

AuScope VLBI Dynamic Observing: Dynamic Scheduling Simulation Results

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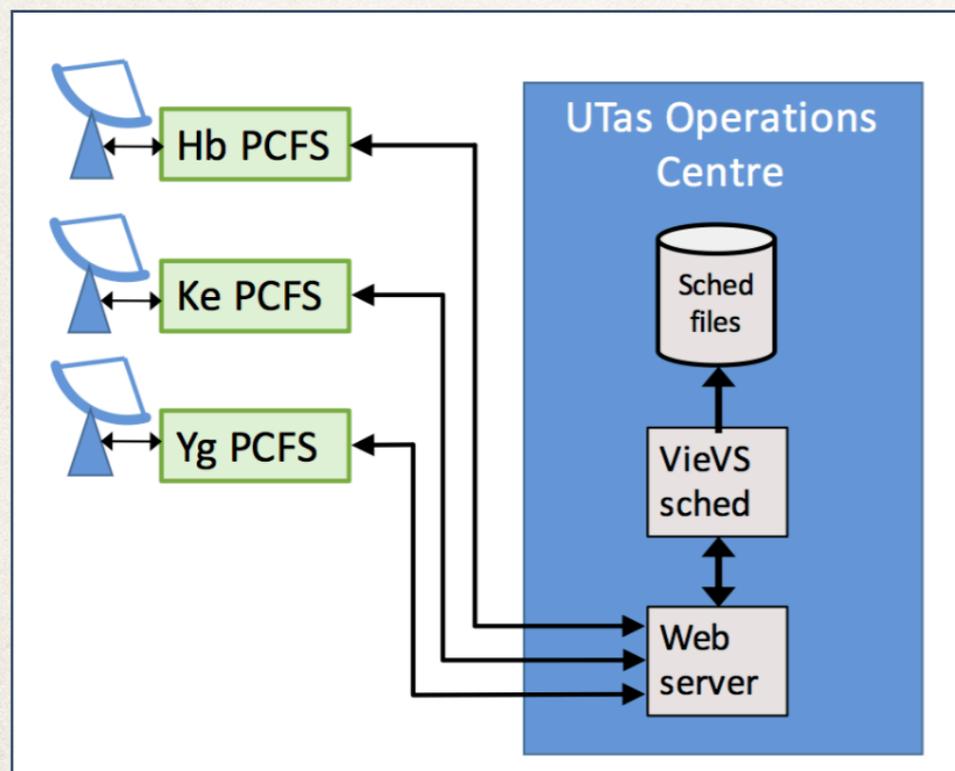
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Dynamic Observing

- ◆ The aims are:
 - **automation**
 - to coordinate simultaneous observing programs.
 - improve feedback throughout the system.
 - be completely adaptable to last-minute changes.
 - allowing each site to have full control by running operations locally.

- ◆ Successful proof-of-concept with AuScope and the 15 m antenna at Hartebeesthoek in South Africa.



Session Name	Antennas	Observation Time Range in 2016 (day/UT)	Extracted Session Time Ranges
ds239	Hb Ke Yg	240/0126 - 242/0250	240/0126 - 240/2359 241/0000 - 241/2359
ds258	Hb Ke Yg	257/2312 - 258/2237	257/2312 - 258/2232
ds275	Hb Ke Yg	275/0027 - 276/2300	275/0027 - 275/2359 276/0000 - 276/2300
ds288	Hb Ke Yg	288/2346 - 291/0354	289/0300 - 290/0259 290/0300 - 291/0259
ds317	Hb Ht Ke Yg	317/0100 - 319/0201	Awaiting correlation
ds337	Hb Ht Ke Yg	337/1942 - 339/2147	337/2322 - 338/2247 338/2248 - 339/1846
ds351	Hb Ke Yg	350/2349 - 354/0003	351/0001 - 351/2359 352/0000 - 352/2359

Dynamic Scheduling

- ◆ Currently allows almost real-time assessment and allocation of resources (~10 minute update intervals).

