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Session 1

Status and future plans for the VieVS scheduling package

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VieVS
Vienna VLBI Software

Scheduling Program

skd file

skd file

Station

DRUDG

prc file, snp file

FS

log file

Correlator
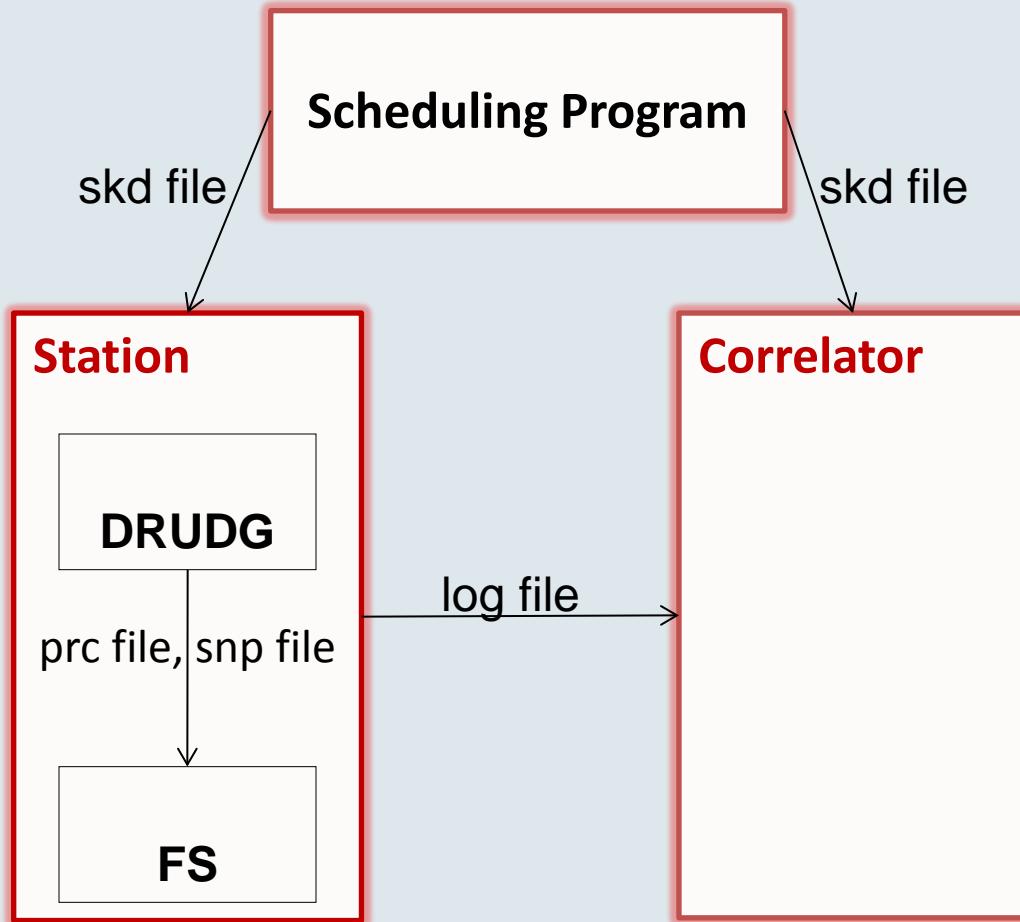
Current scheduling

programs :

✓ sked (Goddard)

✓ sched (NRAO)

✓ ...

# Why is a new scheduling program needed?

VLBI2010 Goals

- 1 mm measurement accuracy on global baselines;

- continuous measurements for time series of station positions and EOP;

- turnaround time to initial geodetic results of less than 24 hrs.

VLBI2010 Specifications

- small fast-moving antennas;

- broadband frequency (2–14 GHz);

- two or more antennas at a site;

