP need not be “touchable”, just geometrically determinable
(e.g. VLBI = intersection of two orthogonal spin axes)

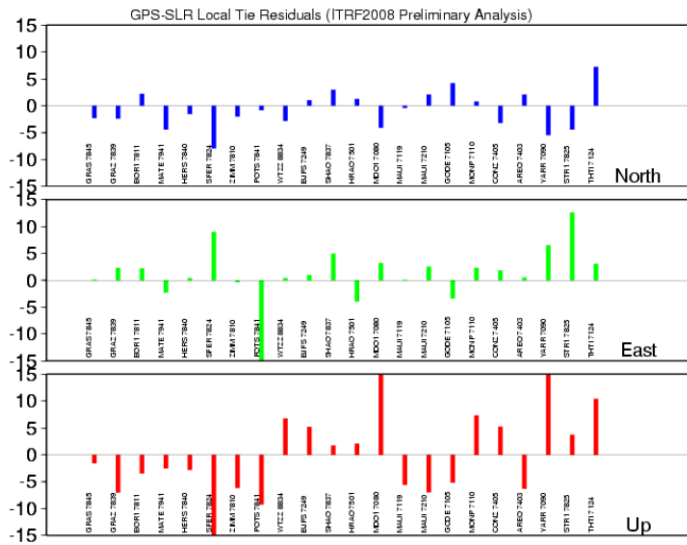
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GPS -VLBI Tie Residuals (at tie epochs in mm) Space Geodesy *minus* Local Survey



GPS -SLR Tie Residuals (at tie epochs in mm) Space Geodesy *minus* Local Survey



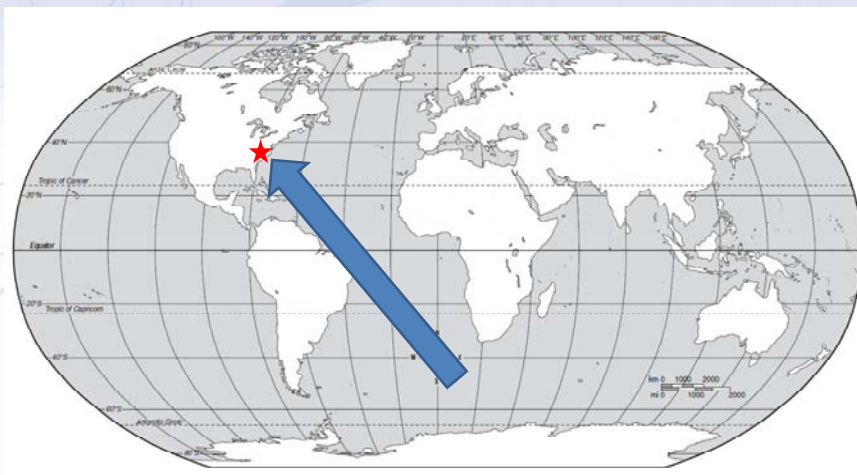
GGAO Survey

- Anticipating a policy shift, NGS engaged in re-training employees in co-location survey techniques
 - Goddard Geophysical and Astronomical Observatory, Maryland, U.S.A.
 - PRP-to-PRP only

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GGAO



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NOAA's National Geodetic Survey Positioning America for the Future www.ngs.noaa.gov

GGAO

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GGAO Control Network

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GGAO Survey Equipment

- GPS
 - Trimble R7 GNSS receivers
 - Javad Ringant-DM GNSS antenna
- Leveling
 - Leica DNA03 digital level
 - 2-meter Invar staff
- Angles and Distances
 - Leica TDMA 5005 total station
 - Leica GPH1P precision reflectors



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Status of GGAO Project

- GPS data analysis completed
- Tie vector data analysis is near completion
- A project report will be delivered to the IERS in the format proposed by the *IERS Site Survey and Co-location Working Group*

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NGS Future Work

- Planning other IERS site surveys
 - Brewster (Washington State, USA, VLBI/GNSS) planned for 2010
- Debating total resource allocation for future years
- Engaged in *IERS Site Survey and Co-location Working Group*

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NGS Future Work

- Evaluating external software (Sarti , Johnston) for future operational use
- Training additional employees on site survey techniques

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FIG Future Work

- Efficiency is gained if the IERS has site surveys performed by local persons at local sites
 - Think globally, act locally
- NGS will likely work with other international agencies to develop training and workshops to encourage more international participation on IERS site surveys...we all benefit!

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Questions?

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