	HOBART12	KATH12M	YARRA12M	HARTRAO	HART15M
Availability	Available	Available	Available	Unavailable	Available
Timestamp	2017-05-27 02:41:48	2017-05-27 02:41:57	2017-03-20 03:34:05	2016-08-17 05:42:26	2017-05-28 03:18:57
Status	slewing	tracking	tracking		
Schedule	r4795hb	r4795ke	r4795yg	none	none
Log	r4795hb	r4795ke	r4795yg	station	station
Halted?	no	no	no	yes	no
Scan name	160-0537	160-0538a	160-0538a	100-1431	339-1444
Next command	05:36:57	05:38:11	05:38:11	16:14:48	04:22:11
Source	0434-188	cta26	cta26		
Az	275.9946	276.4477	296.0773		
EI	34.4179	30.0320	41.1463		



Dynamic Scheduling as a Tool to Maximise Capabilities of AuScope VLBI and Global Networks

Background

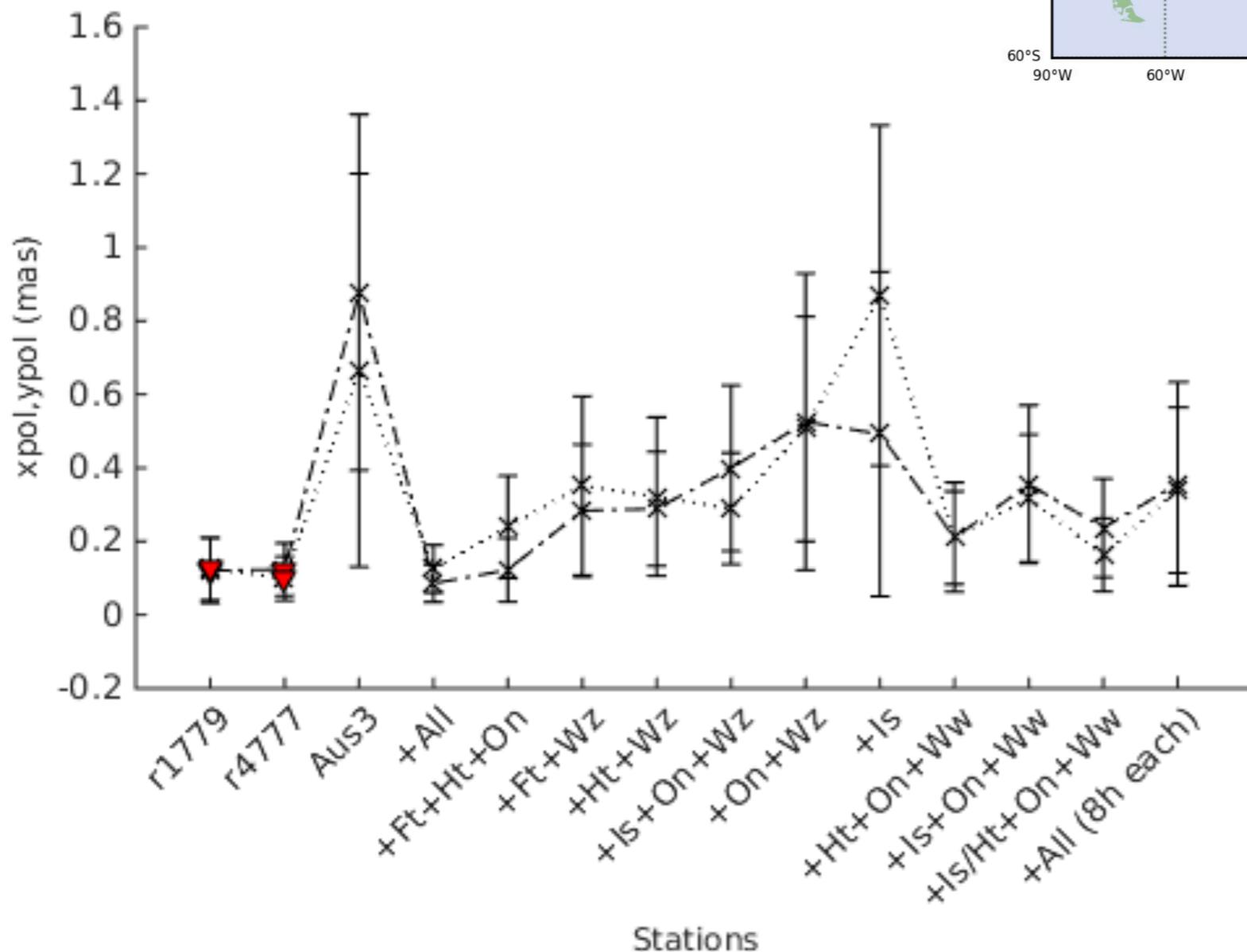