- …

sources

stations

observing modes

VIE_SCHED

skd file

ngs file
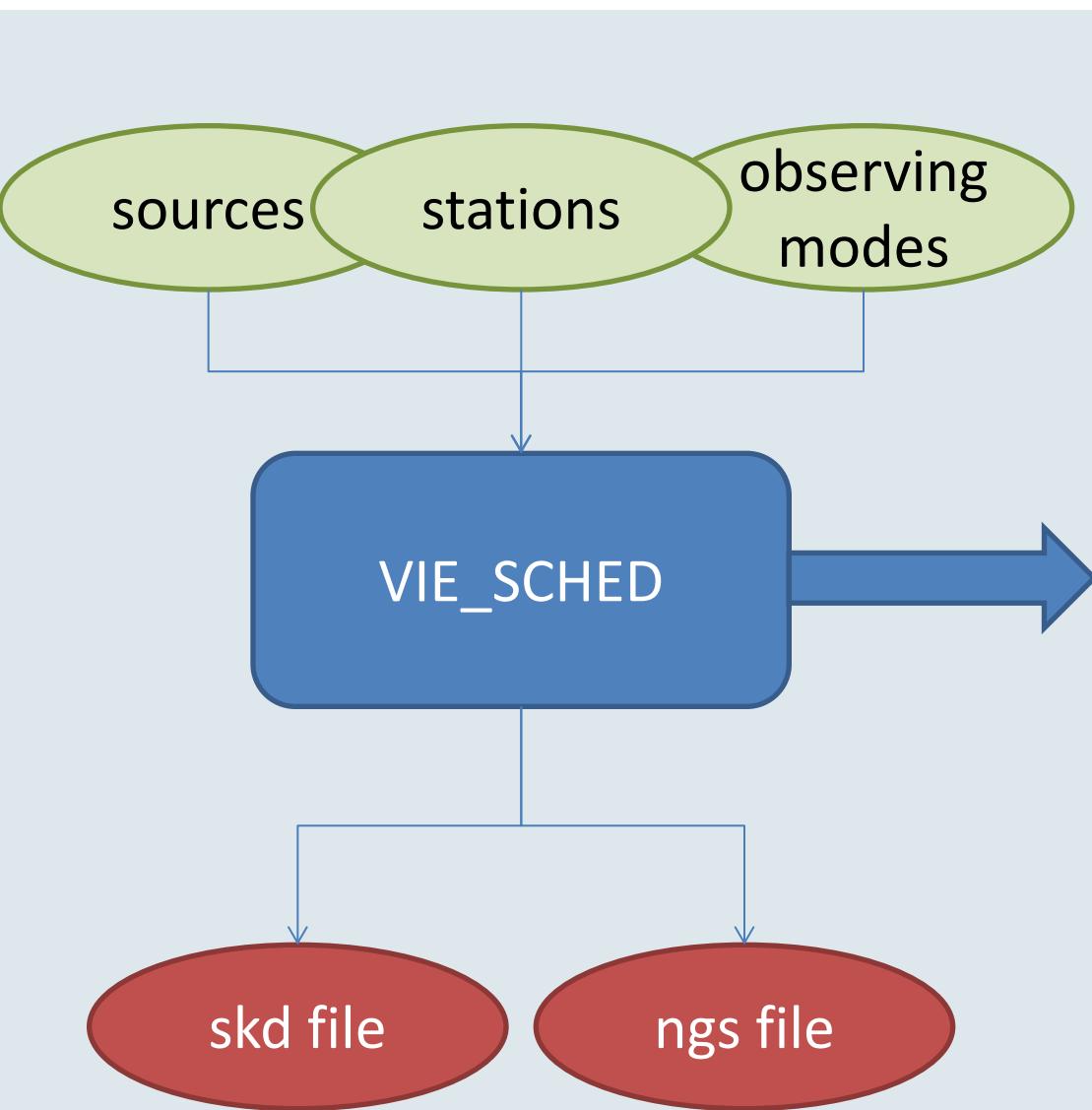
1.
Calculate the possible configurations

2.
For each possible configuration
For each scan in the configuration
Calculate the start time
Calculate duration for each station
Check it and store it by rank
End
End

3.
Select the configuration with the highest rank considering the criteria

4.
Enter the selected configuration into the schedule

Calculate the possible configurations

--- The source is up at the current time.

--- The source is strong enough on each baseline of a scan.

--- The same source won't be repeated in a short time.

--- If the source is too close to the sun, it won't be considered.

--- The multiple sources in the same

Criteria of optimization	Criteria of evaluation
• number of observations	• station position repeatibilities repeatibilities
• sky coverage	• baseline length repeatibilities repeatibilities
• time between scans	• RMS of EOP
• covariance analysis	• other parameters

