

NEXPRes

**Where should
we invest our money?**

**Waar moet ons
geld naartoe?**

**Europe : où investir
notre argent ?**

**In die Zukunft
investieren – aber wie?**



Use your vote in the European Parliament
Elections on 4 - 7 June.

www.elections2009.eu

Huib van Langevelde, JIVE

EXPRoS Introduced e-VLBI as operational facility



- **Connections work great!**
 - often dedicated light paths
 - Use optimized protocols
- **Closed feedback loop makes e-VLBI more robust**

EXPRoS Introduced e-VLBI as operational facility



Total eVLBI throughput



From 2010-11-23 08:40:00 To 2010-11-24 11:50:00 (CET)

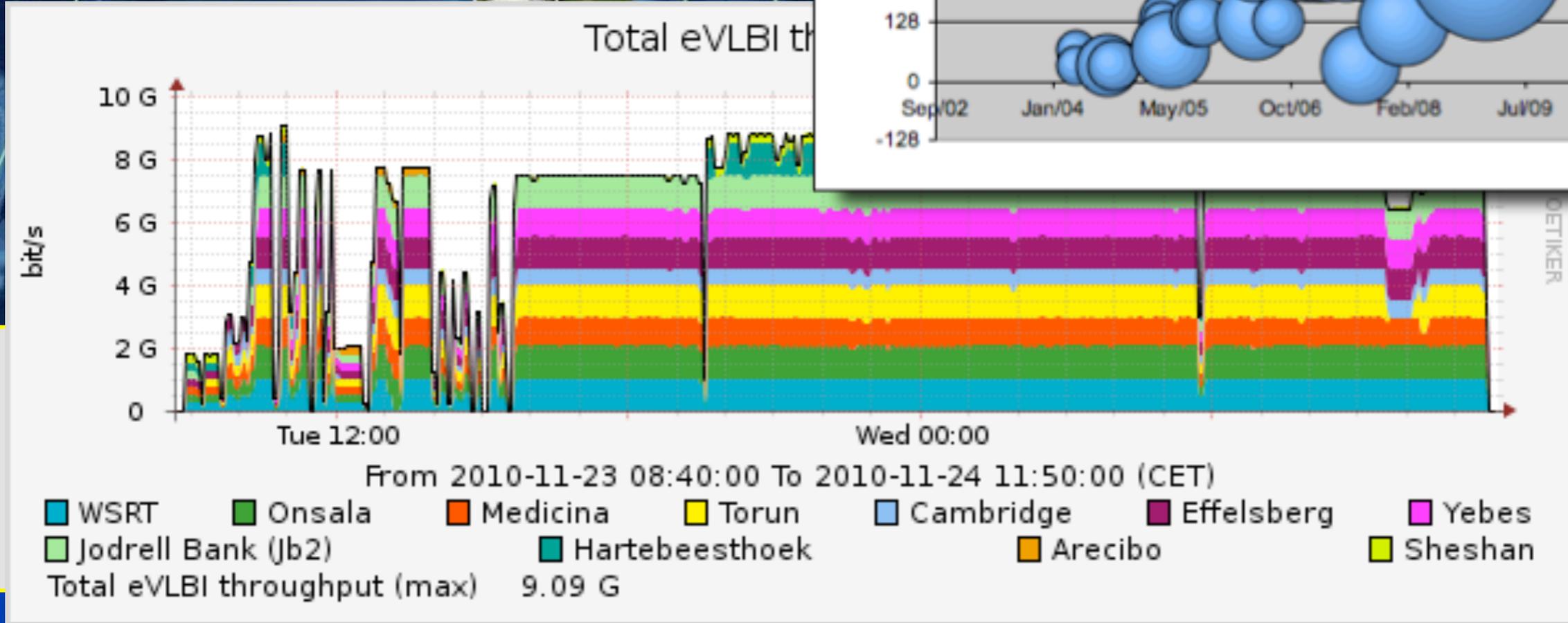
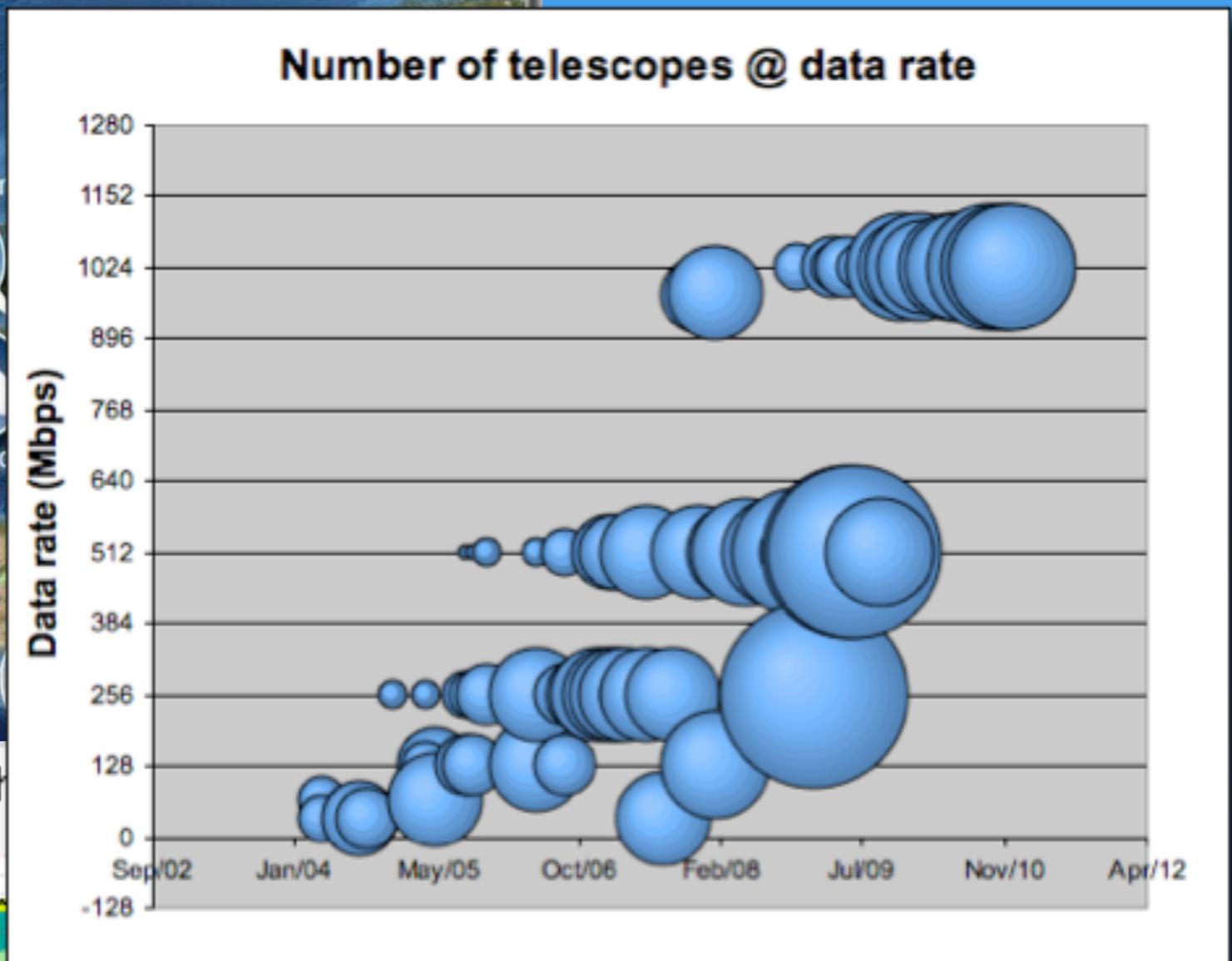
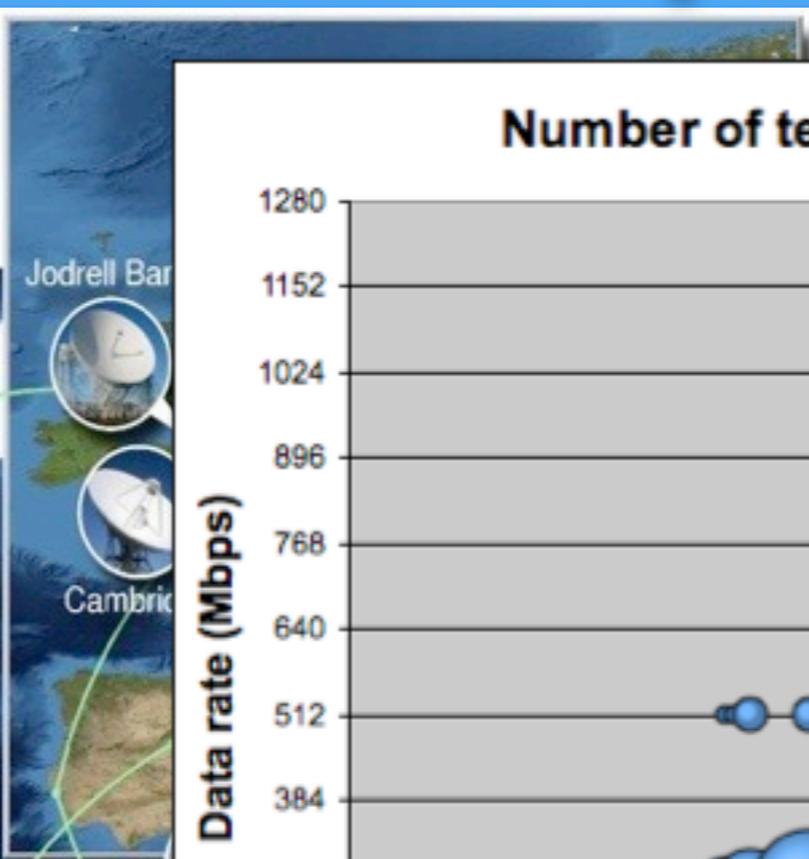
- WSRT
- Onsala
- Medicina
- Torun
- Cambridge
- Effelsberg
- Yebes
- Jodrell Bank (Jb2)
- Hartebeesthoek
- Arecibo
- Sheshan

