Single Session Analysis using VieVS

Helene Wolf

aTU Wien, Department of Geodesy and Geoinformation
Analyzing R1 session

- IVS-R1891
- start date: 23.April.2019 17:00
- 24 hours
- 11 stations
Least Squares Method

- VLBI observables (group delays $\tau$)
  - instrumental calibration
  - ionosphere
  - troposphere
  - source structure
  - thermal deformation
  - axis offsets

- a priori station coordinates
  - deformations of the Earth
  - a priori Earth orientation parameters

- a priori source coordinates
  - relativistic delay model

- reduced observed delay
- theoretical delay

- least-squares adjustment

- single sessions
  - station coordinates
  - source coordinates
  - Earth orientation parameters
  - troposphere estimates
  - clock parameters

- global solutions
  - terrestrial reference frame
  - celestial reference frame
  - geodynamical parameters
  - astronomical parameters
  - ...

15.09.2019 Helene Wolf
Estimation

Least Square Method

- Troposphere
- Clock
- EOP
- Station coordinates
- Source coordinates
Estimation  Least Square Method

- Troposphere
- Clock
- EOP
- Station coordinates
- Source coordinates

Continuous Piecewise Linear Offsets (PWLO)

- we estimate parameters every $X$ minutes
- linear interpolation in between
Estimation
Continuous Piecewise Linear Offsets (PWLO)

- we estimate parameters every $X$ minutes
- linear interpolation in between

$$x(t) = x_1 + \frac{t - t_1}{t_2 - t_1}(x_2 - x_1)$$
Estimation constraints

To avoid singularities and improvement constraints

- pseudo observations

- \( zwd_{03:00} = zwd_{04:00} \pm 1.5 \text{ [cm]} \)
Iterative LSM

First solution
- reduced number of parameters
- clock approximated as only one offset, one rate & one quadratic term
→ look at first solution to detect clock breaks!

Main solution
- use results from first solution as new a priori values
- estimate main solution with all parameters as PWLO
Output

- plot estimated parameters using VieVS

- data stored in Matlab structure
  - "x_*" MATLAB structure in 
    VieVS/VLBI/VLBI/DATA/LEVEL3/...
  - contains all estimates → further analysis

- SINEX file
  - standardized output format for geodetic parameters
  - used for distribution of products and estimates
Single Session Analysis

Helene Wolf\textsuperscript{a}, helene.wolf@geo.tuwien.ac.at

\textsuperscript{a}TU Wien, Department of Geodesy and Geoinformation