



VieVS

Vienna VLBI and Satellite Software

Results with the scheduling software VieSched++

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Motivation

- scheduling is an integral part of every VLBI session
 - directly determines which observations are available for analysis
- obvious that great care should be taken while scheduling
- almost all schedules created using sked
 - we have created a new scheduling software written in C++
 - modern, easy to use, flexible and very good

Features (for more info see Schartner IVS-GM18 proceedings)

- recursive scan selection
- sophisticated optimization criteria
- automated iterative source selection
- multi-scheduling feature
 - generate hundreds of schedules per session
 - simulate sessions with VieVS
 - compare schedules and pick best one
 - highly automated
- graphical user interface
 - many quality of life improvements
 - multiple analysis and comparison tools
- easy installation
 - no need to build anything (Windows 10, Ubuntu 18.04)
 - but if you want we provide CMake and QMake scripts

Schedules

Multiple sessions were already scheduled using VieSched++:

- AUA (035, 037, 040, 041, 044, 047)
- AUM (001 - 010)
- T2 (129, 130, 131)
- EURR&D (09)
- EUR (149)
- OHG (117)
- INT3 (021, 028, 035, 042, 049, 056, 063, 077, 084)

Non IVS:

- EINT (001 - 012)
- INT9 (059, 066) → see next talk by Christian Plötz

Schedule summary

- T2
 - high number of stations 15-22
 - almost no stations in the south (Oh, Ht)
 - low observing rate 128 Mbit/s
 - some stations very low sensitivity (Oh, Sy, K1)
 - difficult to include Oh
- EURR&D
 - only European stations (6-8 stations)
 - observing rate 512 Mbit/s
- INT3
 - 4-5 stations
 - high observing rate 1024 Mbit/s

T2 comparison

	#sta	#scans	#obs	%idle	%obs	#obs Oh
T2123	19	617	6773	30.98	50.46	79
T2124	17	733	7175	28.10	44.54	22
T2125	17	1064	5528	22.94	53.70	48
T2126	17	1075	6081	24.55	49.66	98
T2127	19	627	6304	34.30	45.22	73
T2128	18	803	5983	26.24	44.90	97
T2129	15	526	12713	8.20	66.90	400
T2130	22	626	16730	10.45	69.24	451
T2131	19	771	15714	4.33	73.68	267

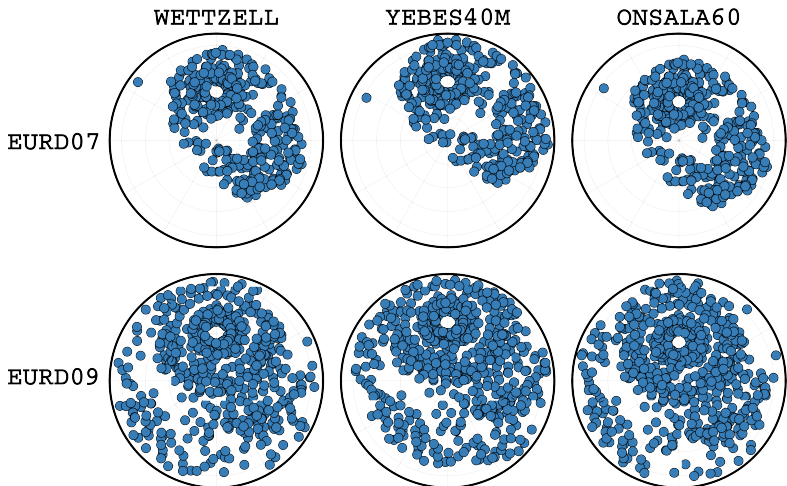
VieSched++: high number of observations, low number of scans, low idle time, high observing time, good integration of Oh

EURR&D comparison

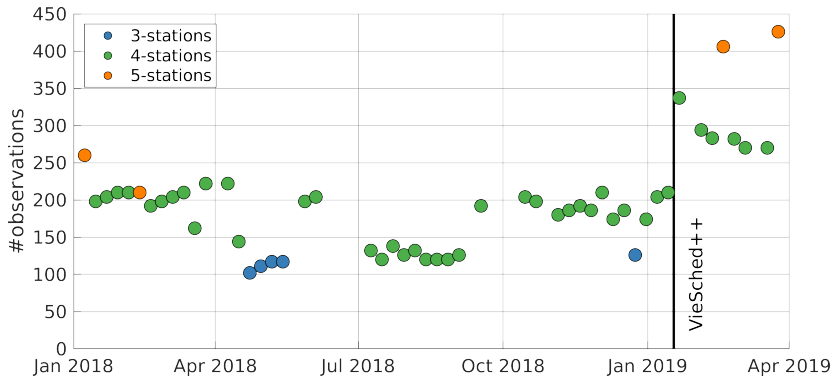
	#sta	#scans	#obs	%idle	%obs
EURD05	8	374	10134	25.00	39.97
EURD06	6	538	8061	21.63	30.87
EURD07	8	344	9437	36.42	29.40
EURD08	7	361	7215	25.78	33.08
EURD09	8	665	11565	5.78	39.03

VieSched++: high number of observations, high number of scans, very low idle time
 main difference → sky coverage