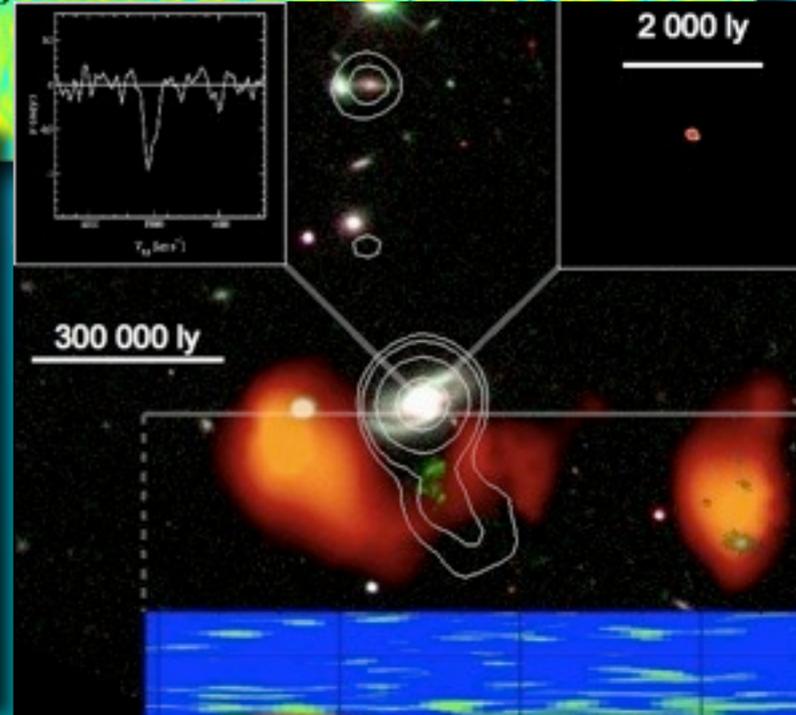
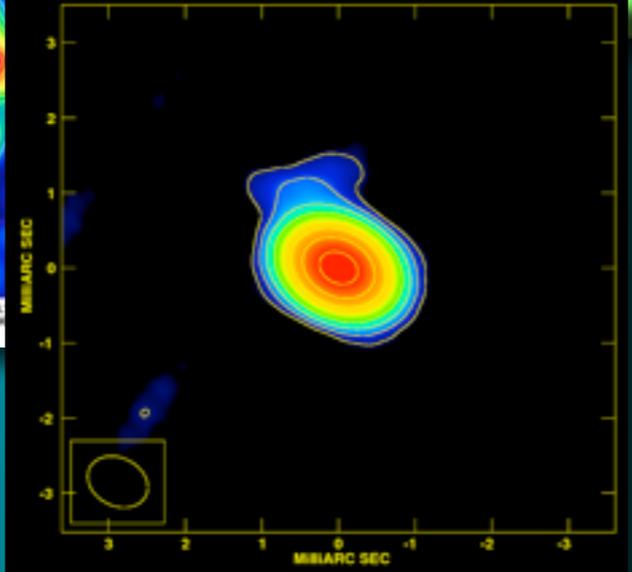
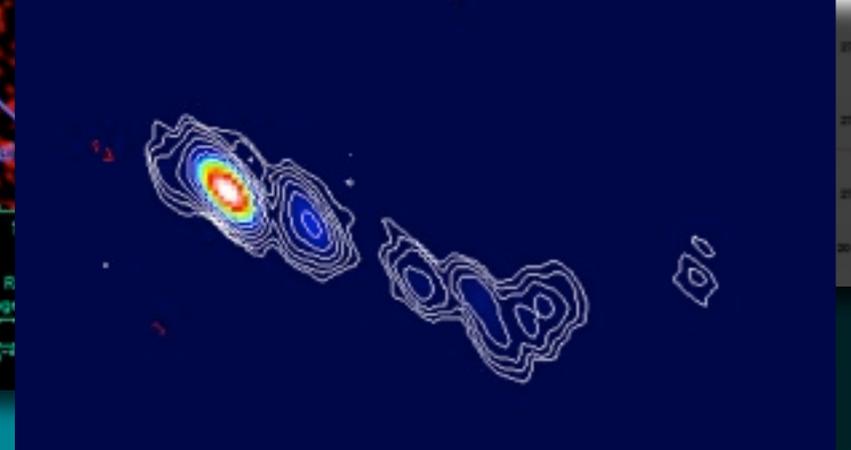
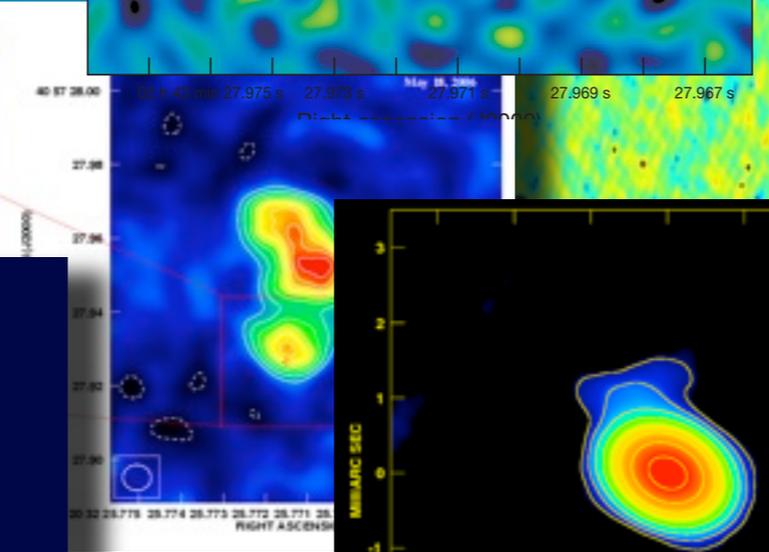
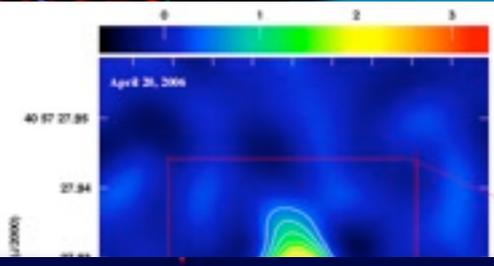
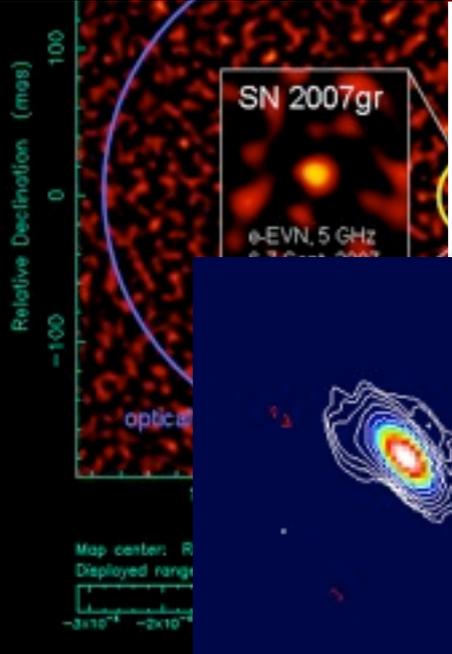
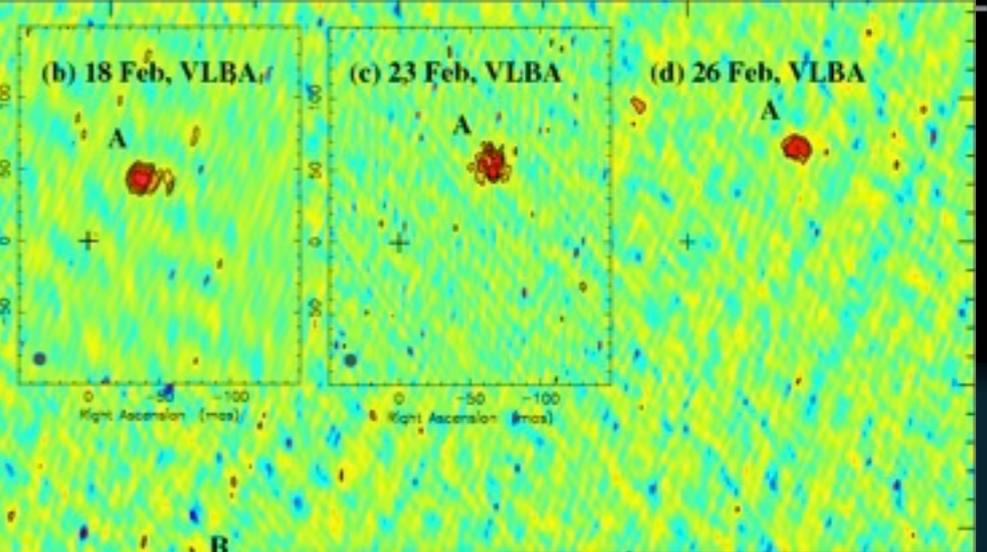
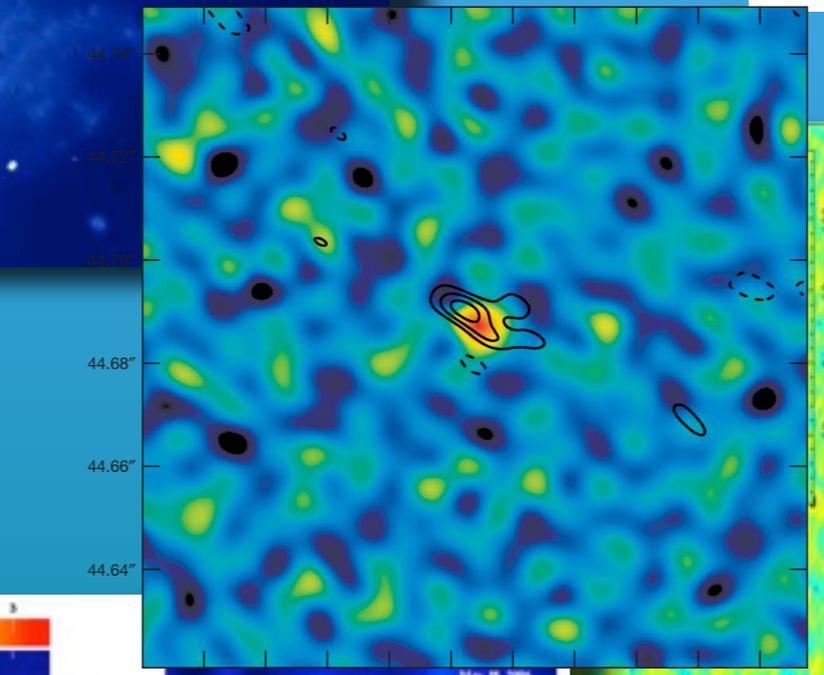
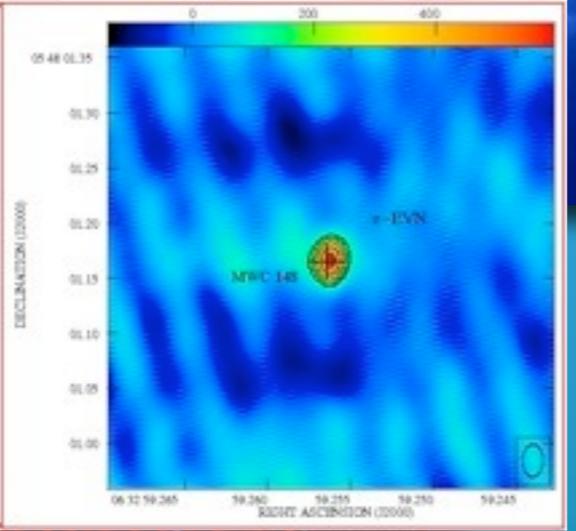
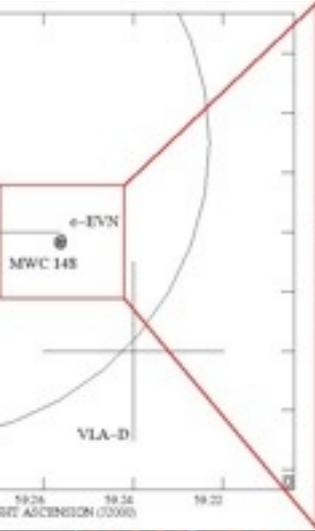
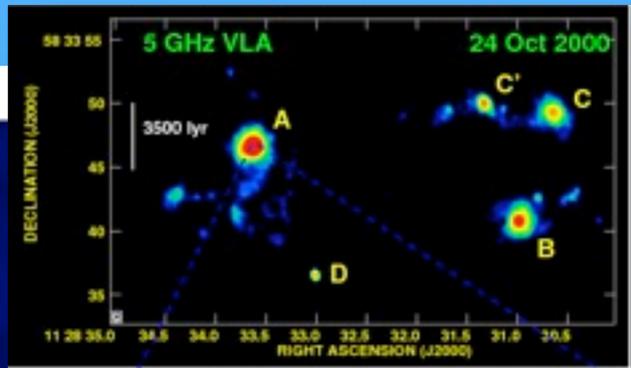
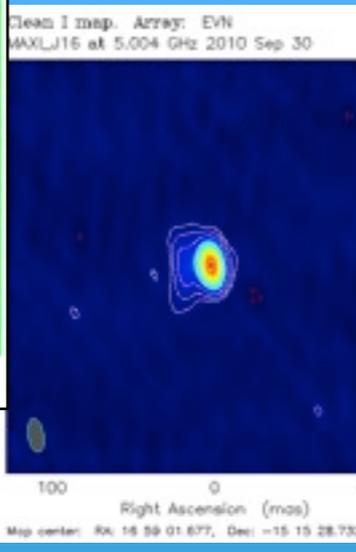
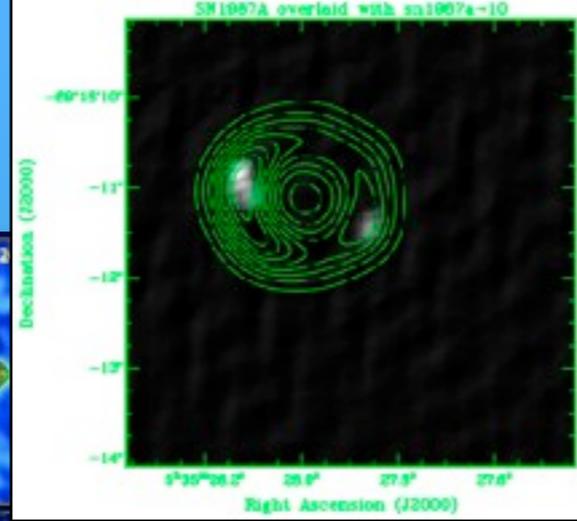
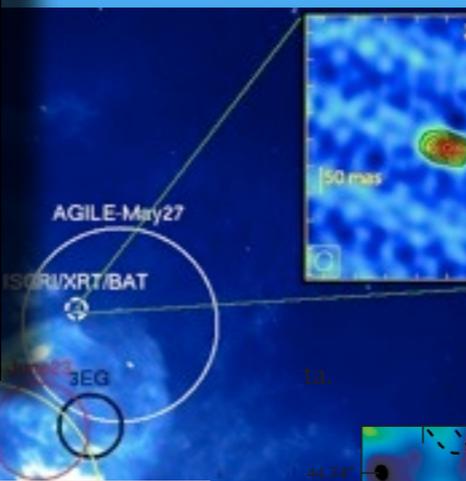
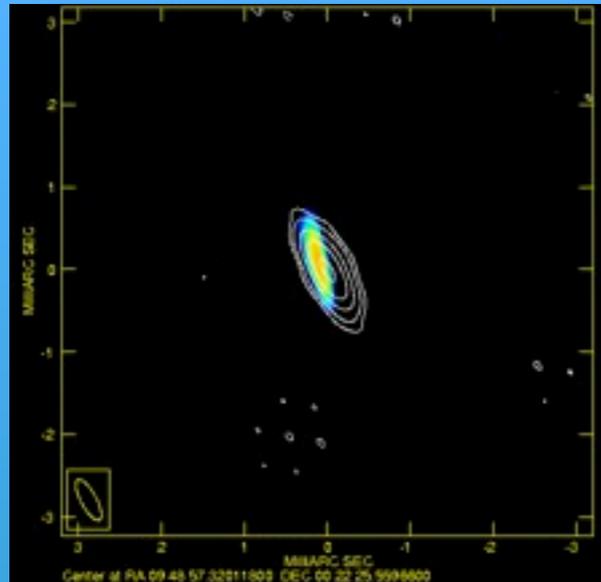
Total eVLBI throughput (max) 9.09 G