Schedule

➢ Interim network : 18 stations

station distribution

--- legacy
antennas
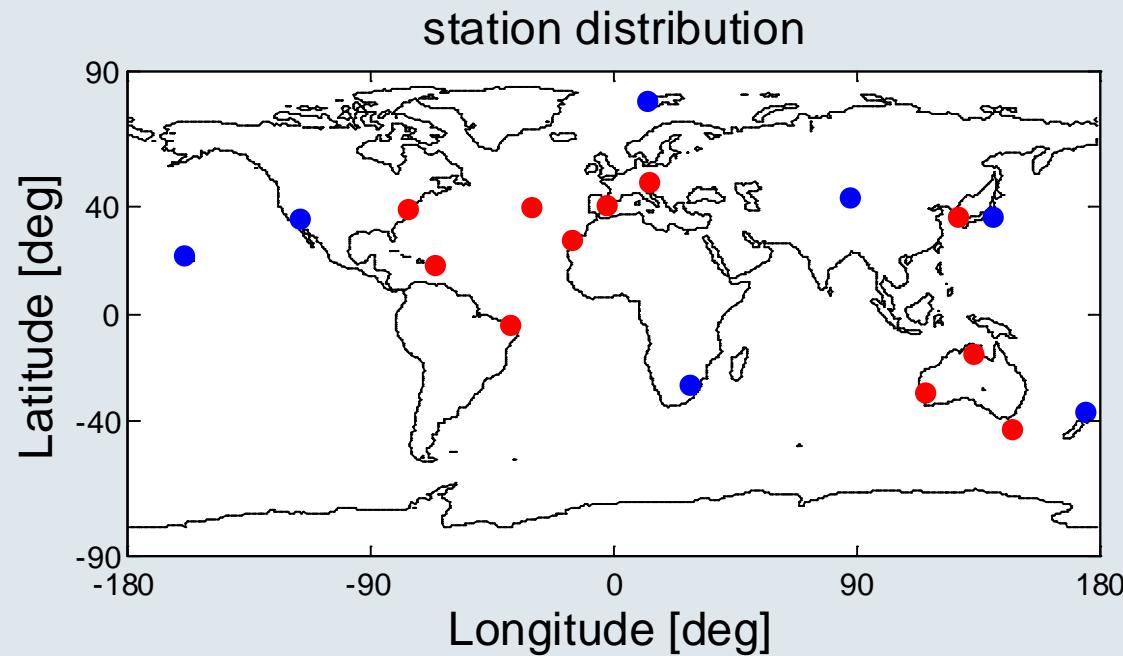
Schedule

➢ Number of observations

	From SKED (red)	From VIE_SCHED (blue)
Number of sources	200	225
number of scans	4000	4138
number of observations	99371	84398
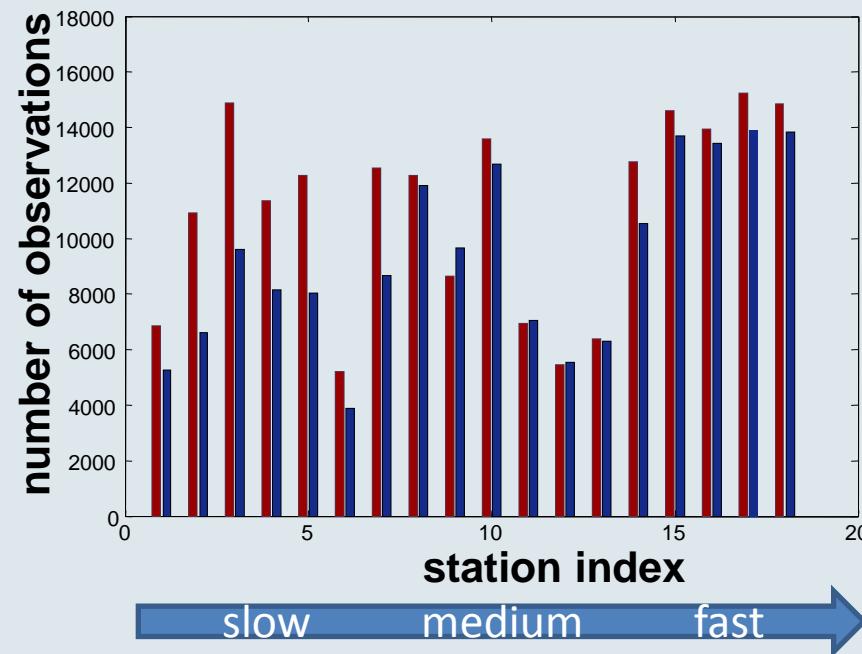
Schedule

➢ Idling percentage

From SKED
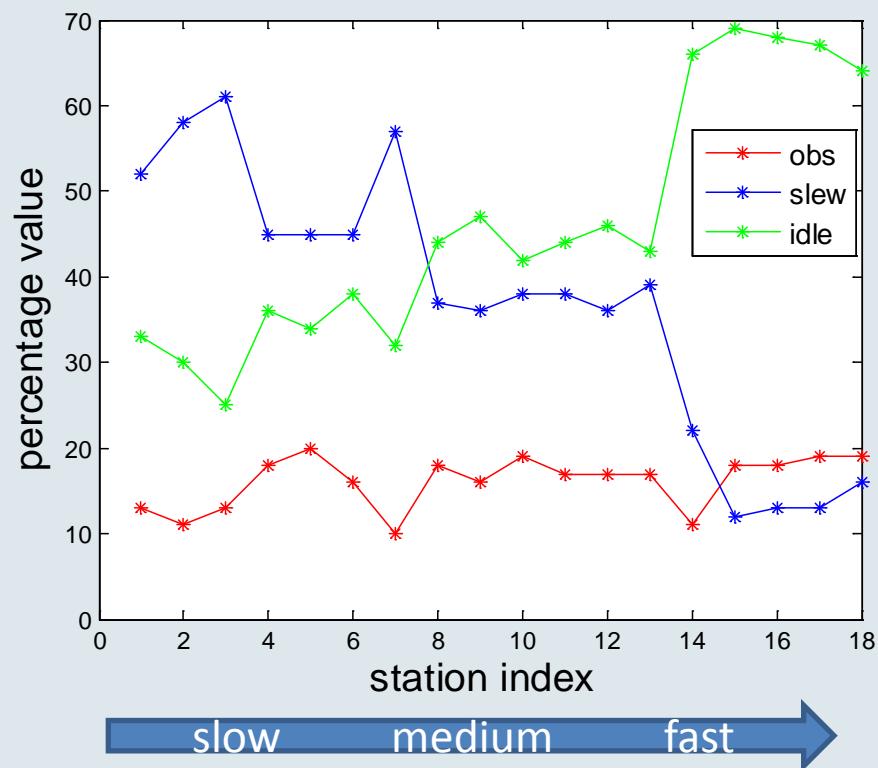
From VIE_SCHED
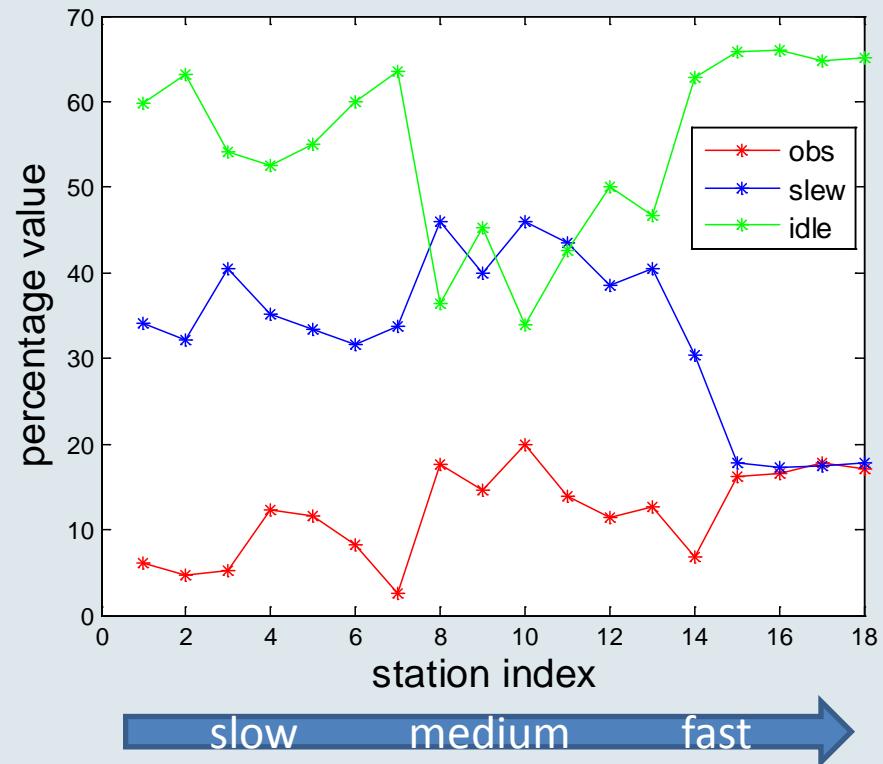
Schedule

