

Vie_SCHED_V22

Sun Jing¹ and David Mayer



¹ Shanghai Astronomical Observatory

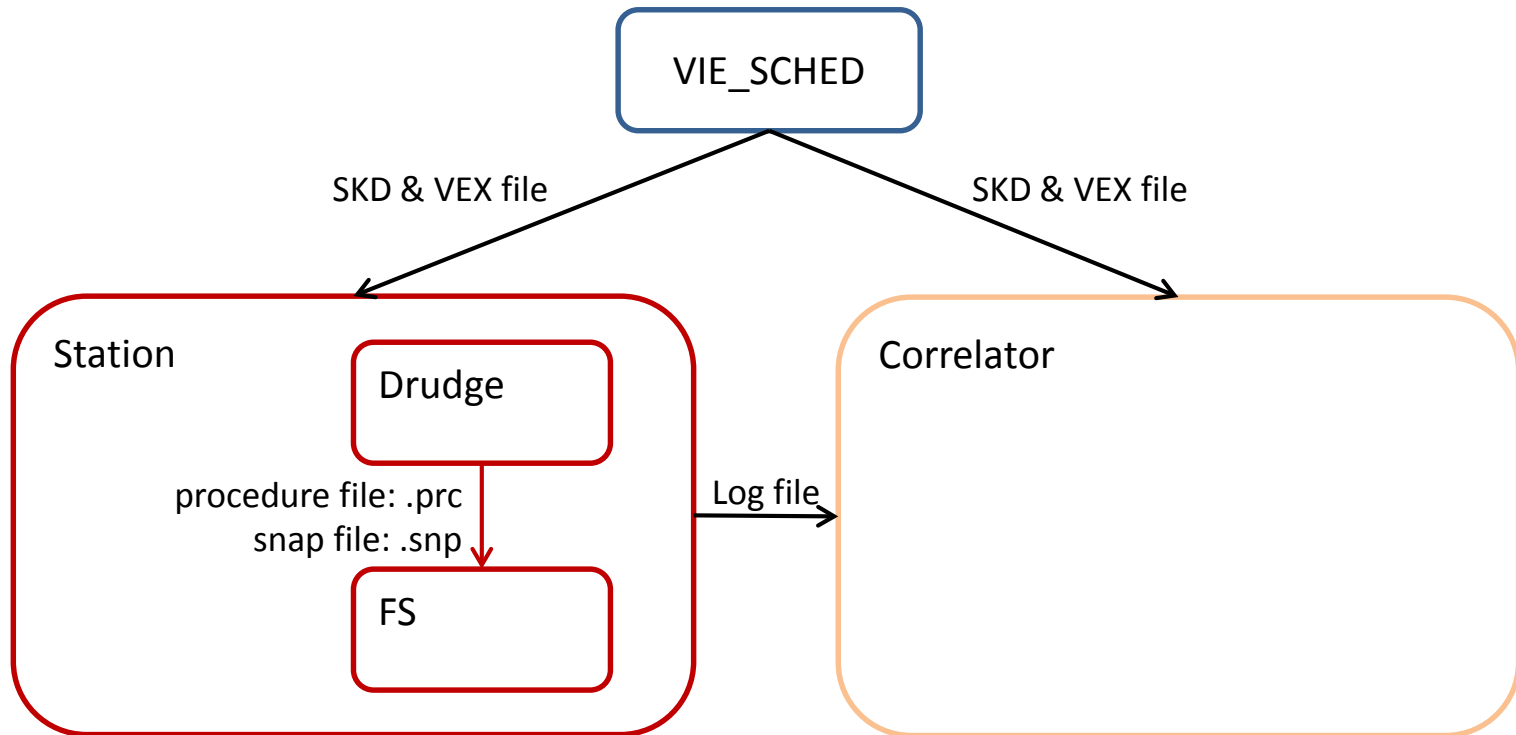
What is a schedule?

A schedule is basically the observing plan of a session.

- What do we need?
 - Parameters which describe the dish (e.g. dish size, slew speed etc.) and recording hardware (e.g. LO-frequencies)
 - Parameters which describe the sources (e.g. flux density, position)
 - Parameters which describe the setup of the experiment (e.g. frequencies etc.)
- Where do we get it from?
 - All informations are saved in the so called CATALOG files.