RRDTool / TOBI OETIKER

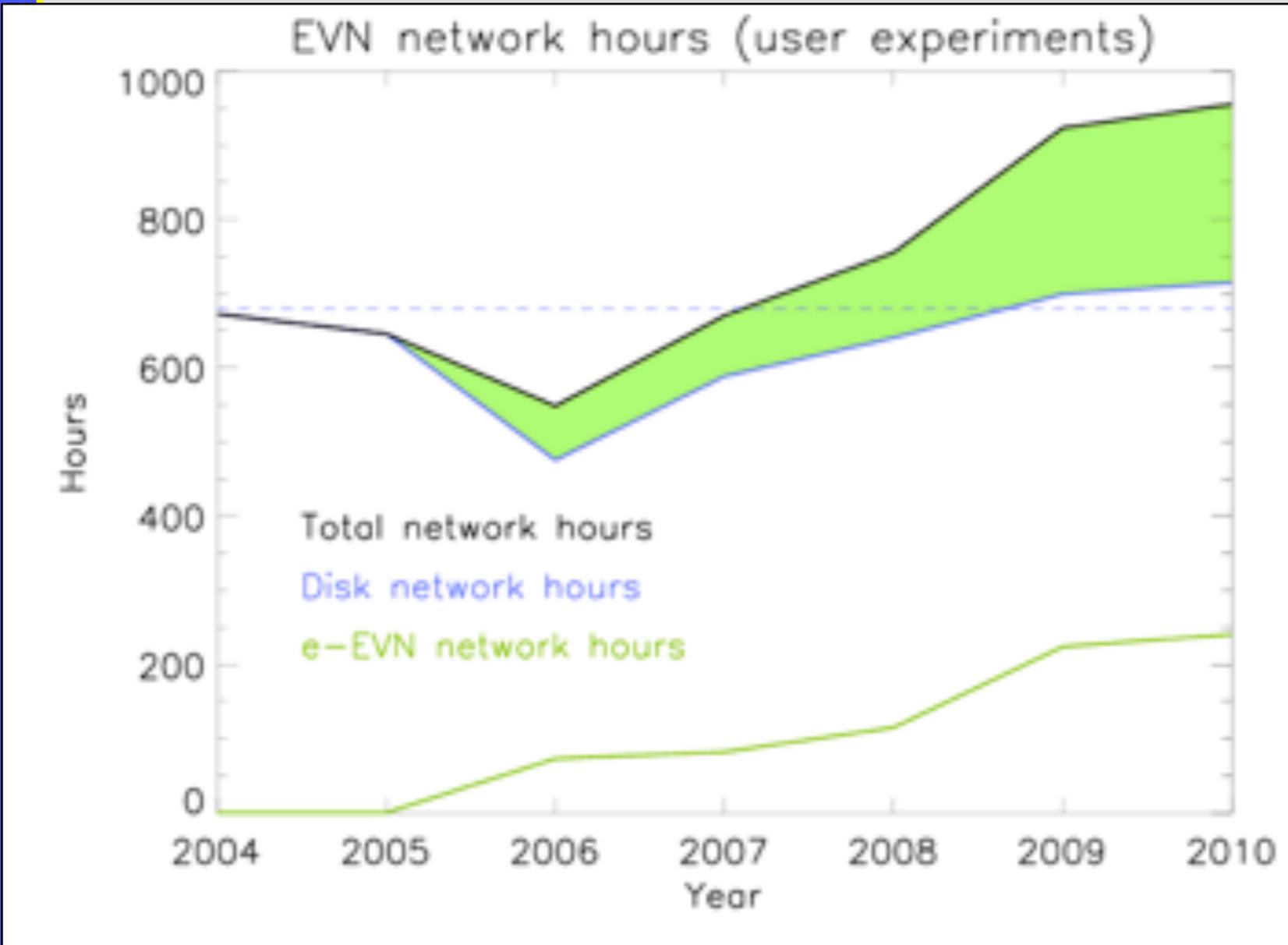


EXPReS Introduced e-VLBI as operational facility

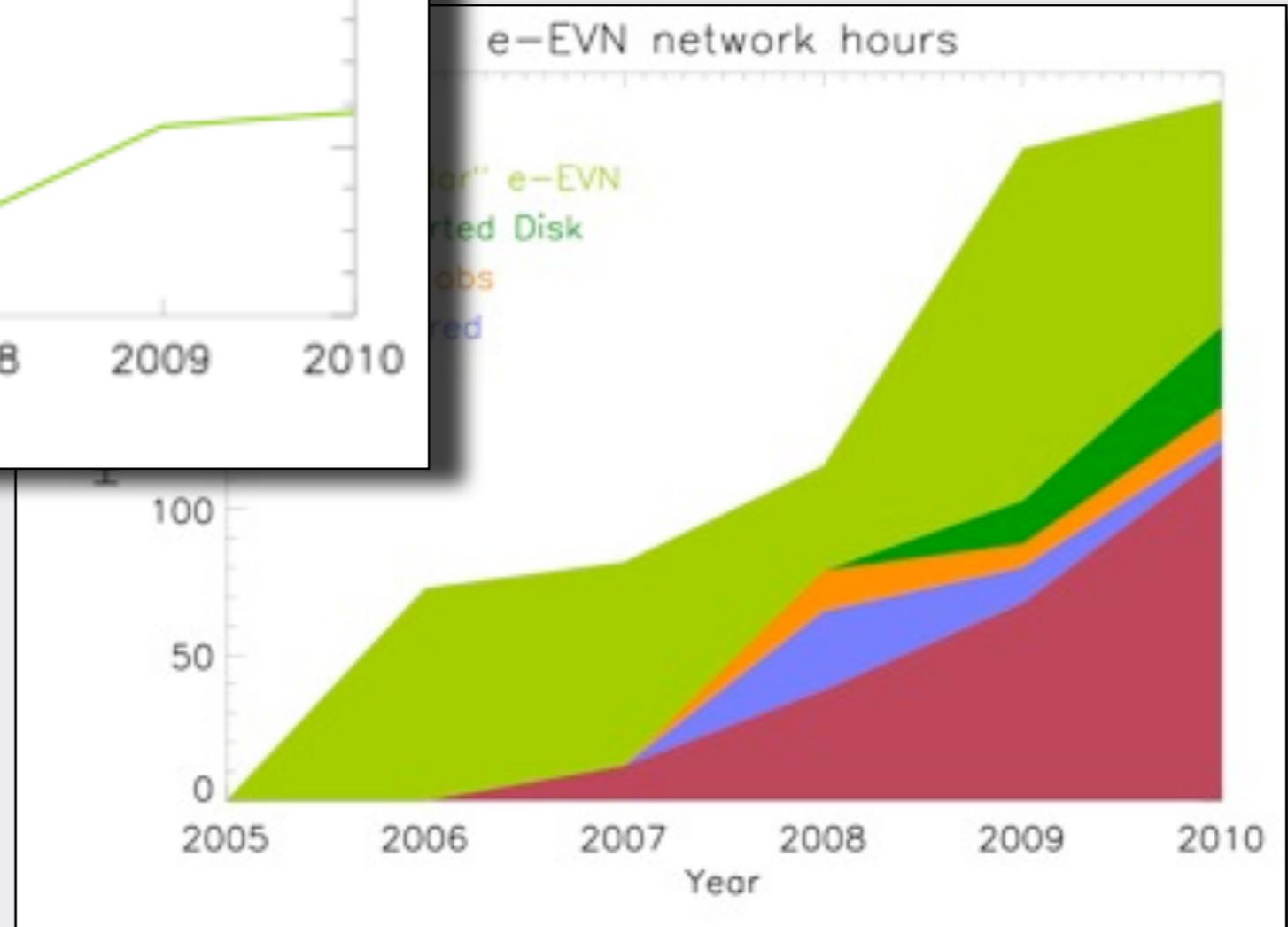




User demand



- Disk-based network hours roughly constant
- 2010 e-EVN network hours now at 240.5
- Total network hours 2010 at 999



ToOs: half (49.5%) of the total e-EVN observing time....