➤ Mean sky coverage

slow   medium   fast
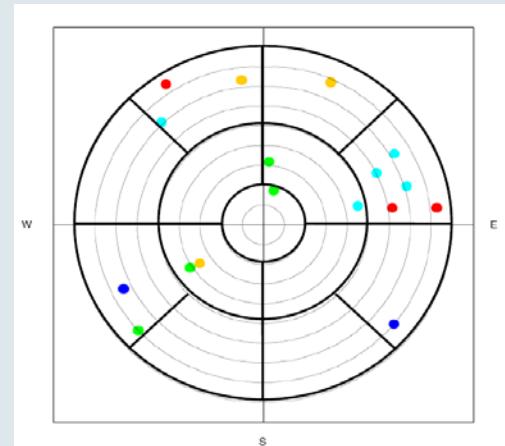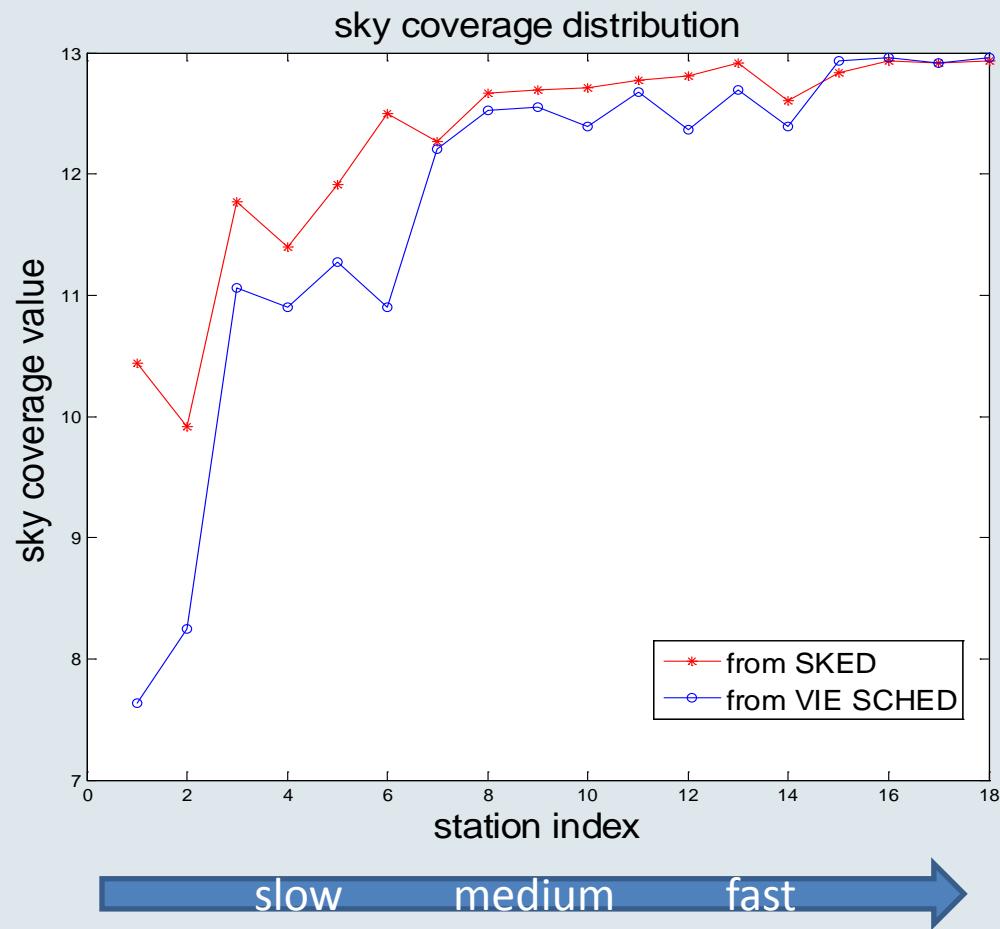
Simulation

- the refractive index structure constant Cn : $2.5 \times 1.0^{-7} m^{-\frac{1}{3}}$
- the effective height of wet troposphere H : 2000 [m]
- the wind velocity vector v (8.0 m/s) towards east
- the Allan standard deviation (ASD) of 1e-14 @ 50 min
- the white noise : 16 ps per baseline

