TU WIEN

VieVS

Vienna VLBI and Satellite Software

VGOS Session Analysis

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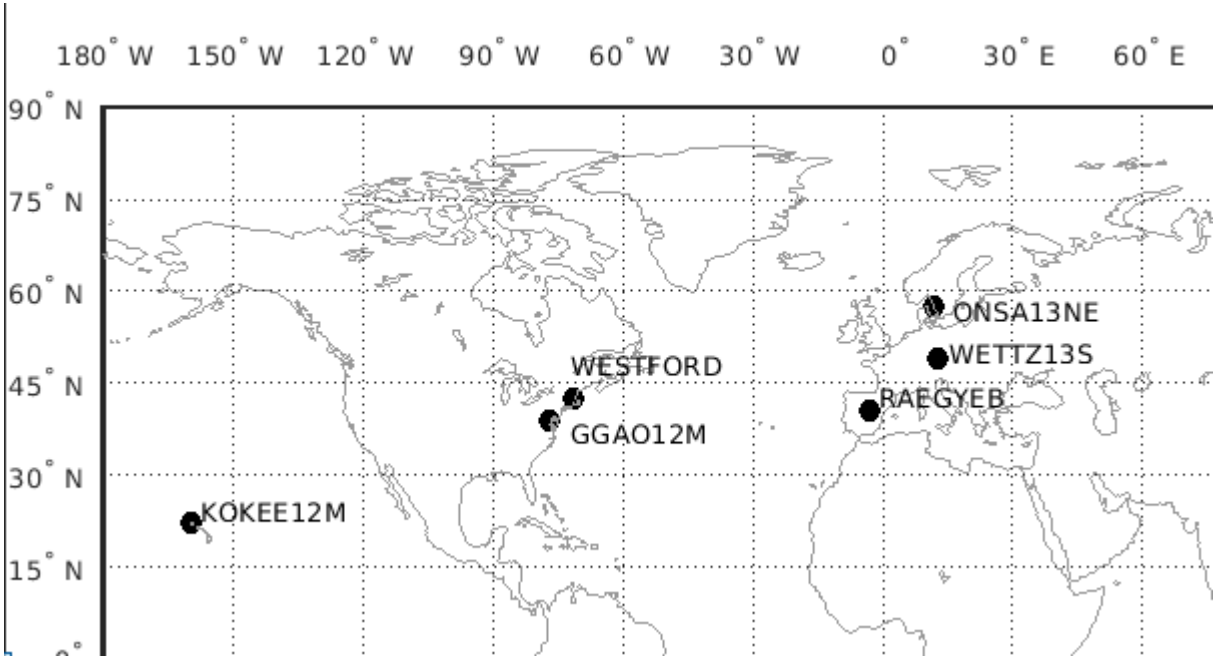
VieVS

Session

- VGOS-T9035
- vgosDB: 19FEB04VG
- 6 Stations: K2, Wf, Gs, Oe, Ws, Yj



The Problem

- Datum is not defined → N-Matrix singular
- 7 Parameters for datum:
  - 3 Translation
  - 3 Rotation
  - 1 Scale
- Scale is defined by observations
- → 6 DOF → Rank defect: 6
- → 6 conditions needed

The Problem

- Translation → NNT
  - Sum of translations of all stations is zero
- Rotaton → NNR
  - Sum of rotations of all stations is zero

- At least 3 stations are needed!