EXPRoS was concluded in Mar 2010



NEXPRoS

*Novel EXplorations Pushing
Robust e-VLBI Services*



Successful NEXPRoS proposal kicked off in July 2010

- Correlate in real time what you can,
- Correlate later what you need

- Allow multiple correlator passes
- Continue to connect more telescopes
- Reliable operations
 - addressed by simultaneous recording
 - Retrofit Mk5AB code
 - Implement Bandwidth on demand
 - Distributed correlation workflow
 - High bandwidth storage solutions
 - and get the best of both worlds
- NEXPRoS maintains expertise
 - Collaborations with NRENs

NEXPreS project info

- **15 partners (cf. 19 in EXPReS)**
 - Of which 3 choose not receive funds from EC
 - Good mix from astronomy-networking-HPC communities
 - High level of partner-contributed effort
- **Kicked off in 2010 with EVN symposium**
 - Had to fit project within 3.5 M€ envelope



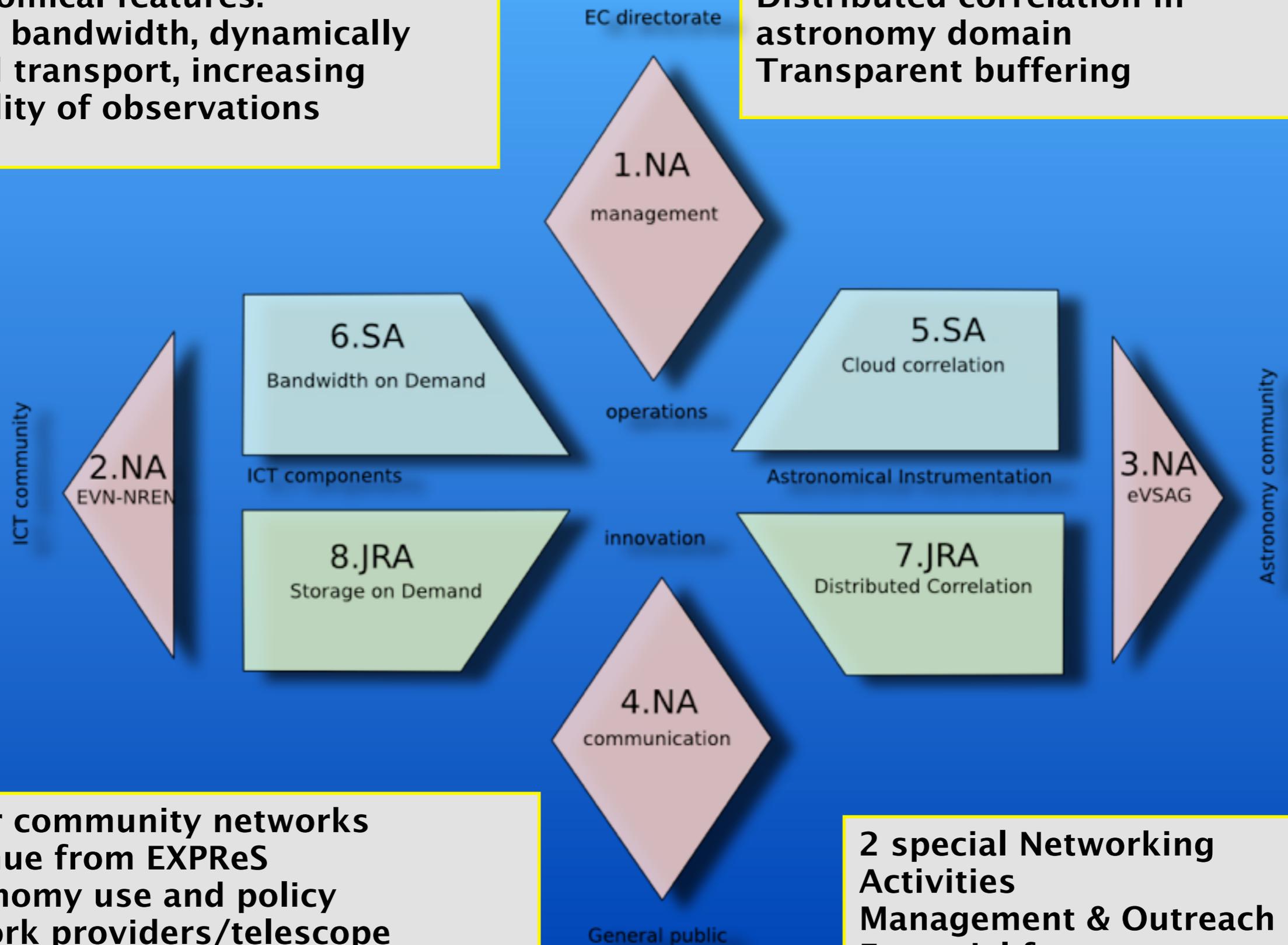
- **Passed Year 1 review with good marks**
 - Some issues on spending profile
 - Metrics of success hard to define
 - And consortium agreement
- **NEXPreS Consortium Agreement now done**
 - Money flowing any day now...

Responsibilities

#	Partner	Management	Coordination	Other	RTD	Total	Requested EC contrib.
		NA 1	NA 2,3,4	SA 5,6	JRA 7,8		
1	JIVE	€326,700	€426,000	€1,356,400	€554,200	€2,663,300	€1,581,240
2	ASTRON	€2,500	€0	€222,877	€339,044	€564,421	€334,390
3	INAF	€0	€0	€0	€259,000	€259,000	€158,250
4	MPG	€0	€0	€135,375	€0	€135,375	€135,375
5	UMAN	€0	€0	€204,540	€126,524	€331,064	€219,113
6	OSO	€0	€0	€63,360	€386,648	€450,008	€287,088
7	VENT	€0	€0	€0	€86,025	€86,025	€52,144
8	FG-IGN	€12,250	€0	€0	€0	€12,250	€0
9	NORDUnet	€0	€0	€214,825	€0	€214,825	€129,145
10	SURFnet	€0	€0	€80,000	€0	€80,000	€0
11	PSNC	€0	€0	€0	€354,400	€354,400	€184,800
12	DANTE	€29,600	€0	€29,600	€0	€59,200	€0
13	AALTO	€0	€0	€54,000	€312,760	€366,760	€229,605
14	TUM	€0	€0	€136,520	€0	€136,520	€109,425
15	CSIRO	€0	€0	€79,425	€0	€79,425	€79,425
Total		€371,050	€426,000	€2,576,922	€2,418,601	€5,792,573	€3,500,000

2 Service Activities
 focus on new operational
 astronomical features:
 Higher bandwidth, dynamically
 cached transport, increasing
 flexibility of observations

2 Joint Research Activities aiming
 at innovating future operations
**Distributed correlation in
 astronomy domain**
Transparent buffering

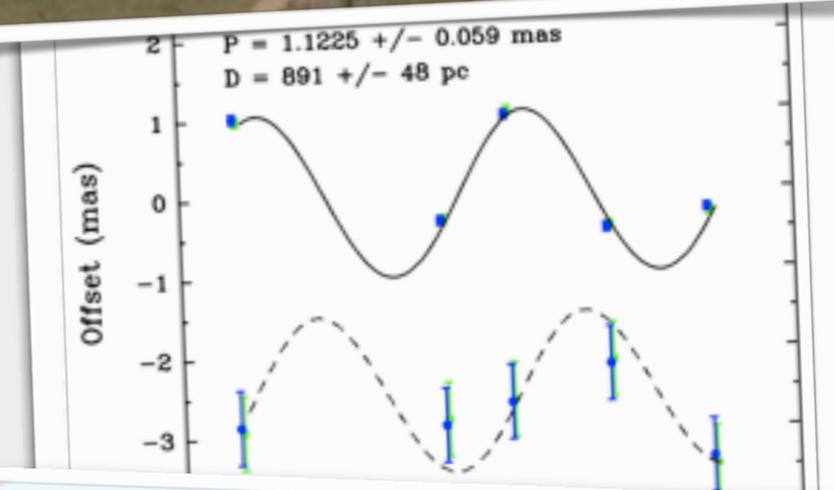


2 user community networks
 continue from EXPRoS
 Astronomy use and policy
 Network providers/telescope
 operators