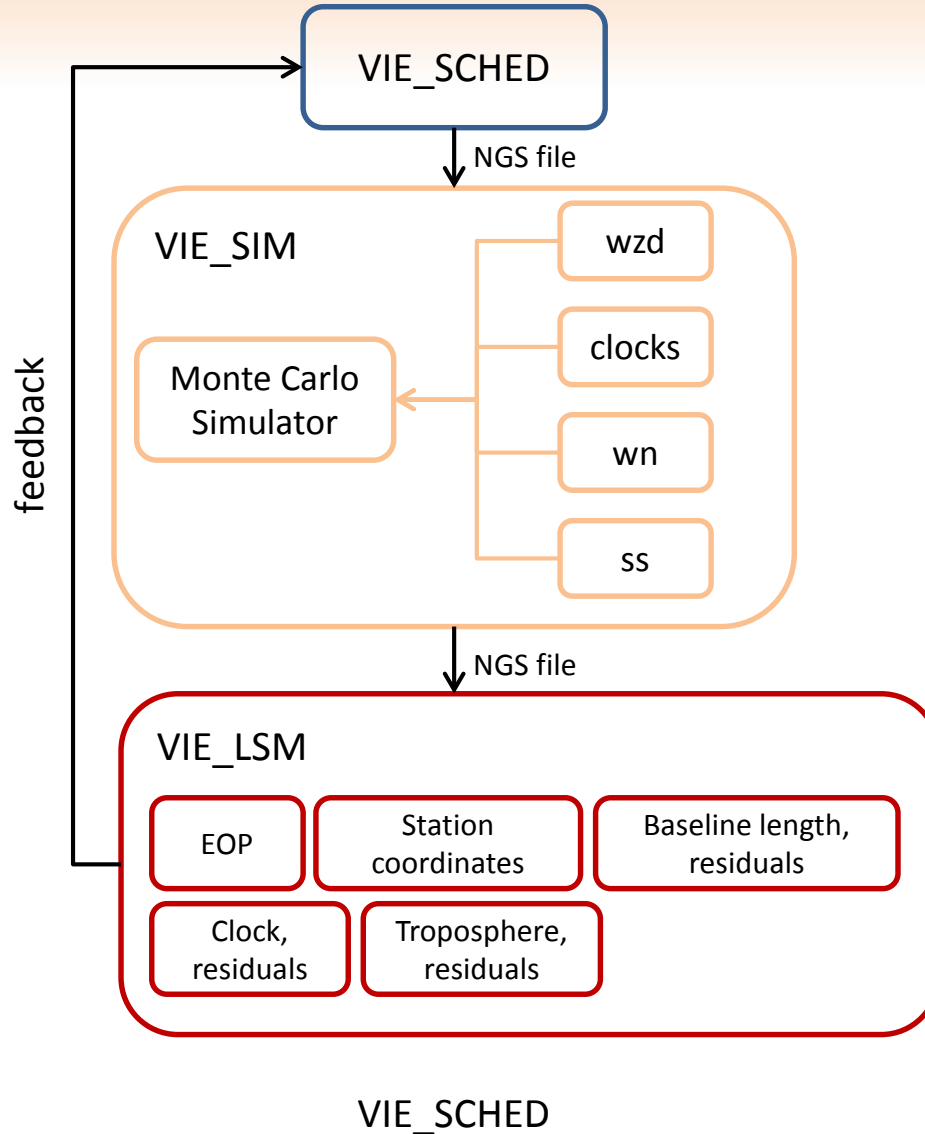
Purpose of a scheduling program (1)

→ real VLBI experiment



Purpose of a scheduling program (2)

→ simulation research



Scans and observations

What is a VLBI observation?

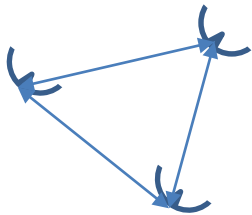
The delay measured on one baseline is called an observation.

What is a scan?

A scan is a subnetwork of stations observing a source at once.



= 1 scan
= 3 observations



Algorithms and models

The length of a scan depends on several station and source specific factors:

$$scanlength = \left(\frac{1.75 \times SNR_{min}}{F_{obs}}\right)^2 \times \left(\frac{SEFD_1 \times SEFD_2}{2 \times B \times N_{ch}}\right) + CORSYNCH$$

The time in between scans depends on the slew speed of the antennas and some additive constants.