- Only Wf has ITRF2014 coordinates

Solution 1

- Apply NNR and NNT to ALL Stations
- vievsTRF coordinates are used where no ITRF2014 coordinates exist
- Estimation → LSM → Station coordinates
  - Apply NNR/NNT to all stations
- Rerun VIE_LSM

VieVS

Superstation file

- in VLBI/TRF
- Station information and coordinates in different reference frames
- vievsTRF mainly as BU → theoretical delays
- Differing accuracies in vievsTRF
- All VGOS Stations except Wf have only vievsTRF coordinates

code	name	itrf2014	vtrf2014	ivsTrf2014b	VieTRF13	vievsTrf
' Ws'	'WETTZ13S'	[]	[]	[]	[]	*1x1 struct*
' Wt'	'WHTHORSE'	*1x1 struct*	*1x1 struct*	[]	[]	*1x1 struct*
' Ww'	'WARK12M '	*1x1 struct*	*1x1 struct*	*1x1 struct*	*1x1 struct*	*1x1 struct*
' Wz'	'WETTZELL'	*1x1 struct*	*1x1 struct*	*1x1 struct*	*1x1 struct*	*1x1 struct*

Solution 2

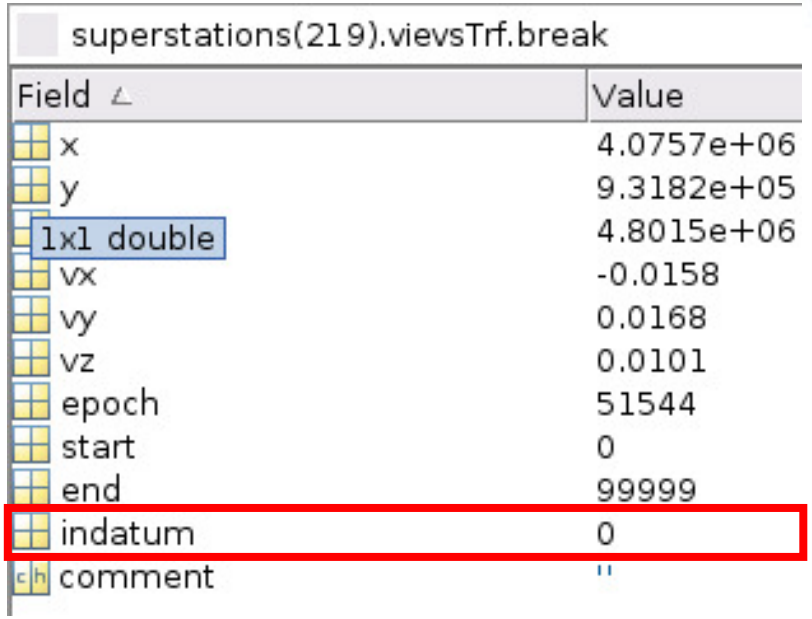
- Select a reference frame with enough station coordinats → vievsTRF

- Models → reference frame
  - Selected frame: vievsTRF

- Model changed → theoretical delays change
  - VIE_MOD has to be rerun
  - → Save + Run

Solution 2

- Matrix singular again?
- → „indatum“-flag in vievsTRF
- Ignored in solution 1!



- Use different file with at least 3 stations in datum
- Models → Reference frame → load file
- Set reference frame to vievsTRF again

Solution 2

- New Superstationfile

- vievsTRF:
  - Ws coordinats from local surveying
  - Gs, K2, Yj from global solution of 5 VGOS Sessions from CONT17

  - All Stations with improved coordinates in datum (indatum = 1)

Solution 2

- Success!
- Chi² is the same for both solutions
- Does it matter then?
- Compare estimated parameters
  Plotting → Parameters

Comparison

- Constant offsets in estimated pwclk

- Corrections to station coordinates are smaller
  eg.: Wf y-coordinate (in ITRF!):

  Solution 1: -14 cm

  Solution 2: 0 cm

  Except Oe

  Oe z-coordinate:

  Solution 1: 70 cm

  Solution 2: 105 cm

Comparison

- EOP = link between terrestrial and celestial RF
- LSM needs to „explain“ the observed delays regardless of used TRF
- → estimated EOP „compensate“

Conclusion

- VieVs is VGOS ready
- Good station coordinates are still needed
- Datum can be fixed with „all stations“
- Problem: vievsTRF coordinates are partially inaccurate
  → influences estimated parameters
- Changing to vievsTRF with stations with good coordinates „indatum“ can help