**2 special Networking
 Activities**
Management & Outreach
Essential for success

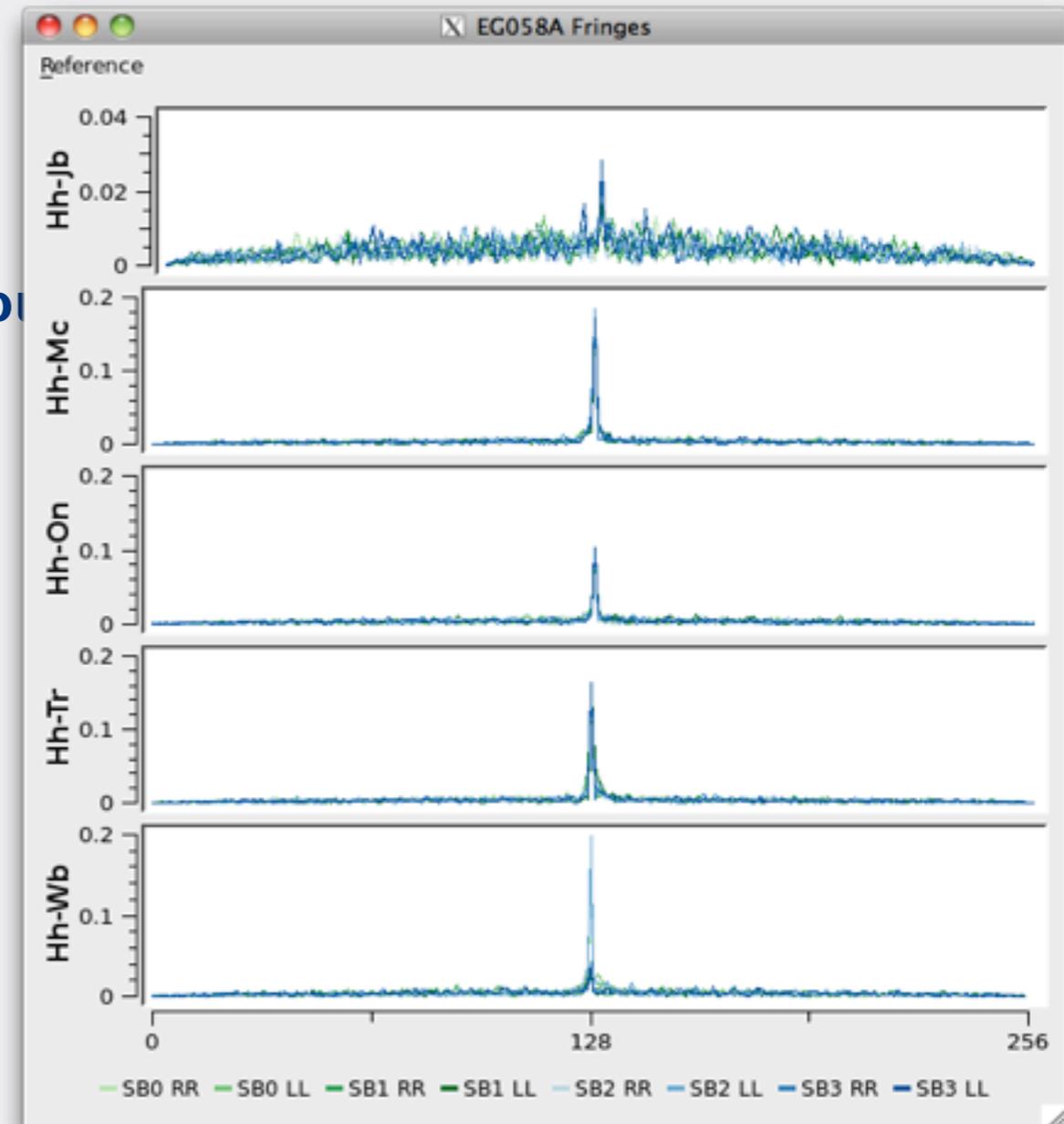
Addressing issues:

- **Want to make all VLBI eVLBI**
 - Correlator passes are a problem
 - Continue to work on correlator solutions
 - Not all telescopes connected
 - Sardinia, Russian, USA
- **Reliable operations**
 - Of all components in the chain
- **Implemented by transparent caching**
 - And get the best of both worlds!
 - Research high bandwidth recording
 - Also useful for future archives
- **Use resources sensibly**
 - Bandwidth on demand strategies
 - Do distributed correlation in own domain
- **Expertise relevant for SKA**
 - collaboration with Network providers



Technical progress

- **First real-time e-VLBI with SFXC**
 - 6 stations @512 Mbit/s
 - August 26th
 - Gracefully deals with stations dropping out
 - Sensitive to equipment errors
 - bad CRCs, dead "tracks"
 - **Now solved!**
 - only invalidate data in affected tracks
- **3 Gbps fringes done!**
 - 11 Oct 2011
 - Sh —Km — (Ur)
 - CDAS/Mk4
- **First experiment with Korea**
 - worked straight out of the box



