



Prospects for Global VLBI

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Global VLBI

- Context of this talk: cm-wave VLBI for astrophysics
- Not discussed: GMVA, EHT, IVS
 - Important cases of global VLBI
 - Special cases with different challenges
 - Can return to discuss these during the session if desired

Why Global VLBI?

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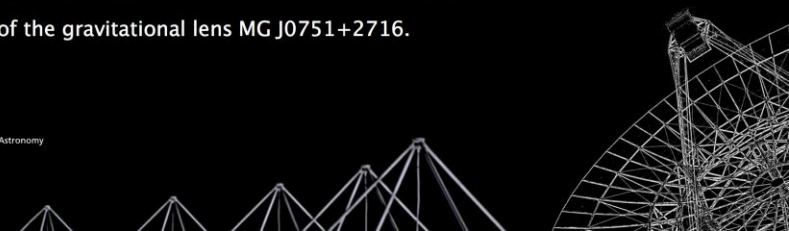
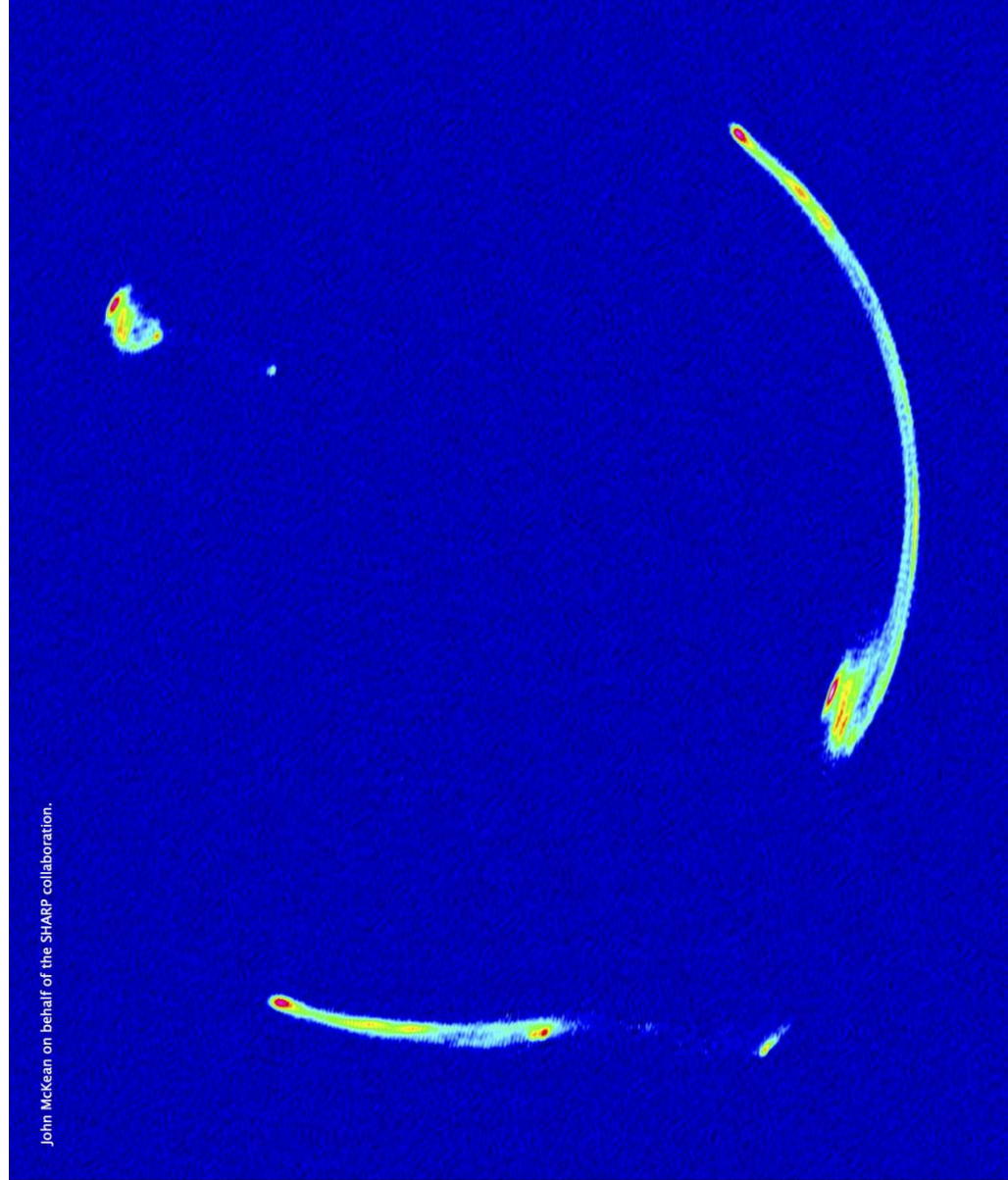
Spingola et al, in press

John McKean on behalf of the SHARP collaboration.

