

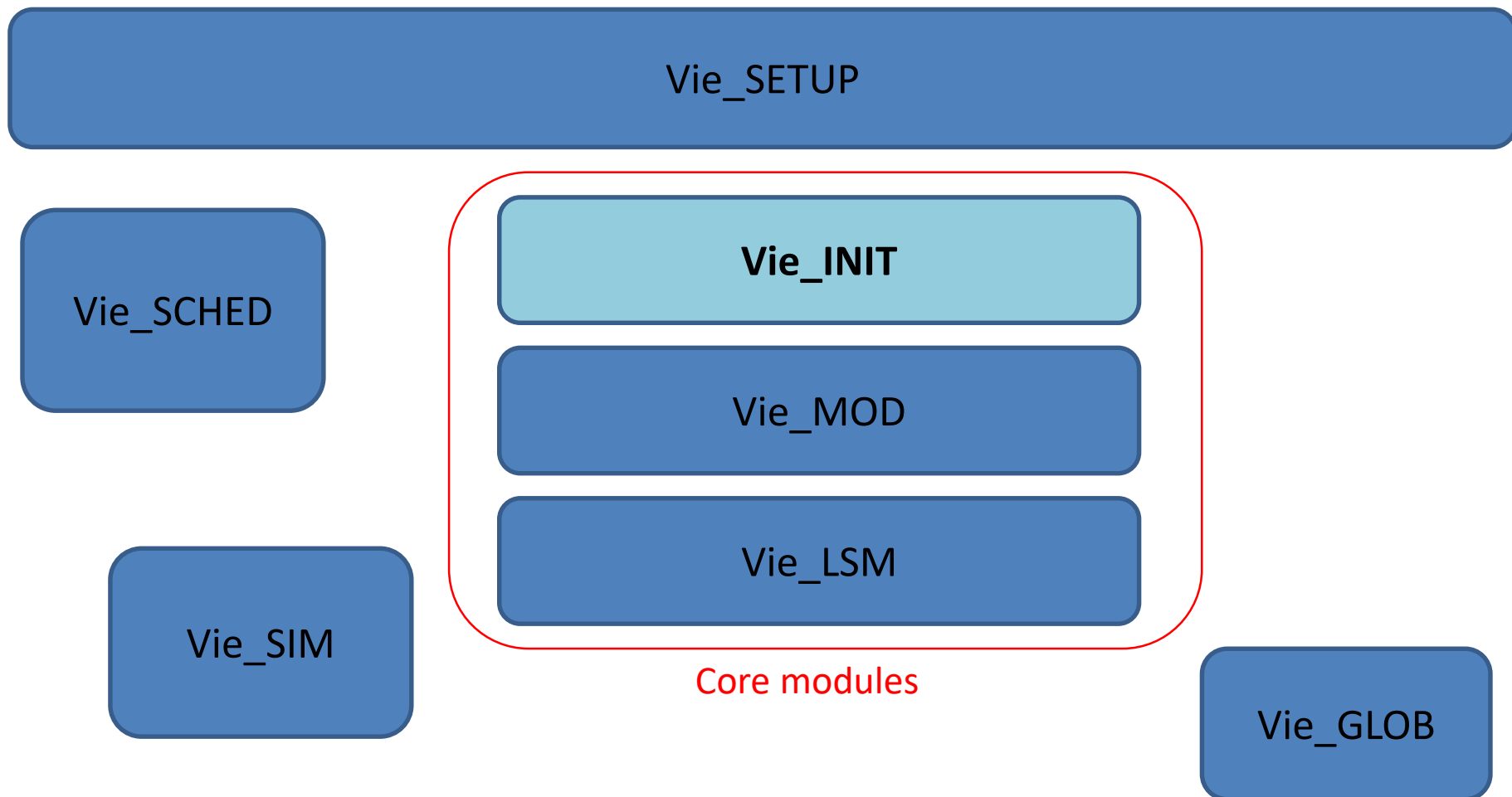
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VIE_INIT 3.1