Technical progress

- **First real**

- 6 stations

- August 2011

- Gracefully

- Sensitive

- bad CR

- Now solved

- only in

- **3 Gbps fr**

- 11 Oct 2011

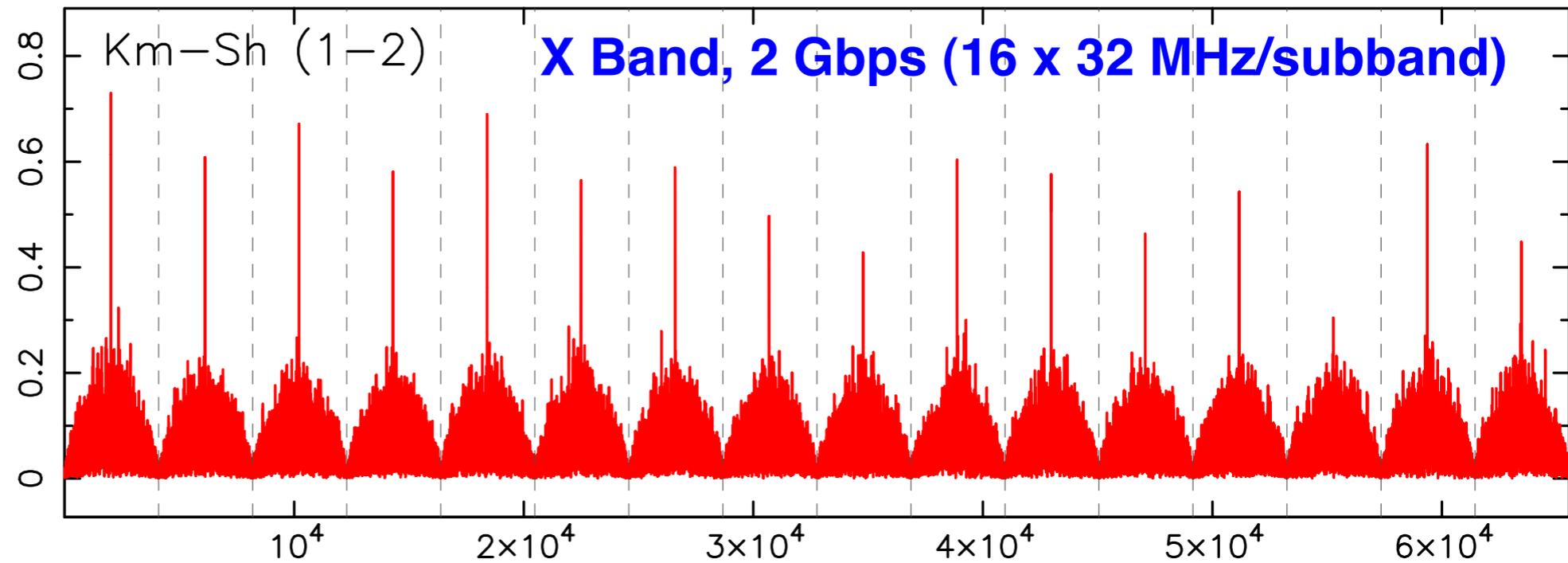
- Sh — Km —

- CDAS/Mk

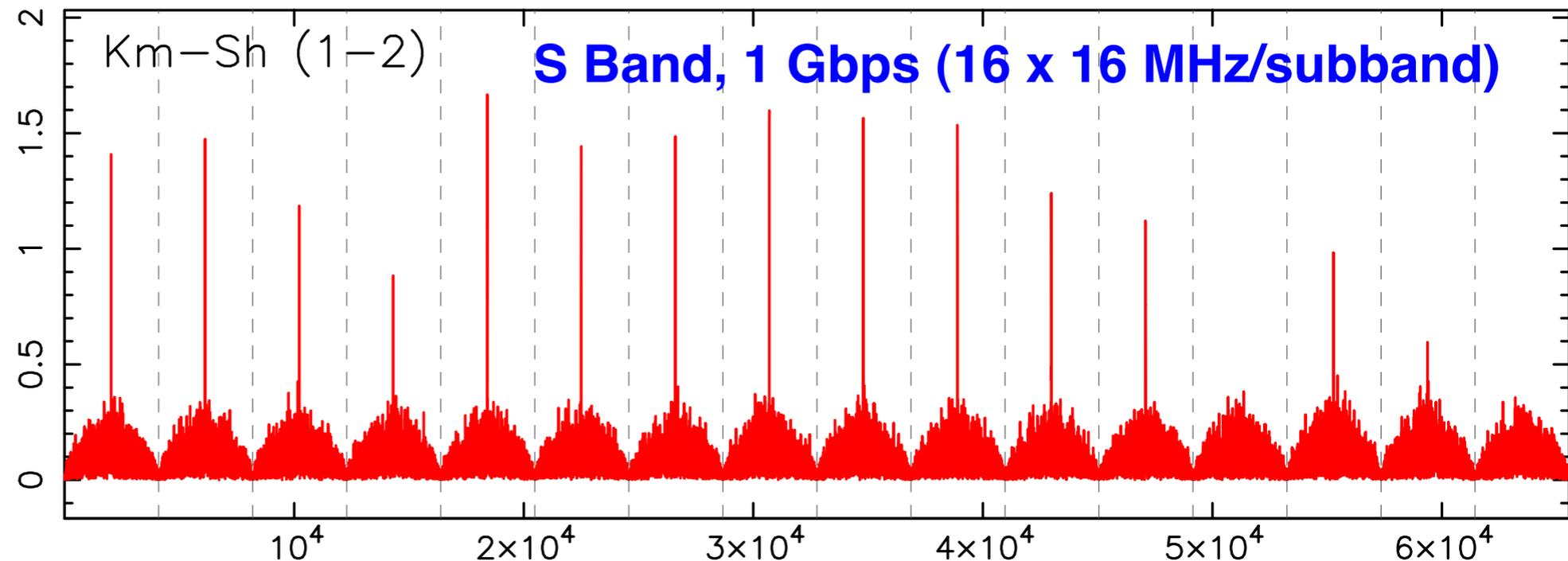
- **First exper**