Results

Median 3D repeatability from SKED
    = 3.3 mm

Median 3D repeatability from VIE_SCHED
   = 3.45 mm
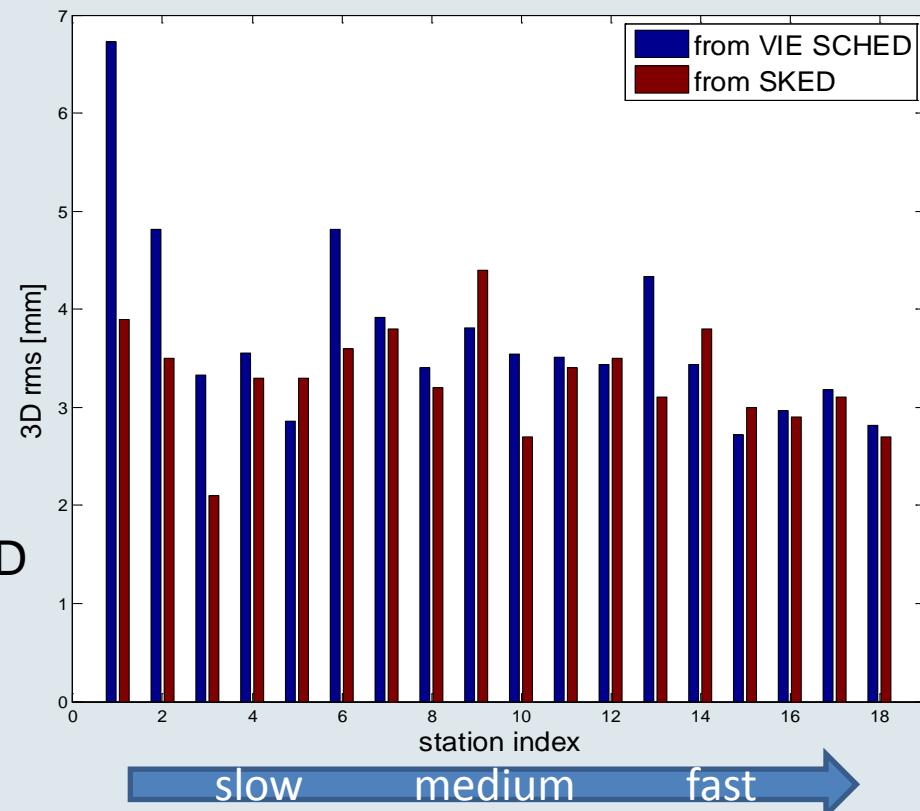
Schedule(IVS-R1464)

➢ Network

station distribution


| Sta index	1	2	3	4	5	6	7	8	9
Sta name	BADARY	HARTRAO	KOKEE	NYALES20 MEDICINA	ONSALA60	TIGOCONC	TSUKUB32	WESTFORD	WETTZELL
Cn	2.50	1.47	1.78	0.95 2.84	2.09	1.52	2.30	3.67	1.80
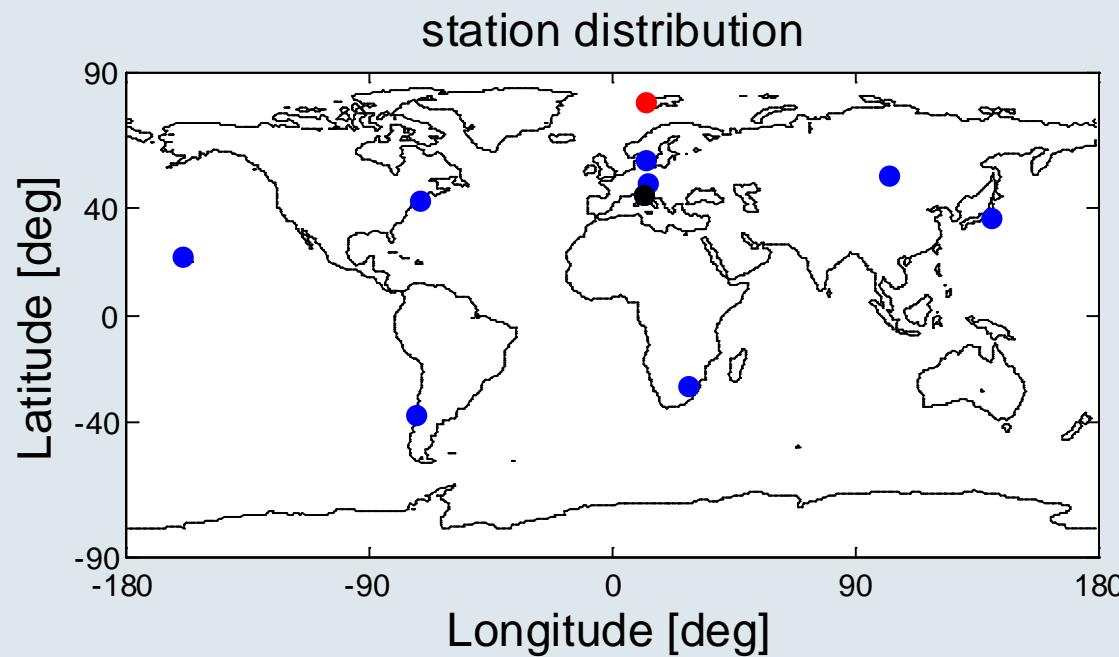
Schedule(IVS-R1464)