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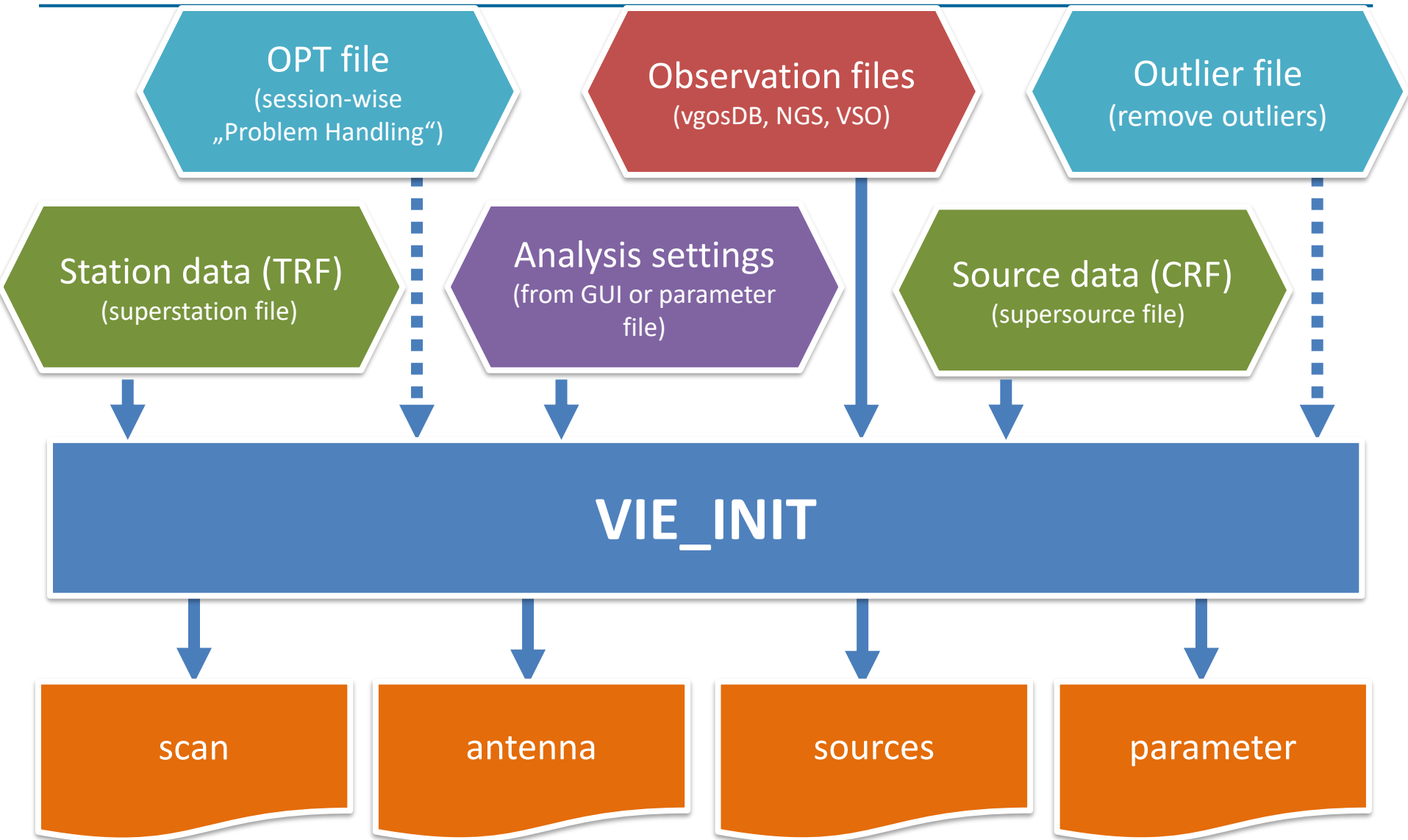


VieVS Modules



Vie_INIT....initialize the data analysis process

Purpose of VIE_INIT



Supported Observation File Formats

- **vgosDB**
 - Binary data, netCDF format
 - New IVS standard format, complete transition until Sept. 30, 2018
 - Native format of calc/solve, nuSolve (developed by GSFC)
 - Full support in VieVS 3.1
- **NGS cards**
 - Old standard format
 - Text files
- **VSO („VieVS observation format“)**
 - Text files
 - Possibility to specify near-field observations, e.g. of satellites

http://viewswiki.geo.tuwien.ac.at/doku.php?id=public:views_manual:data#observation_data

