VieVS

Vienna VLBI and Satellite Software

Introduction to VieVS

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What is VieVS?

- VieVS = **Vie**nna **V**LBI and Satellite **S**oftware
- State-of-the-art VLBI data analysis software for geodetic applications
  - Main geodetic products: EOPs, station coordinates (TRF), source coordinates (CRF)...
  - Many further estimates: geodynamic and atmospheric parameters (ZWD)...
- Written in MATLAB (now also C++, Fortran)
- Developed at the Department of Geodesy and Geoinformation (Research Group Advanced Geodesy) since 2008, TU Wien

What is VieVS?

Current reference:
J. Böhm, S. Böhm, J. Boisits, A. Girdiuk, J. Gruber, A. Hellerschmied, H. Krasna, D. Landskron, M. Madzak, D. Mayer, J. McCallum, L. McCallum, M. Schartner, K. Teke
Vienna VLBI and Satellite Software (VieVS) for Geodesy and Astrometry
Publications of the Astronomical Society of the Pacific, Vol. 130, Number 986, 2018
`http://stacks.iop.org/1538-3873/130/i=986/a=044503`

Why did we develop VieVS?

- Important that there exist several different types of VLBI analysis software
  - CALC/SOLVE (NASA, GSFC), DOGS_CS (DGFI), OCCAM ...
- Different software packages can validate each other. Helps identifying bugs.
- We want to have a VLBI software which is easy to use:
  - BSc, MSc, and PhD students can easily learn it and use it
  - Should be easy to add new models etc. for special investigations
  - Graphical User Interface (GUI)
  - Should have a clear structure

Why MATLAB?

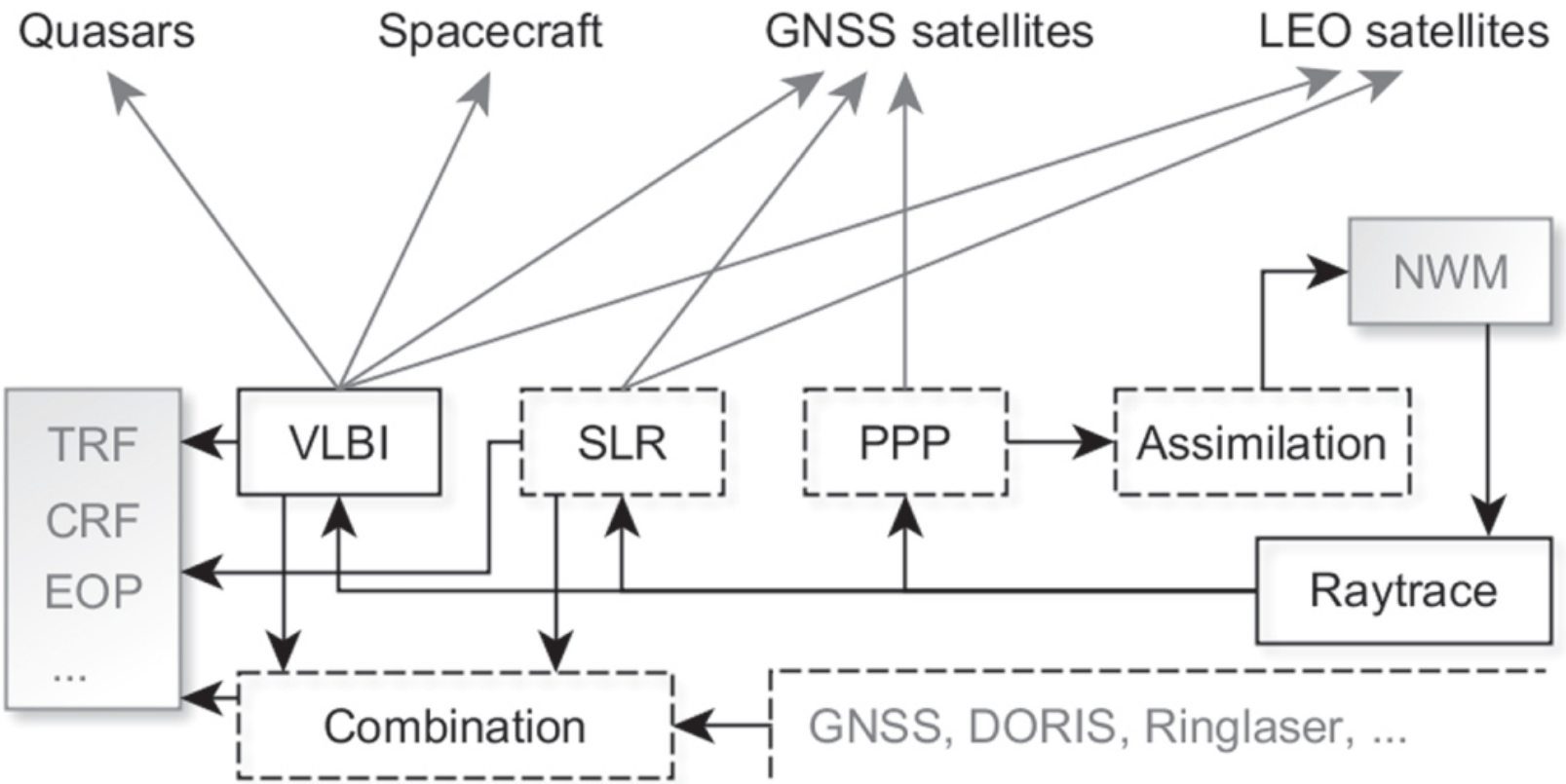
Advantages:

- Easy to use
- Very convenient IDE (code editor, debugging tools ...)
- Easy to change source code
- Lots of predefined functions/toolboxes (plotting tools ...)
- MATLAB is available on all major operating systems (Windows, Linux/UNIX, Mac OS)

Disadvantages:

- MATLAB is an expensive commercial software
  - VieVS is in principle working on GNU Octave, but without GUI and it is much slower
- Interpreted language $\rightarrow$ slower than compiled languages (like C++)

VieVS in near feature



Availability and user policy

- VieVS is freely available to registered users
  - Easier to get feedback
  - Easy to spread information about bugs, new updates ...
- For more information, see VieVS homepage
  `http://vievswiki.geo.tuwien.ac.at/doku.php`
- We are open for cooperation:
  - Modules can be written at other institutions

Modules of VieVS VLBI

Module structure of VieVS

- Possibility to run different processing steps separately
- Clear separation of individual tasks
  - good to try different parameterizations for one task
  - easy to add extensions
  - Intermediate results are saved and preserved
- All modules controlled via a common GUI

Modules of VieVS VLBI VIE_SETUP

- Graphical User Interface for all modules
- Allows to define all options and parameters
- Plotting tools for data inspection (residuals, estimates, correlation matrices...)

Modules of VieVS VLBI VIE_SCHED

- automatic scheduling for VLBI sessions
- manual scheduling for VLBI sessions
- $\rightarrow$ lecture scheduling

Modules of VieVS VLBI VIE_INIT

- reads in data and parameter files
- prepares observations in internal formats
- necessary for VIE_MOD, VIE_SIM and VIE_LSM

Modules of VieVS VLBI VIE_MOD

- calculates the theoretical time delay $o - c$
- builds up the partial derivatives A
- contains a variety of different models

Modules of VieVS VLBI VIE_SIM

- Simulation of
  - troposphere
  - clock
  - white noise
- writes NGS-files

Modules of VieVS VLBI VIE_LSM

- estimates the unknown parameters with Least Squares Adjustment
  - troposphere
  - clock
  - EOPs
  - station coordinates
  - source coordinates
- possibility to update A scan-wise
- SINEX files

Modules of VieVS VLBI VIE_GLOB

- stacking of single sessions
- estimate common parameters
  - TRF
  - CRF

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Lecture Introduction to VieVS

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