➢ Number of observations

|	Network1 (9 sta) (original network)	Network2 (8 sta) (without NYALES20)	Network3 (9 sta) (8 stations + MEDICINA)
Number of sources	57	58	58
number of scans	675	683	605
number of observations	6172	4655	5634
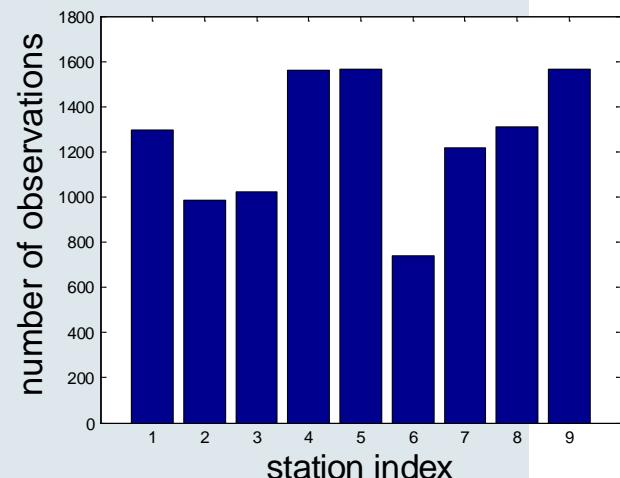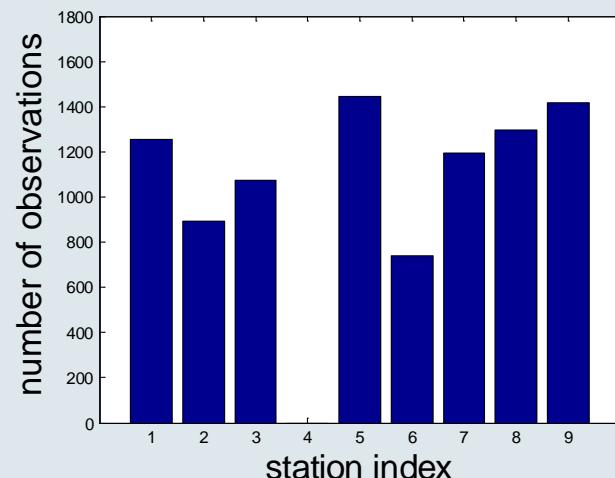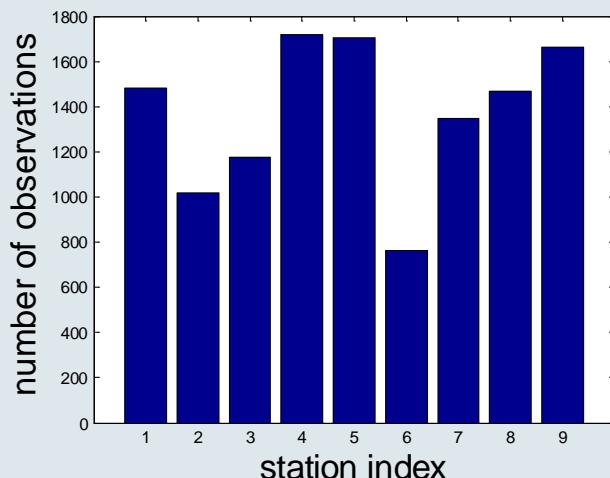
Results(IVS-R1464)

	Network1 (9 sta) (original network)		Network2 (8 sta) (without NYALES20)		Network3 (9 sta) (8 stations + MEDICINA)	
ERP & St. dev [uas, uas, us]	[52.39 58.64 2.31] [30.94 30.78 1.26]		[55.59 49.80 2.32] [35.64 33.48 1.39]		[61.00 59.79 2.63] [39.63 35.34 1.46]	
station position repeatability [mm]	Mean 3D repeatability = 8.05		Mean 3D repeatability = 8.84		Mean 3D repeatability = 9.84	
baseline length repeatability [mm]						
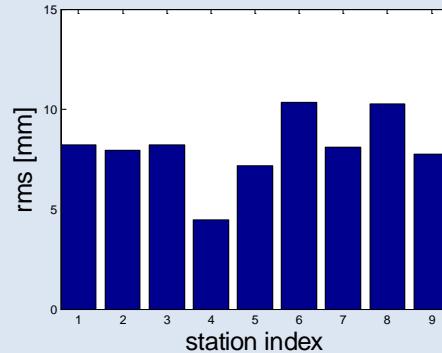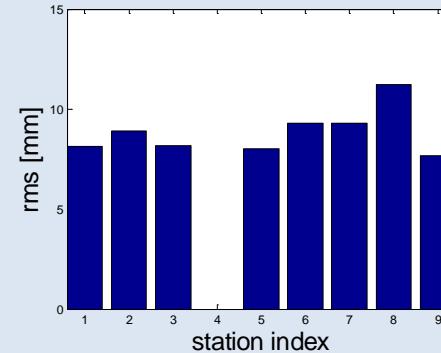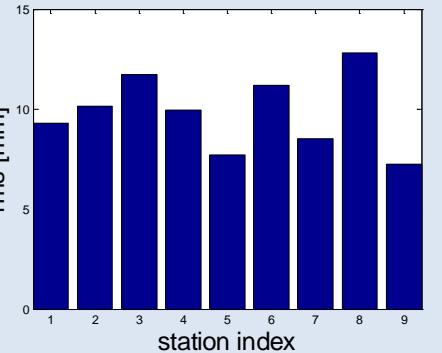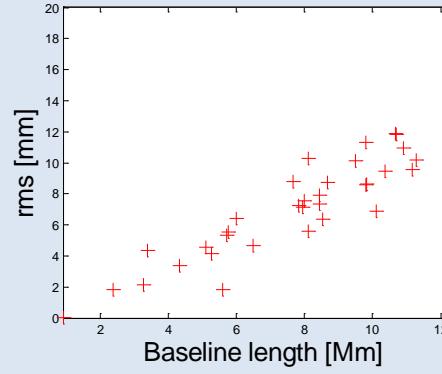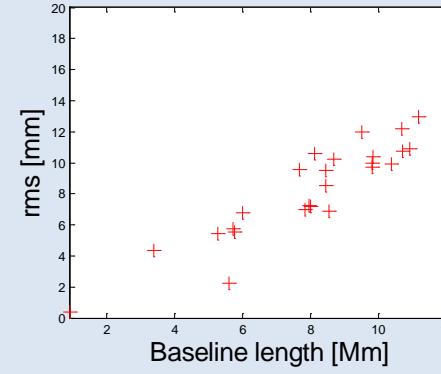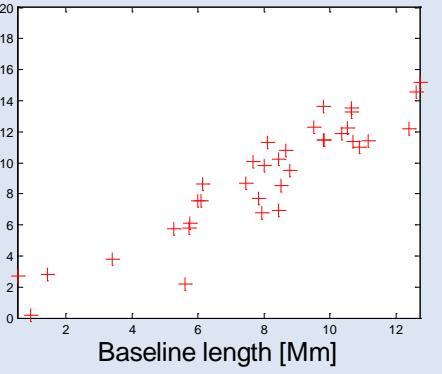
Schedule(IVS-R4464)