Data Loaded by VieVS from Observation Files

- **Observed group delay + formal error**
 - Usually multiband delays of the X-band observations
- **Ionosphere correction + formal error**
 - Computed in post-correlation processing based on observations in two bands (S and X)
- **Cable delay corrections**
 - Measured by cableCal units (station logs)
- **Meteorological data (p, t, e)**
 - Measured at the stations (station logs)
- **Quality flags** for delay and ionosphere correction
 - Quantify the reliability of the fringe detection (for the delay) and of the calculated ionosphere correction

vgosDB (1)

- Database to store, archive and exchange VLBI data
 - Replaces mark3/4 databases
 - Meets the anticipated requirements of VGOS
- Based on netCDF files (*.nc) in a **predefined folder structure**
 - Information is split up into separate *.nc files
- **netCDF** (Network Common Data Format) = „*binary exchange format for array-oriented scientific data*“¹
 - Machine independent

➔ **Example:** /VLBI/DATA/vgosDB/2018/18JUL23XA

¹<https://www.unidata.ucar.edu/software/netcdf/docs/>

vgosDB (2) – Structure

- Each netCDF file contains one or more **variables**
 - Defined by: name, type (e.g. 1x20 int, 1x1 char, etc.) and value
- Each variable is **characterized by metadata**
 - Providing information on the variable content
- One vgosDB can contain different version of the same dataset
 - E.g. For different processing stages
 - V001 = Only group delays from fringe fitting
 - V004 = Complete database including ion. Corr., resolved ambiguities, met. data, cable cal., etc)
 - **Wrapper files** define which combination of *.nc files yield a consistent dataset

vgosDB analyzer

The screenshot shows the 'Analyse vgosDB (netcdf)' window. It features a menu bar, a toolbar, and several panels. Callouts point to the following elements:

- Select database:** Points to the 'VGOS database' field containing the path `../DATA/vgosdb/2018/18JUL23XA/` and a 'Reload' button.
- List of wrapper files:** Points to a list box showing two files: `1 18JUL23XA_V001_kall.wrp` and `2 18JUL23XA_V002_kall.wrp`.
- Select folder and netCDF file:** Points to the 'Database content' section, which includes dropdowns for 'WETTZELL' (9 stations) and '0016+731' (70 sources), and another set of dropdowns for 'stat' (Folders) and 'Met' (Files).
- Select variable in netCDF file:** Points to the 'Variables' table, where the 'TempC' row is selected.
- Meta-data, explaining the selected variable:** Points to the 'Attribute' table below the variables.
- Plot numerical data (n x 1) of selected variable:** Points to a line graph showing temperature data over time, with the y-axis ranging from 15 to 30 and the x-axis from 0 to 450.

The 'Variables' table is as follows:

	Name	Type	Value
1	Station	8x1 char	WET...
2	TempC	409x1 double	20.9325, 21...
3	RelHum	409x1 double	0.79813, 0...
4	AtmPres	409x1 double	946.4, 946...

The 'Attribute' table is as follows:

Attribute	Value
1	

The 'Log' panel shows the following messages:

```
12:55:08 Cannot plot variable: invalid dimension.  
12:55:06 Cannot plot variable: invalid dimension.  
12:51:02 Cannot plot variable: invalid dimension.  
12:51:01 Cannot plot variable: invalid dimension.  
12:50:47 Cannot plot variable: invalid dimension.  
12:50:24 Cannot plot variable: invalid dimension.  
12:50:08 Loading done
```


vgosDB (3) – Files/variables loaded by VieVS

- /<session_name>_Vxxx_ixxx_kxxx.wrp (*wrapper file*)
- /ObsEdit/GroupDelayFull_bx.nc → GroupDelayFull (*group delays*)
- /ObsEdit/Edit.nc → DelayFlag (*delay quality flag*)
- /Observables/GroupDElay_bx.nc → GroupDelaySig (*delay formal error*)
- /ObsDerived/Cal-SlantPathlonoGroup_bx.nc
 - Cal_SlantPathlonoGroup (*ion. corr*)
 - Cal_SlantPathlonoGroupSigma (*ion. corr formal error*)
 - Cal_SlantPathlonoGroupDataFlag (*ion. corr. quality flag*)
- /Scan/TimeUTC.nc (*scan reference time*)
- /<station>/Met.nc → TempC, RelHum, AtmPres (*t, e, p*)
- /<station>/Cal_Cable.nc → Cal_Cable (*cable delay*)
- + Cross-references