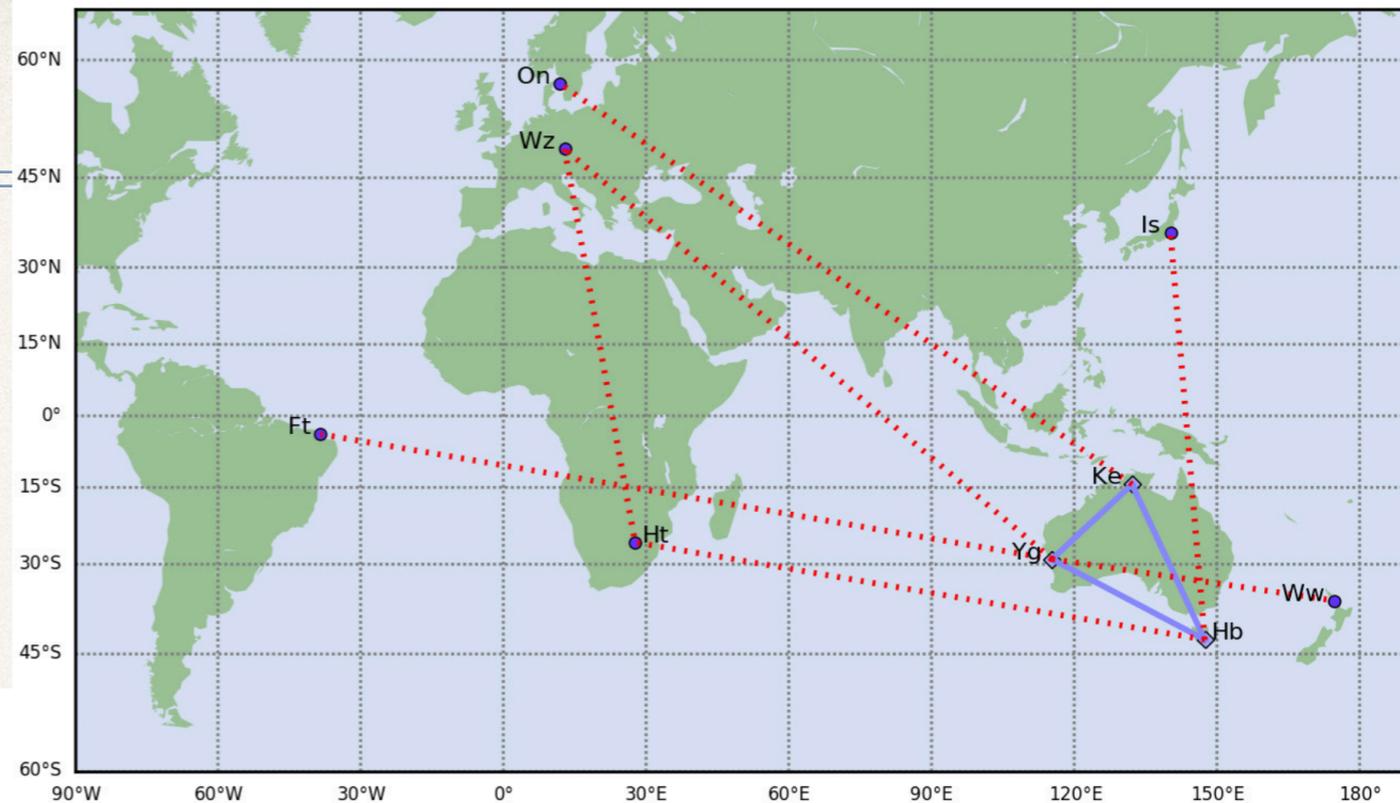
- ♦ Observationally it works, but what can we really do with it?
 - With the AuScope network; or
 - On a global scale?

- ♦ Using VieVS, VGOS simulation with turbulence, noise and clock but at 1 Gbps data rate:
 - A schedule was created;
 - Simulated 50 times;
 - The least squares method was applied;
 - A result was generated for each of the 50 cases;
 - Statistical analysis in MATLAB.



A Global Network

- ◆ The AuScope network has traditionally struggled to produce precise EOP results as it relies on comparatively short baselines (Plank et al., 2016).



- ◆ The dynamic scheduling process can be used to augment the 3 Australian stations with additional global stations for more precise results.