➢ Network

station distribution
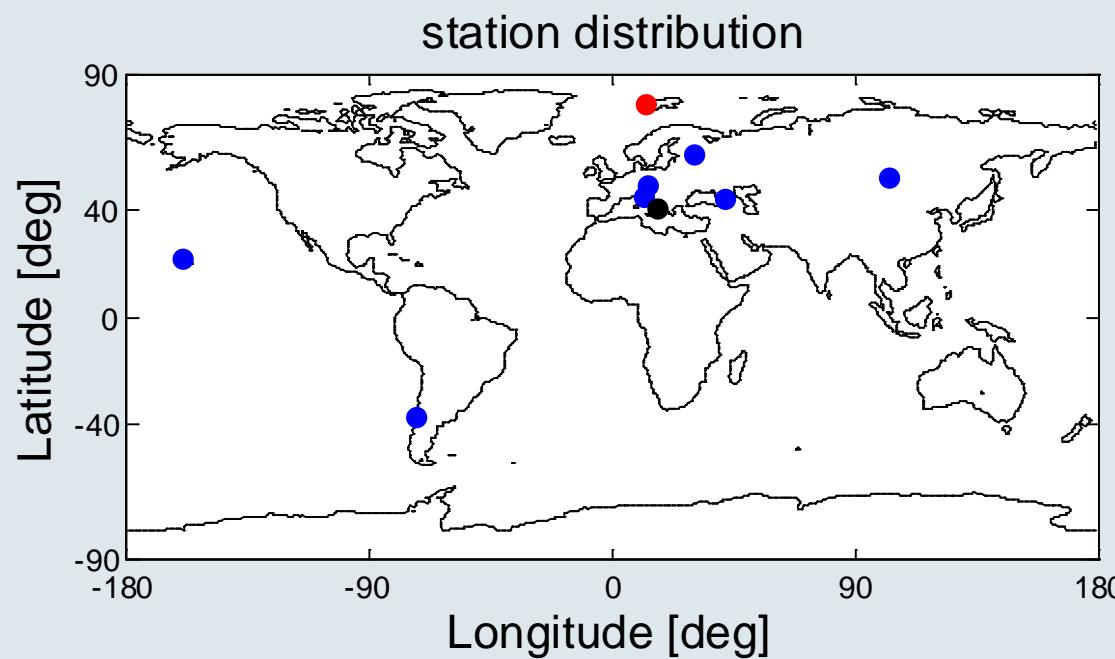
| Sta index	1	2	3	4	5	6	7	8
Sta name	BADARY	KOKEE	MEDICINA	NYALES20 MATERA	SVETLOE	TIGOCONC	WETTZELL	ZELENCHK
Cn	2.50	1.78	2.84	0.95 2.50	1.55	1.52	1.80	3.15

Schedule(IVS-R4464)

➢ Number of observations

	Network1 (8 sta) (original network)	Network2 (7 sta) (without NYALES20)	Network3 (8 sta) (7 stations + MATERA)
Number of sources	59	59	61
number of scans	596	644	521
number of observations	4954	3606	4606
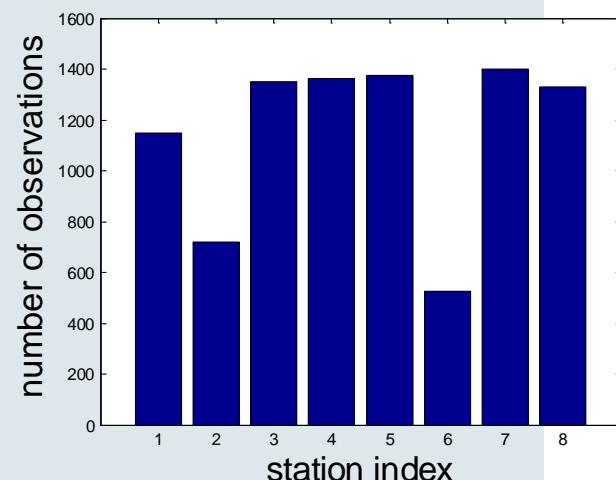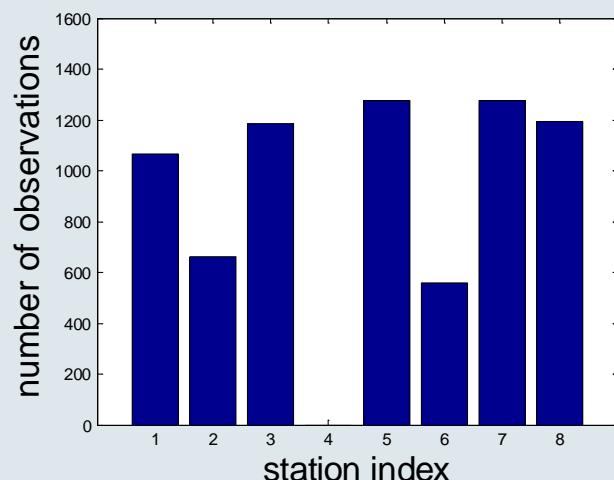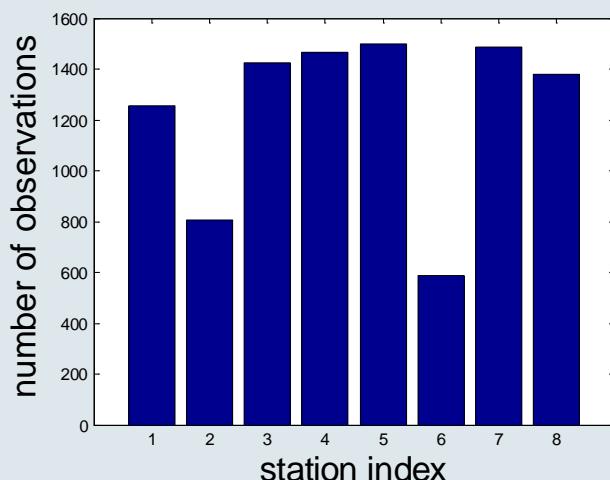
Results(IVS-R4464)