- worked st

Amplitude for chin06a.ms

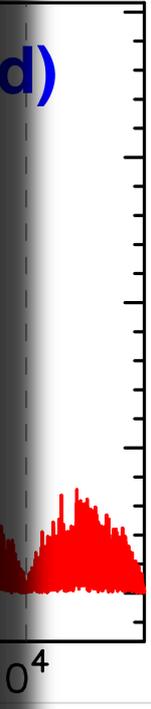
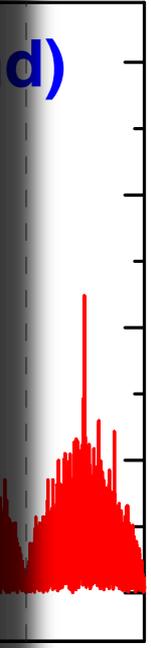
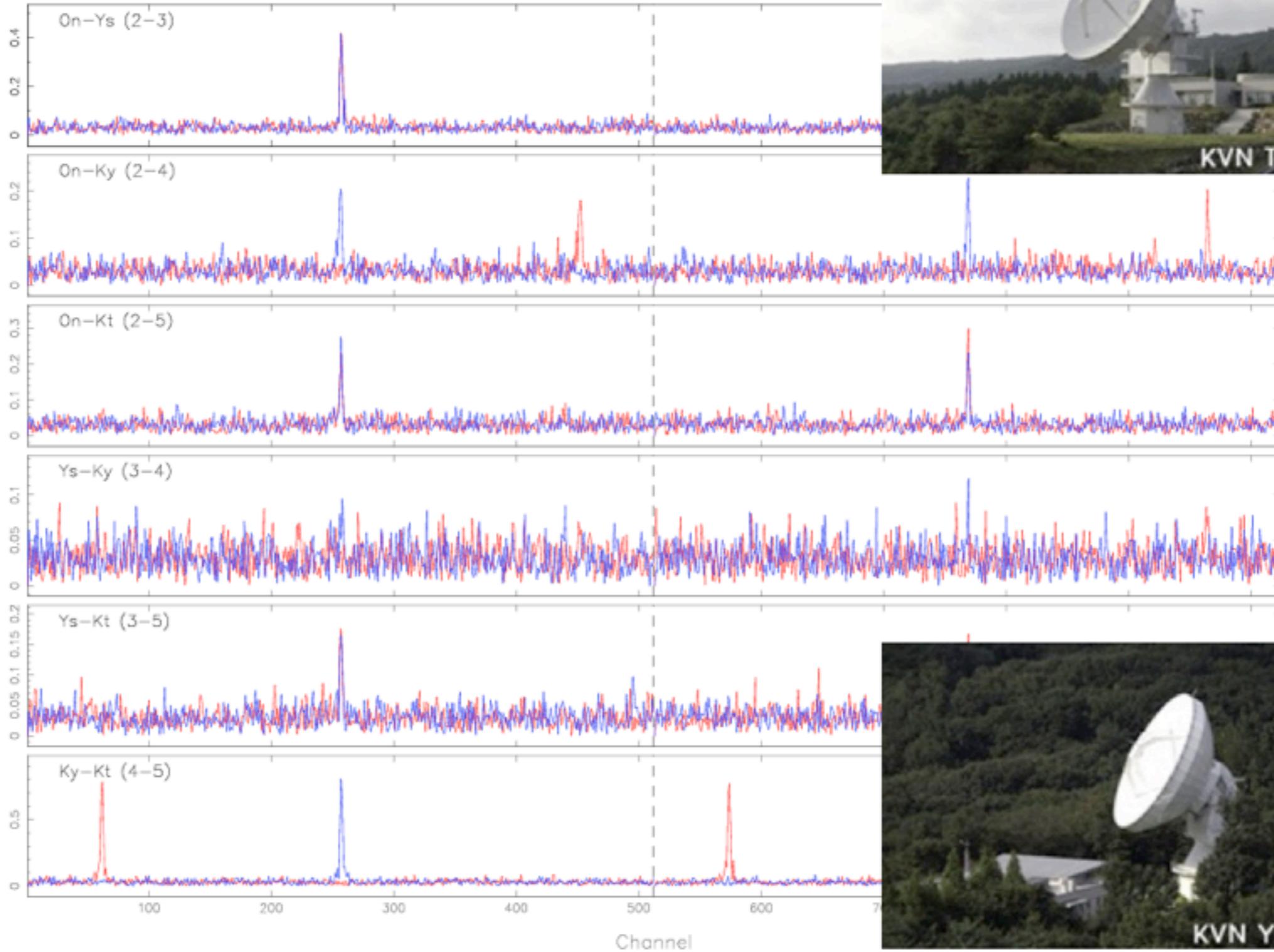


Amplitude for chin06b.ms



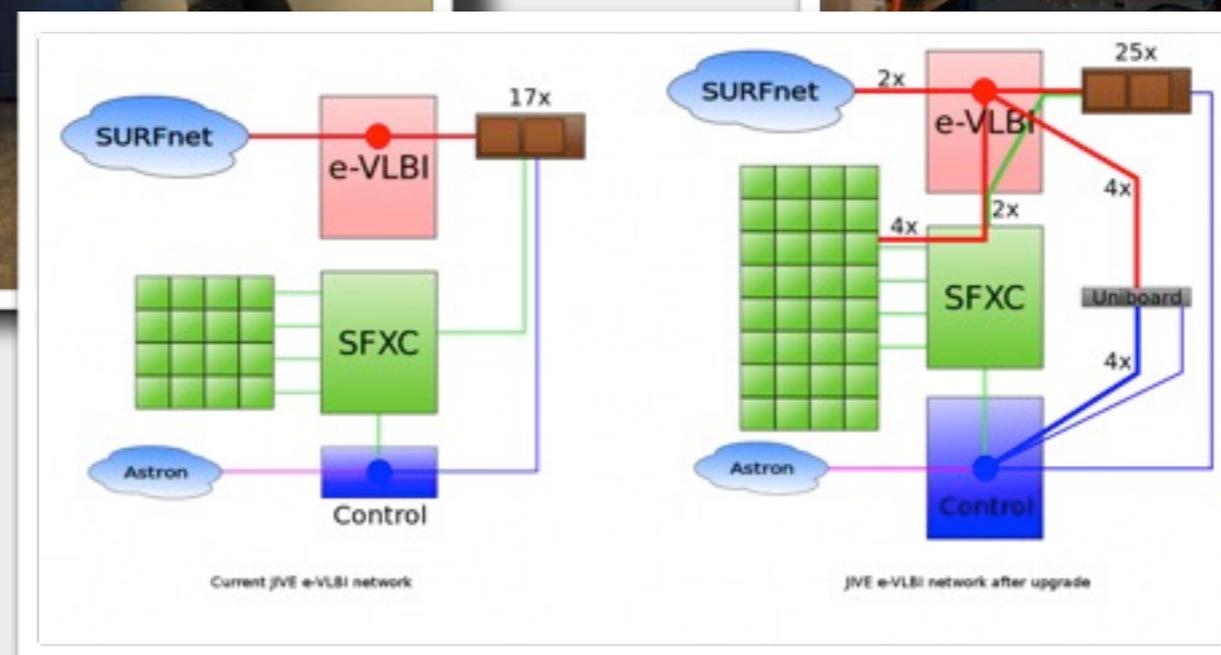
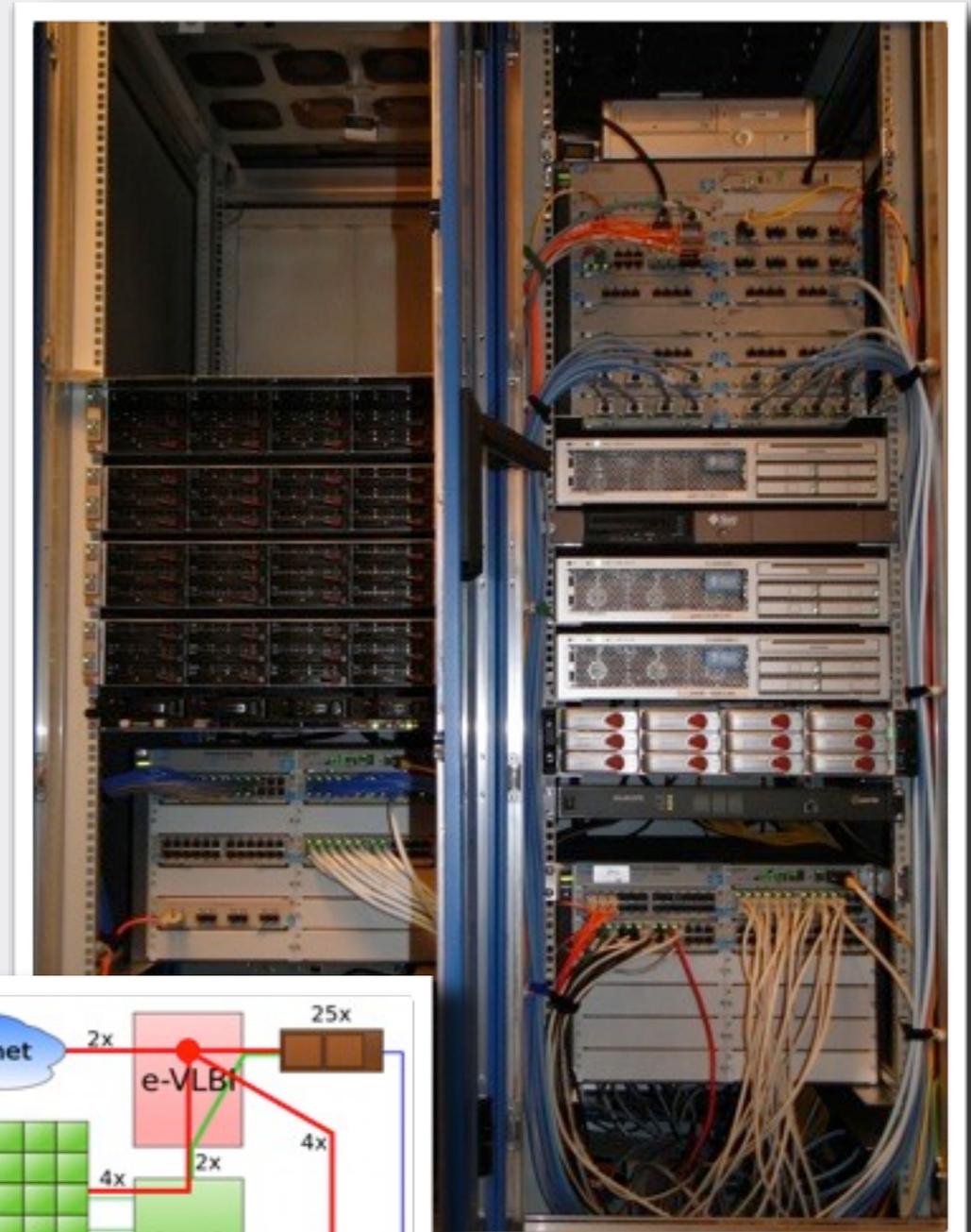
Technical progress