Summary

- ◆ Dynamic scheduling allows flexibility and adaptability in the scheduling process - automation for optimisation.
- ◆ With 6 additional stations, the 'global network' is able to reproduce EOPs of an R1 / R4 standard.
- ◆ Significant improvement to EOP results with only two additional stations even with non-continuous contribution.
- ◆ Yet to determine the limit to dynamic scheduling's capabilities...



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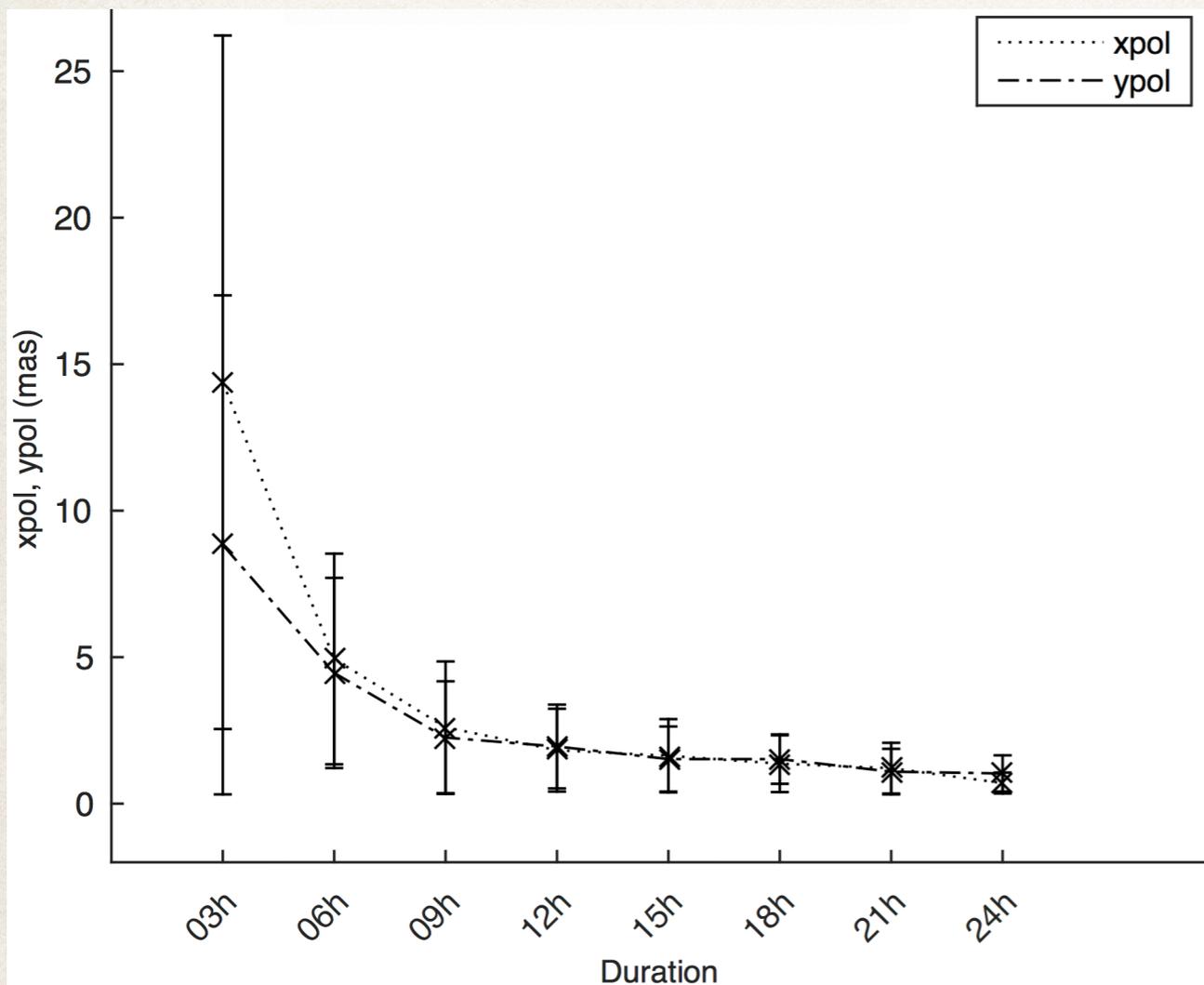