Red ... Placeholder

Blue ... Contained data

- Binary (*.mat) file containing all **static station dependent information**
 - Station positions of **different TRS realizations**
 - ITRF2014, ITRF2008, VTRF2014, VTRF2008, DTRF2014, etc.
 - viewsTRF → Used as backup, if station is not available in selected TRF
 - Parameters for modelling atmosphere and ocean loading
 - Station characteristics (axis offsets, axis mount type, parameters for modelling thermal extension, etc.)
- Stored per default at ... /TRF/superstation.mat

- Binary (*.mat) file containing all **static source dependent information**
 - Different CRS realizations (RaDec coordinates)
 - ICRF1, ICRF2, VieCRF13, etc.
 - vievsCRF → Used as backup, if source is not available in selected CRF
- Stored per default at *.../CRF/supersource.mat*

OPT File (1)

- Provides options to treat problems in sessions
- One OPT file per session
 - Clock breaks
 - Exclusion of stations, sourcee, baselines
 - For whole session of limited time span
 - Downweight stations
 - Use/not use cable cal. Data
 - Set clock reference
- Default location:
.../DATA/OPT/<subdir>/<session_name>.OPT

OPT File (2) - Example

```
# example
# =====
# CLOCK REFERENCE:
# WETTZELL
#
# CLOCK BREAKS: 2
# BADARY    55454.4
# WETTZELL  55372.369
#
# STATIONS TO BE EXCLUDED: 5
# MATERA
# WETTZELL
# MATERA    YMMDDhhmm-YMMDDhhmm
# WETTZELL  YMMDDhhmm-YMMDDhhmm
# BADARY    MJD1-MJD2
#
# BASELINES TO BE EXCLUDED: 3
# WETTZELL  ZELENCHK
# SVETLOE   ZELENCHK
# BADARY    ZELENCHK
#
# SOURCES TO BE EXCLUDED: 1
# 1936+095
# 2356+385  YMMDDhhmm-YMMDDhhmm
#
# STATIONS TO BE DOWN-WEIGHTED (NOISE IN [m]): 2
# MATERA    0.040
# WETTZELL  0.020
#
# NO CABLE CAL: 2
# WETTZELL
# MATERA
```

Outlier File (1)

- Contains list of outliers
- Created in VIE_LSM (if outlier test is activated)
- Observations marked as outliers are removed when the data is loaded in VIE_INIT

- To detect and remove outliers you need to run VieVS twice:
 1. Outliers are detected by VIE_LSM and saved in outlier file
 2. Outlier file is loaded and applied in VIE_INIT

- Default location:
`.../DATA/OUTLIER/<subdir>/<session_name>.OUT`

Outlier File (2) - Example

Stat. 1 Stat. 2 Time (MJD)