Amplitude for kvn.2sbL



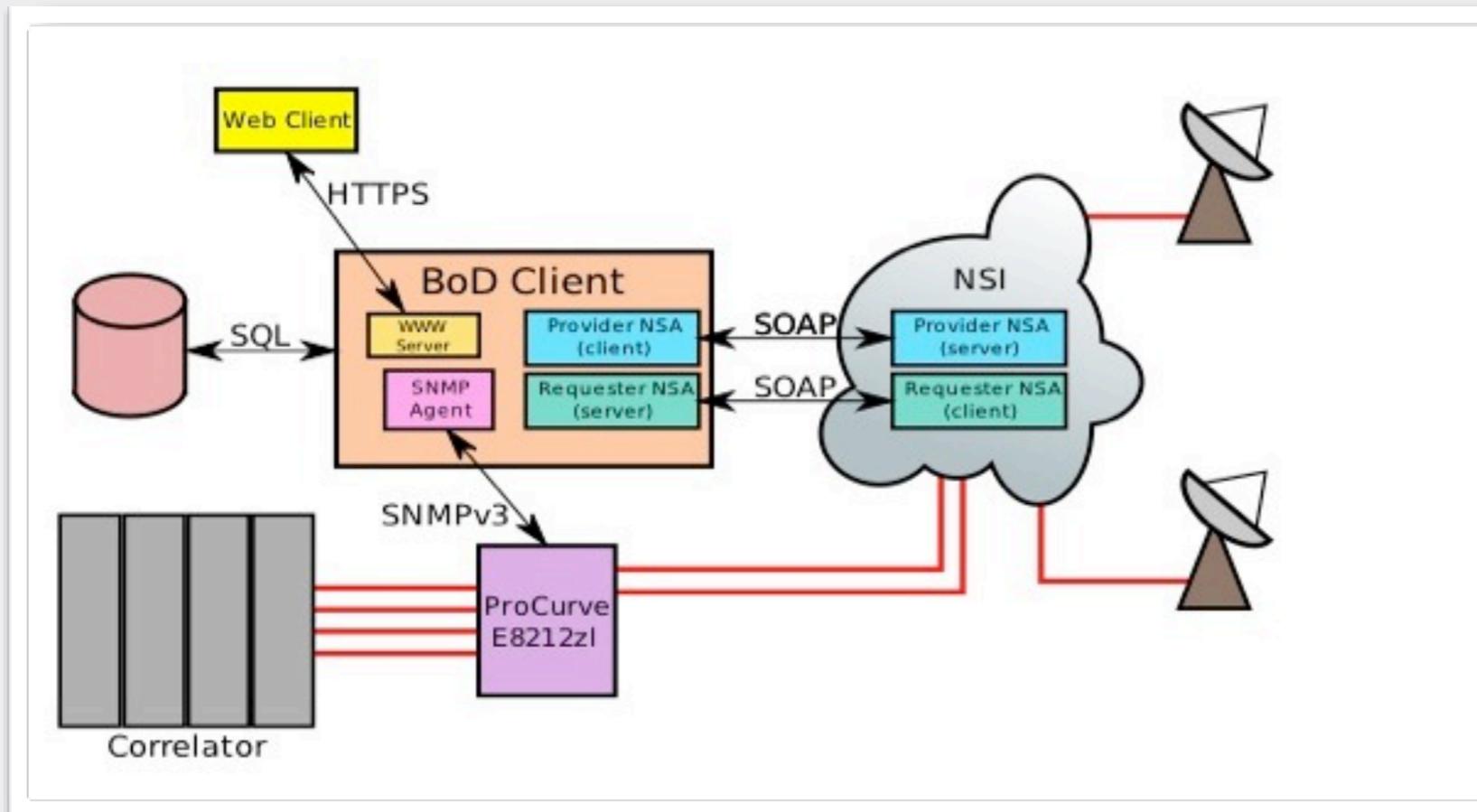
NEXPRoS-related activities

- **Hardware upgrades:**
 - Major overhaul of local network
 - re-shuffling of equipment and cabinets



Service Activities

- **Bandwidth on demand:**
 - **NSI (Network Services Interface) has been declared the standard**
 - Only one BoD standard needs to be targeted
 - First working version expected within weeks
 - **Pushing for VDIF in dBBC**
 - For NEXPreS, UniBoard, international compatibility
 - Where is the Mk5C 4Gbps functionality?



New Reservation

NSA

Requester

Provider

Period

From

To

Observation

Name

- **Development of European e-VLBI continues through NEXPRoS**
 - Essential in keeping local expertise
 - Vital for keeping in touch with NRENs
 - Continued effort in outreach/dissemination
- **NEXPRoS continues to support e-VLBI operations**
 - Will report on e-VLBI for science, although not formal deliverable
- **Gets some upgrades going**
 - Notably Mk5Cs at JIVE
- **Step towards all EVN in e-VLBI**
 - Must increase interoperability with other VLBI networks
- **Raise level of availability**
 - Continuous data quality monitoring
 - Continuous network monitoring
 - More remote control, immediate feedback



- **In EXPRoS real-time observations were introduced**
 - Several policy issues discussed and implemented over EXPRoS duration:
 - **Dedicated e-VLBI sessions**
 - For normal proposals
 - Triggered proposals
 - **More readiness for ToO opportunities**
 - Not necessarily e-VLBI
- **eVSAG must continue discussion of optimal procedures**
- **In NEXPRoS more, new options may occur:**
 - **Same real-time/transient opportunities**
 - But including those that require multiple correlations
 - And reaching 4Gbps data rates
 - **Distinction between real-time and disk recording will vanish**
 - Must define when science objectives are met
 - Release data and re-correlate decisions
 - **Consumables bottleneck/logistics disappear**
 - Can have continuous array, small telescopes, distributed correlation
 - **Flexibility of array improves**
 - Can adapt schedules to observing conditions
 - Or react to triggers!

- **In addition, new requests from (new) user communities**
 - **Could impact on policy discussions**
 - RadioAstron, space applications
 - Monitor programmes/astrometry/joint observations
 - Triggers set by other observatories (link with LOFAR)
- **This flexibility, will it bring new science?**
 - Can we handle it robustly?
 - Logistics easier for fixed sessions, fixed schedules, fixed arrays
 - Nature of the EVN is consortium with best efforts
- **Are there ways forward without exploding the procedures?**
 - Already complex for telescope & correlator operators
 - Also complex for users
 - Data ownership for triggers, concurrent observations
- **Can we address this by (yet) new services?**
 - Offer smaller sub-arrays?
 - More e-VLBI days, leading to “VLBI every Friday”
 - And some telescopes on Thursday as well?
 - Central scheduling?
- **Is it still done under the EVN flag?**

