Vienna VLBI Software

Current release and plans for the future

Matthias Madzak   Johannes Böhm   Sigrid Böhm
Hana Krásná   Tobias Nilsson   Lucia Plank
Claudia Tierno Ros   Harald Schuh   Benedikt Soja
Jing Sun   Kamil Teke

EVGA Meeting
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Introduction

Vienna VLBI Software (VieVS)

- VLBI data analysis software
- Developed since 2008
- Version 2.1 (release in March 2013)
- Written in Matlab
  - Easy to understand/use/modify
  - Many built-in functions
  - Relatively slow
  - Expensive (→ Octave)

- Graphical User Interface
- Freely available to registered users
Overview

- Single session analysis
- Scheduling
- Simulation
- Global solution

In one common Graphical User Interface
Graphical User Interface

Combines all modules in one graphical interface

- Matlab GUIDE
- Set input files
- Change processing settings
- Define output options
Vienna VLBI Software
Matthias Madzak

Introduction
Overview
Graphical User Interface
Plot residuals
Plot parameters
Plot session info

Possibilities
Single session analysis
Scheduling
Global solution
Simulation
VLBI to space probes

Future plans
User workshop

Plotting tool

Allows user to plot
- Residuals
- Parameters
- Session overview
- Zoom
- Pan
- Get values
Detect bad stations, sources or baselines
Plotting tool - Residuals

Find and remove clock breaks interactively
Plotting tool - Residuals

Select outliers interactively
Plotting tool - Parameters

Visualize estimated parameters

Compare solutions

Output figure to any Matlab supported filetype
Plotting tool - Session analysis

Plot session network
Baseline length repeatability
Plotting tool - Session analysis

Correlation matrix
Single session analysis

Analyze one VLBI session and estimate parameters

- Read in data
  - NGS, netCDF
  - Removes outliers
  - Exclude stations, sources, baselines (.OPT files)

- Calculate
  - Theoretical delay and partial derivatives
  - Most recent IERS conventions

- Estimation
  - Least squares
  - Piece-wise linear offsets

- Parallel computing
Piece-wise linear offsets

- At integer hours
- Estimation options
  - Intervals (5 minutes to 2 days)
  - Constraints
- Define in GUI

\[
x_i = x_1 + \frac{t - t_1}{t_2 - t_1}(x_2 - x_1)
\]
Scheduling VLBI experiments

- Towards VLBI 2010
- Twins included (test version)
- 7 R&D sessions
- Source-based strategy
- Station-based strategy

→ See presentation by C. Tierno Ros / J. Böhm
Global geodetic parameters

Multi-session combination
- TRF, CRF, EOP
- Stacking normal equations

Reduce parameters
Geodynamical and astronomical parameters (internal version)
- FCN period
- Love, Shida numbers
- $\gamma$-parameter
→ See presentation by H. Krásná

Horizontal position differences (VieTRF10a, VTRF2008)
Simulation

- Create simulated observations
- Write NGS files
- Simulate
  - Tropospheric delays (*Nilsson and Haas, 2010*)
  - Clock errors
  - Measurement noise
Internal version

- Processing of SELENE D-VLBI observations
  - Delay model of sources at finite distances
  - Moving target
- VLBI observations to satellites
  - Scheduling
  - Simulations
  - (Processing)
- Goals
  - Develop observing strategies
  - Frame ties

→ See presentation by L. Plank
Future plans

- Kalman filter (see Poster by M. Karbon)
- Scheduling (continue)
- Satellite observations (continue)
- Geophysical and astronomical parameter estimation (e.g. galactic rotation)
- OpenDB
User workshops

- Held every year at TU Vienna since 2010
- Next: Probably autumn 2013
- Everybody welcome!
- vievs.hg.tuwien.ac.at

Participants of the VieVS User Workshop 2012

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