Optimization

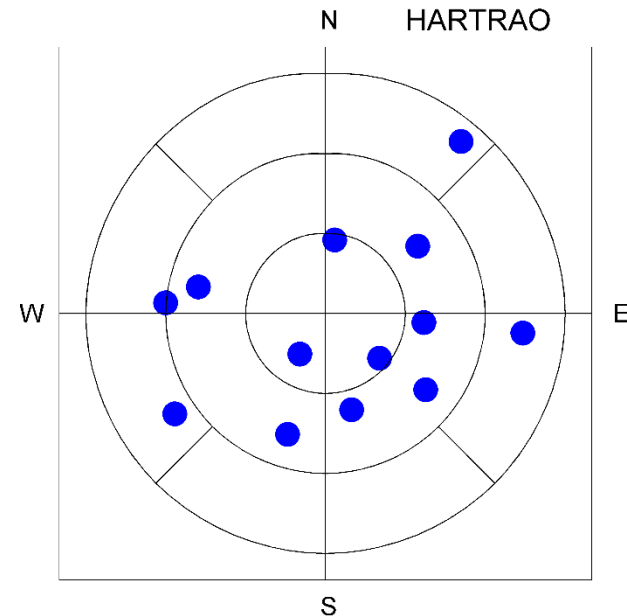
The troposphere is the limiting factor → we need many observations in different directions (uniform sky coverage) to estimate it.

VieVS incorporates two different strategies:

- Station-based scheduling
- Source-based scheduling

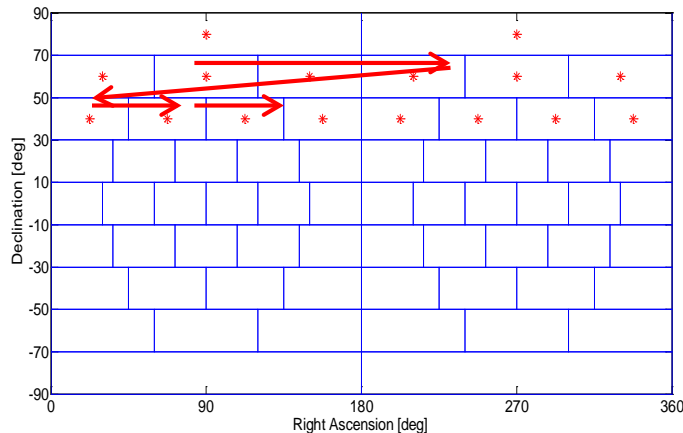
Station-based scheduling strategy

- Classical approach to achieve uniform sky coverage at each station (needed for decorrelation of zwd, clocks and station height)
- Definition of a uniform sky coverage: The sky above the antenna is divided into three different elevation segments: low, middle, and high elevation observations.
- The middle segment is divided into four azimuthal segments and the low segments into eight parts.
- Radio sources from the same segment should not be observed within a certain time interval.
- Time window of sky coverage should correspond to the sampling interval of the estimated parameters



Source-based scheduling strategy

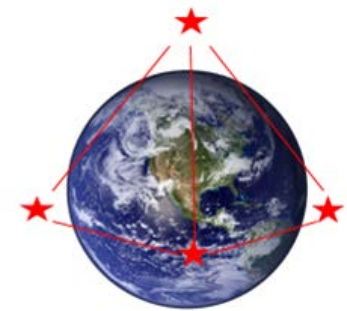
- The source based strategy comes up with the more global station distribution and fast moving antennas
- The schedule program selects radio sources from the catalogue independently of the sky distribution at individual stations
- Different subnets are formed throughout the session in order to optimize geometry and number of observations



- **one** source scheduled each time



- **two** sources scheduled simult.

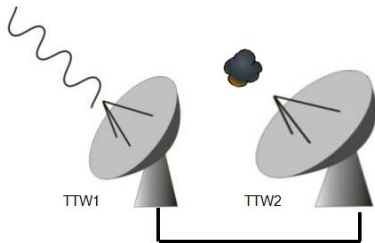


- **four** sources scheduled simult.

Twin telescopes at one site

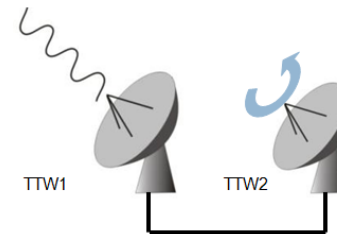
- (1) Same troposphere above the twin telescopes;
- (2) Same H-maser clock connecting them.