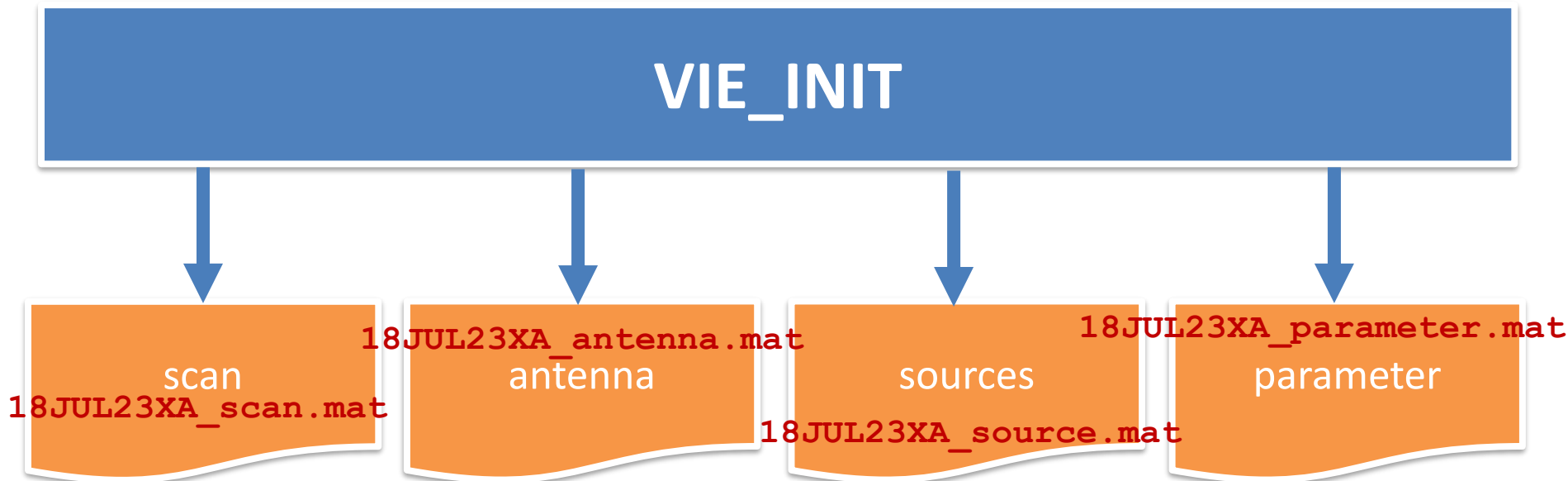
SEJONG	YARRA12M	58322.711342592600
SEJONG	NYALES20	58322.737974537042
SEJONG	NYALES20	58322.759479166663
SEJONG	YARRA12M	58322.760798611111
SEJONG	YARRA12M	58322.788553240738
SEJONG	WARK12M	58322.809409722220
SEJONG	YARRA12M	58322.853125000001
SEJONG	YARRA12M	58322.864212962966
SEJONG	NYALES20	58322.867453703708
KATH12M	SEJONG	58322.892905092594
SEJONG	YARRA12M	58322.908622685187
KATH12M	NYALES20	58322.912569444445
KATH12M	SEJONG	58322.957847222220
SEJONG	NYALES20	58322.971423611110
KOKEE	WARK12M	58322.994594907410
KOKEE	SEJONG	58323.007743055561
KOKEE	NYALES20	58323.078217592592
SEJONG	YARRA12M	58323.085983796300
SEJONG	NYALES20	58323.173229166663
KATH12M	SEJONG	58323.192592592590
SEJONG	WARK12M	58323.247152777782
SEJONG	YARRA12M	58323.264525462968
SEJONG	WARK12M	58323.297719907408
KATH12M	SEJONG	58323.340740740743
SEJONG	YARRA12M	58323.387708333328
SEJONG	NYALES20	58323.394004629634
SEJONG	WARK12M	58323.399444444447
KATH12M	SEJONG	58323.406898148147
SEJONG	WETTZELL	58323.412152777782
SEJONG	YARRA12M	58323.463437500002

Run VIE_INIT

1. Open the menu „***File/Set input files***“
 - a) Press button „*Browse for VGOS-DB*“
 - b) Select Session 2018/18JUL23XA in the window that pops up
 2. Open the menu „***Run/Run options***“
 - a. Select ONLY „Run vie_init“
 - b. Set a sub-directory, e.g. „test“
 3. Press the button „**Save + Run**“
-
- ➔ Status information in the MATLAB Command Window (CW)
- ➔ VieVS structures written to: /DATA/LEVEL0/<sub_dir>/

Output of VIE_INIT

- MATLAB cell arrays
 - Input for all subsequent processing steps
- Save in
/DATA/LEVEL0/<sub_dir>/<session_name>_<type>.mat
- http://viewswiki.geo.tuwien.ac.at/doku.php?id=public:views_manual:important_files#views_data_structures



VieVS Data Structures (1) – Scan

- **Scan-specific data:**

- Observed delays + formal errors
- Ionosphere corrections
- Cable calibration
- Meteorological data (in situ measurements)
- Quality code
- Etc.

http://viewswiki.geo.tuwien.ac.at/doku.php?id=public:views_manual:important_files:views_structures:scan

- (Added in VIE_MOD:)

- Modelled theoretical delays
- Partial derivatives w.r.t. Target estimates
- Modeled meteorological data (if in situ measurements are missing)

VieVS Data Structures (2) - Antenna

- **Station-related data:**
 - Station names (8 char) and codes (2 char)
 - Station coordinates and velocities
 - Antenna axis offsets
 - Axis type
 - Model coefficients for thermal expansion, etc.

VieVS Data Structures (3) - Source

- **Source-related data:**
 - Source names (IVS and IERS name)
 - Coordinates (RaDec) of selected CRF
 - Etc.

VieVS Data Structures (4) - Parameter

- **Parameters from VieVS GUI or from loaded parameter file**
 - Analysis settings (models, estimation settings)
 - Metadata
 - Session name
 - Locations/names of data files
 - Type of observation file
 - Etc.