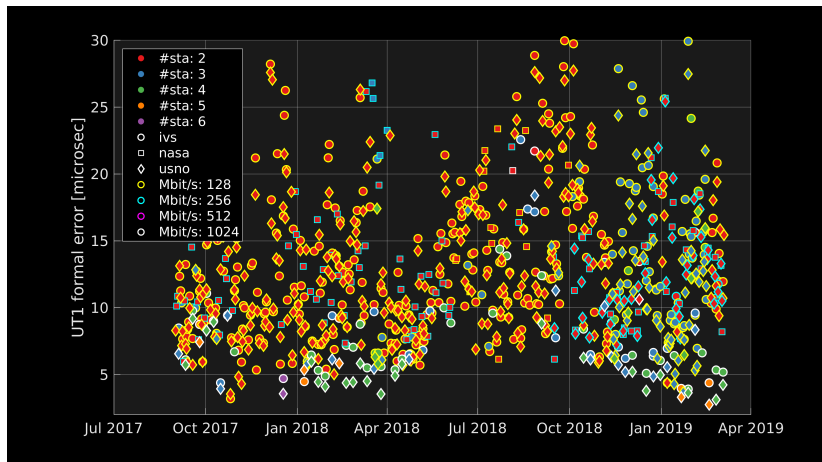
EURR&D sky coverage



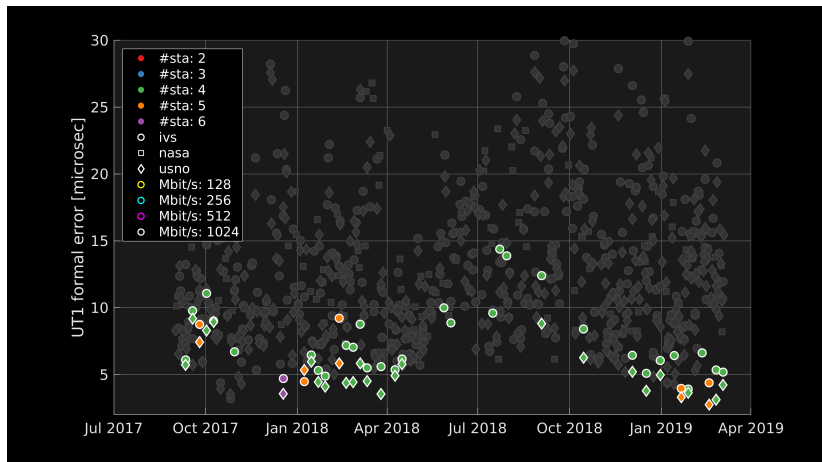
INT3 #observations



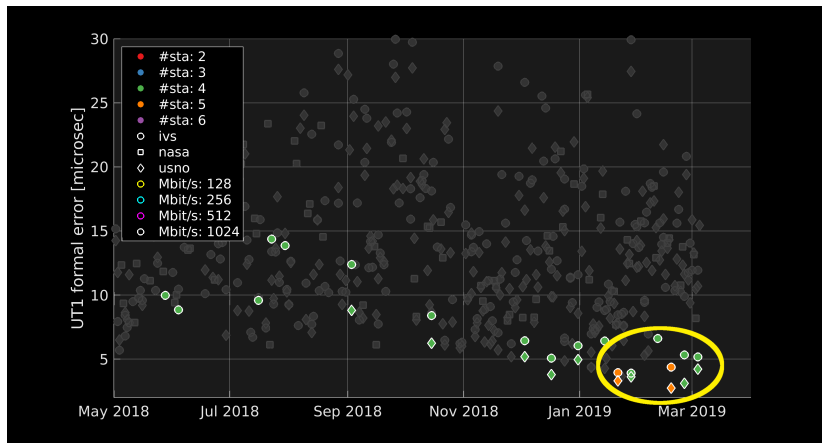
INT3 comparison



INT3 results



INT3 results



Outlook

VGOS/Mixed mode schedules:

- support for different frequency setups per station
- no limitation to SX only
- **mixed mode test: CONT17 XA + XB + Broadband:**
XA: 256 Mbps, XB: 512 Mbps, Broadband: 2Gbps
total: 36 stations, ≈ 125.000 observations (→ talk Böhm)
- we need more expertise for VGOS/Mixed mode
- curious how official catalogs evolve...

Satellite scheduling:

- implementing satellite observations (by Helene Wolf)
- support multiple observing modes per session

Many more ideas and plans... 😊

Conclusion

- **VieSched++** can be used to create high-quality schedules
- we had great success with several session types
- it is very easy to install and use
- available at <https://github.com/TUW-VieVS>

my recommendation

- do not schedule every session the same way
- use multi-scheduling tool to select good parameters
- simulate schedules

multi-scheduling approach

scheduling software is only as good as simulation software!

Posters related to VieSched++

during the developing of our algorithms we have created **several thousand schedules** and **many million simulations...**

scheduling and simulation

- **P207:** In-depth analysis of schedules optimized for certain VLBI experiments using VieSched++
- **P208:** Impact of different observing rates on geodetic results
- **P303:** AUA047 - Students at TU Wien organize their own VLBI session (by Helene Wolf)