– Thank You –

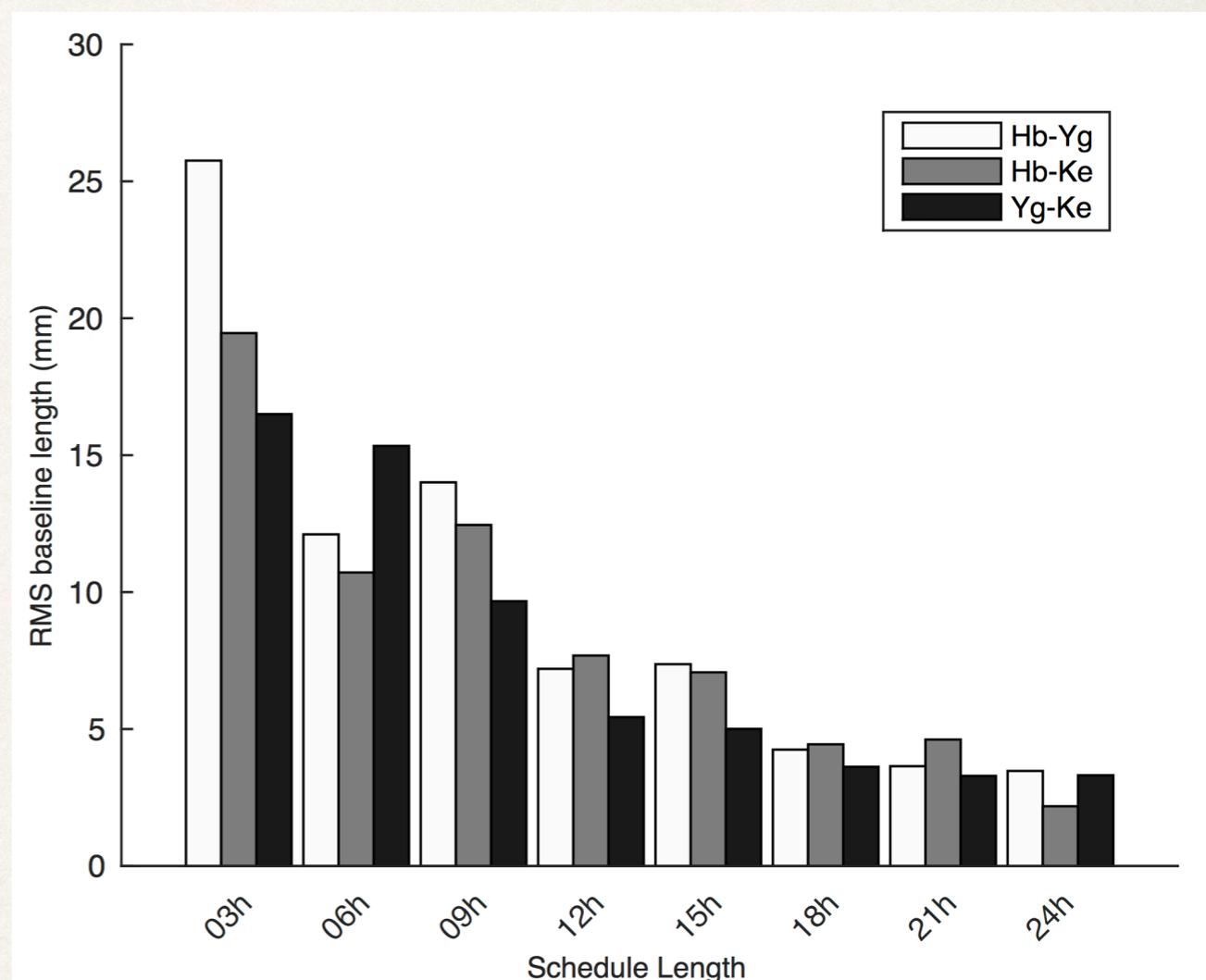
auscope.phys.utas.edu.au/opswiki

Continuous Schedules

- ❖ It is common practice to schedule for 24 hours, well in advance of observations.



- ❖ EOP parameters xpol and ypol results after a variety of schedule durations.



- ❖ Baseline repeatabilities for the 3 baselines after a variety of schedule durations.

Interrupted Schedules

- ❖ In real experiments is not always possible to observe without interruption for 24 hours.
- ❖ Schedules with a long solid break in the middle show the worst baseline results by far (cut6126, cut4154).

