



VieVS

Vienna VLBI and Satellite Software

From correlation on the Vienna Scientific Cluster to VieVS

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Basic VLBI Workstream

- Scheduling
- Observing
- Correlation
- Fringe fitting
- Post-correlation processing
- Geodetic parameter estimation

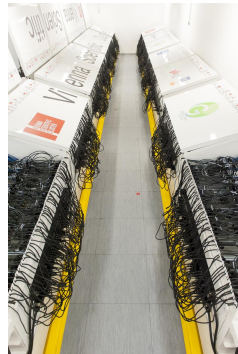
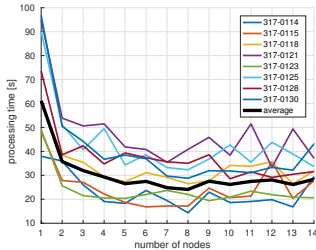
Realization of the VLBI Workstream at TU Wien

- Scheduling →vie_SCHED
- Observing
- Correlation →DiFX on Vienna Scientific Cluster (VSC-3)
- Fringe fitting →HOPS (fourfit)
- Post-correlation processing →nuSolve (vgosDbMake,..)
- Geodetic parameter estimation →VieVS 3.0

Realization of the VLBI Workstream at TU Wien

Correlation:

- DiFX on Vienna Scientific Cluster (VSC-3)
- Performance tests to find tuned configuration for DiFX



Realization of the VLBI Workstream at TU Wien

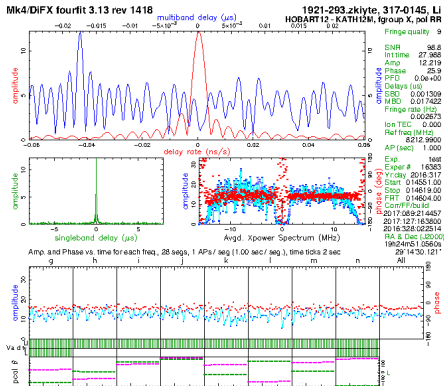
Correlation:

- Refined process chain to process data automatically, e.g. clock parameter estimation
 - Read gps-maser offset from log files to estimate a priori clock offset and rate
 - Find scans with high SNR every 4 to 6 hours
 - Use SBD delay estimates to refine clock parameters
- Currently we are correlating sessions of the VLBI SOuthern Astrometry Project (SOAP)

Realization of the VLBI Workstream at TU Wien

Fringe Fitting:

- Haystack Observatory Postprocessing System (HOPS)
 - fourfit to estimate MBD and to view the DiFX output



Realization of the VLBI Workstream at TU Wien

Post-Correlation Processing:

- Make Version 1 database → `vgosDbMake`
- Database update with theoretical values → `vgosDbCalc`
- Database update with MET data and cable cal data
→ `vgosDbprocLog`
- Ambiguity correction, clock break correction, ionospheric correction → `nuSolve`

VieVS Post-Correlation Toolbox

- We are working on a post-correlation software package implemented in VieVS
- Close the gap between Mark4 database output of DiFX/HOPS and VieVS

Realization of the VLBI Workstream:

- Scheduling →vie_SCHED
- Observing
- Correlation →DiFX on Vienna Scientific Cluster (VSC-3)
- Fringe fitting →HOPS (fourfit)
- **Post-correlation processing →VieVS post correlation**
- Geodetic parameter estimation →VieVS 3.0

VieVS Post-Correlation Toolbox

To-Do list:

1. Make Version 1 database (V001)
2. Database update with theoretical values (V002)
3. Database update with MET data and cable cal data (V003)
4. Clock break correction and ambiguity jump correction (V004)
5. Ambiguity correction (V004)
6. Ionospheric correction (V004)

Output and intermediate results will be stored in VGOS DB format

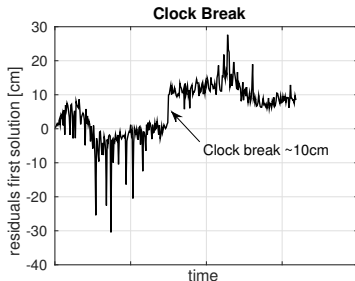
VieVS Post-Correlation Toolbox

Current Status:

1. Make Version 1 database (**in work**)
 - Script that converts Mark4 data to VGOS DB
2. Database update with theoretical values (**pending**)
 - Is in place with `vie_mod`
 - The theoretical delay based on the models used in VieVS would be stored in the VGOS DB format
3. Database update with MET data and cable cal data (**pending**)
 - Functions to read log files and extract all the relevant data like meteorological data and cable calibration
4. Clock break correction and ambiguity jump correction (**in work, beta version**)
5. Ambiguity correction (**in work, beta version**)
6. Ionospheric correction (**pending**)

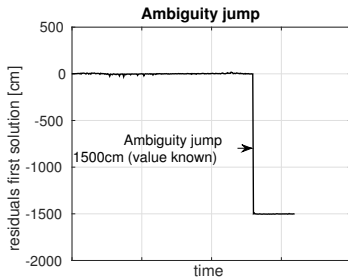
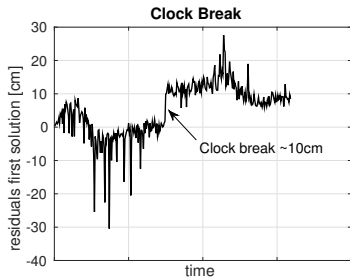
VieVS Post-Correlation Toolbox

- **Clock break correction - current status:**
 - Clock break correction is already implemented in VieVS
 - Can be detected in the first solution by a change in the time series
 - Should be done **before** ambiguity correction to get a reliable ambiguity correction results



VieVS Post-Correlation Toolbox

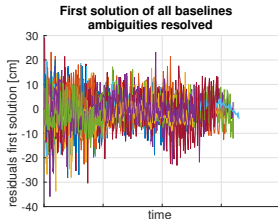
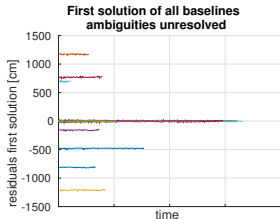
- **Ambiguity jump correction - current status:**
 - Ambiguity jumps are much easier to detect because they are larger than noise and systematics of the observation time series.
 - Correction can not be treated as the clock break correction because only the particular baseline and not the station is affected by the ambiguity jump.



VieVS Post-Correlation Toolbox

■ Resolving ambiguities - current status:

- The whole baseline is biased by an integer number due to unresolved ambiguities.
- Method for automated ambiguity resolving (based on Kareinen et al., 2016):
 - Integer number of ambiguity size is applied if the mean value of the first solution values of a baseline has an offset of e.g. 50% ambiguity size.
 - Stop iteration if result does not improve anymore



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4. Clock break correction and ambiguity jump correction (**in work, beta version**)
5. Ambiguity correction (**in work, beta version**)
6. Ionospheric correction (**pending**)

From correlation on the Vienna Scientific Cluster to VieVS - Summary and Outlook

Correlation and Fringe Fitting:

- Get more experience with correlation
- Implement a refined process chain to process data more automatically

Post-Correlation Processing:

- Finish current work
- Test programs
- Discussion of the implementation in VieVS



VieVS

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Lecture

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