	Network1 (8 sta) (original network)	Network2 (7 sta) (without NYALES20)	Network3 (8 sta) (7 stations + MATERA)
ERP & St. dev [uas, uas, us]	[99.38 113.64 4.05] [54.94 65.05 2.15]	[117.42 114.88 4.28] [62.38 63.95 2.57]	[116.48 121.30 5.09] [69.77 70.95 2.74]
station position repeatability [mm]	Mean 3D repeatability = 8.63	Mean 3D repeatability = 10.20	Mean 3D repeatability = 10.09
baseline length repeatability [mm]			
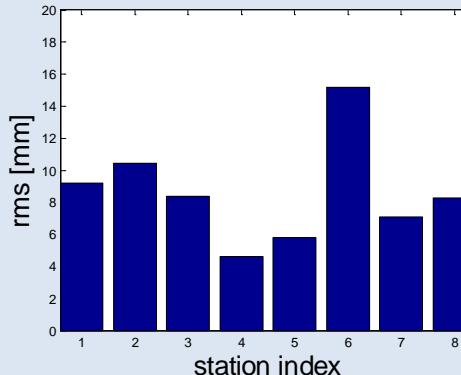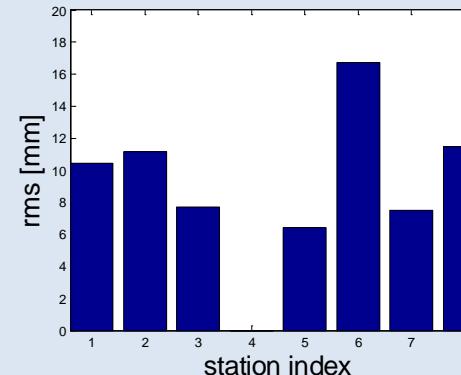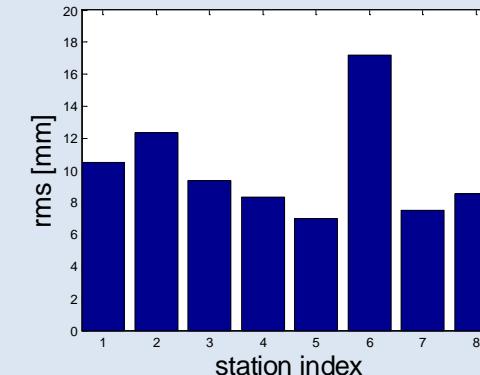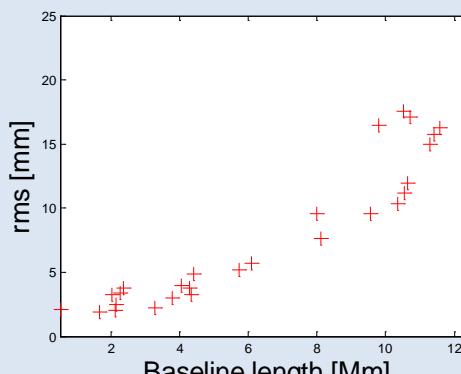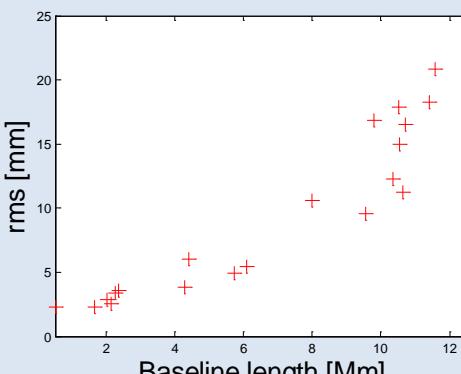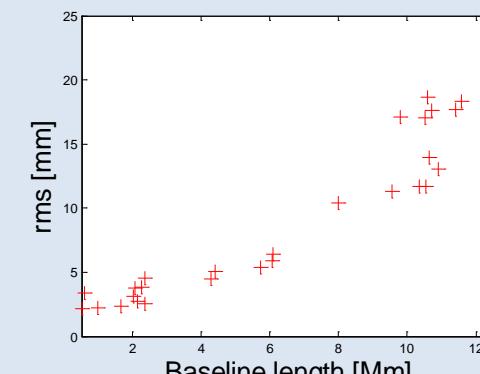
○ Covariance analysis

   ----- optimization criteria

○ More analyses and comparisons

   ----- with sked, sched and other scheduling packages

○ Spacecraft tracking

○ ...

- VIE_SCHED is a new scheduling program written in Matlab, which is a part of VieVS software.

- Results of similar quality as from sked package.

- VIE_SCHED is also available free of charge to registered users.

THE END

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