Mode1 : Maintenance



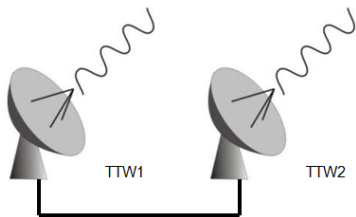
- ✓ full availability

Mode3 : Continuous observations



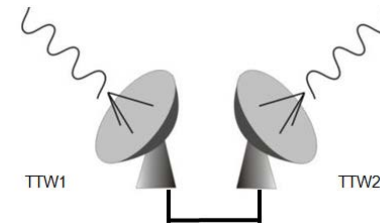
- ✓ continuous observations, without any temporal gaps

Mode2 : Same source observations



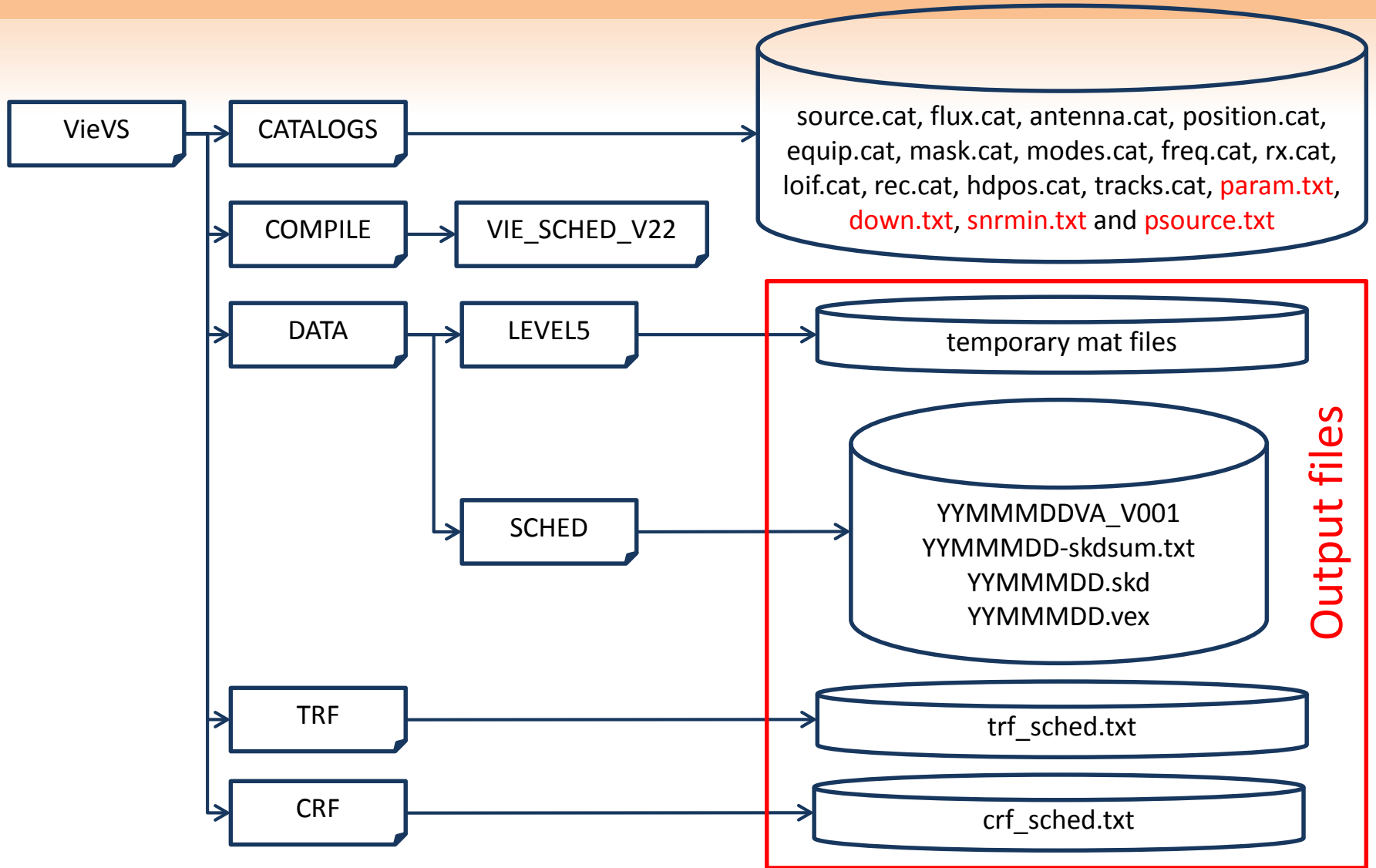
- ✓ increase the sensitivity and decrease on-source time
- ✓ counteract the troposphere effect for calibration

Mode4 : Multidirectional observations



- ✓ more observations and better sky coverage
- ✓ strengthen the geometry

The structure of VIE_SCHED within VieVS



Thank you for your attention!