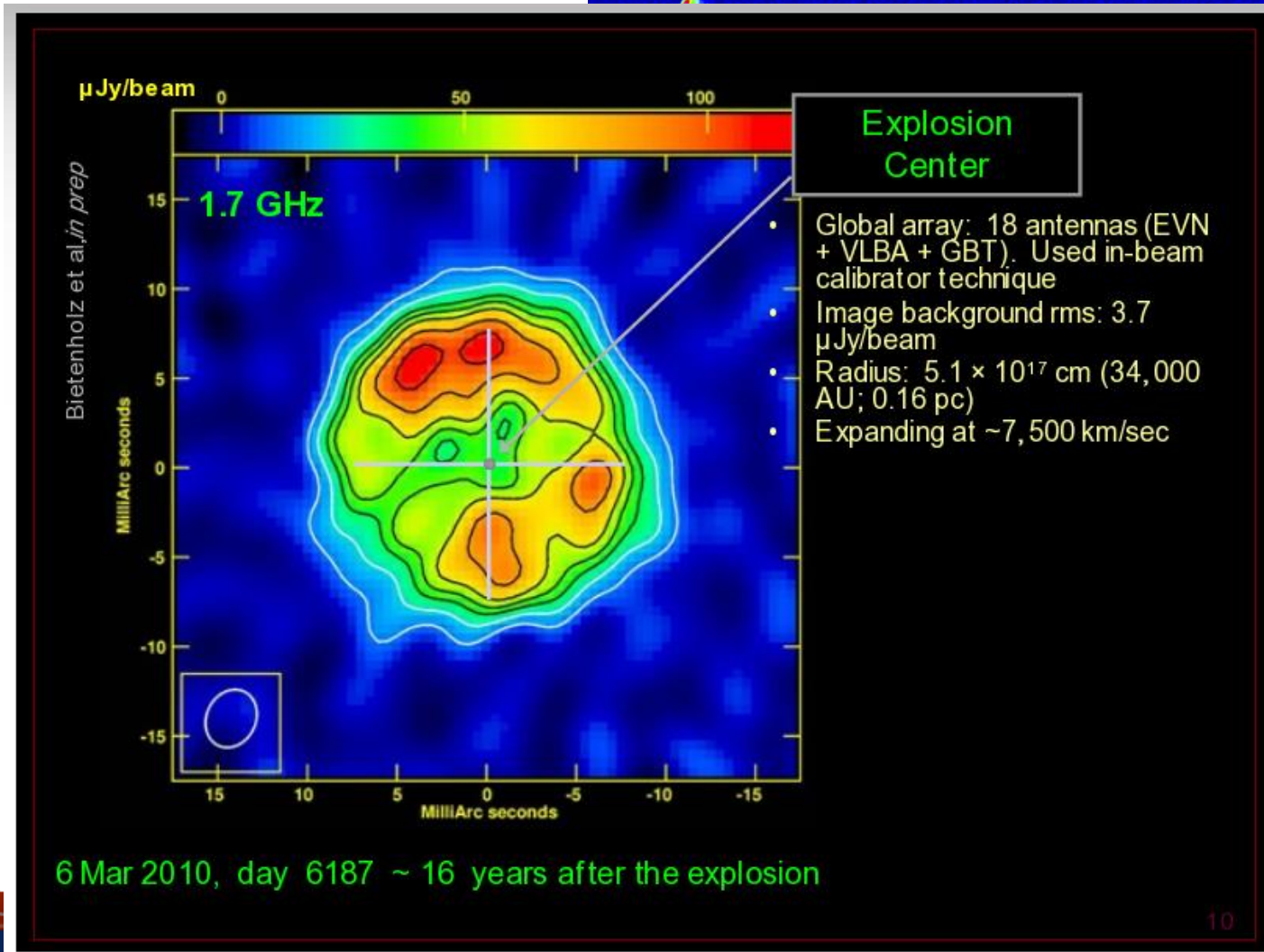
Global VLBI imaging of the gravitational lens MG J0751+2716.

ASTRON
Netherlands Institute for Radio Astronomy

Insert Data

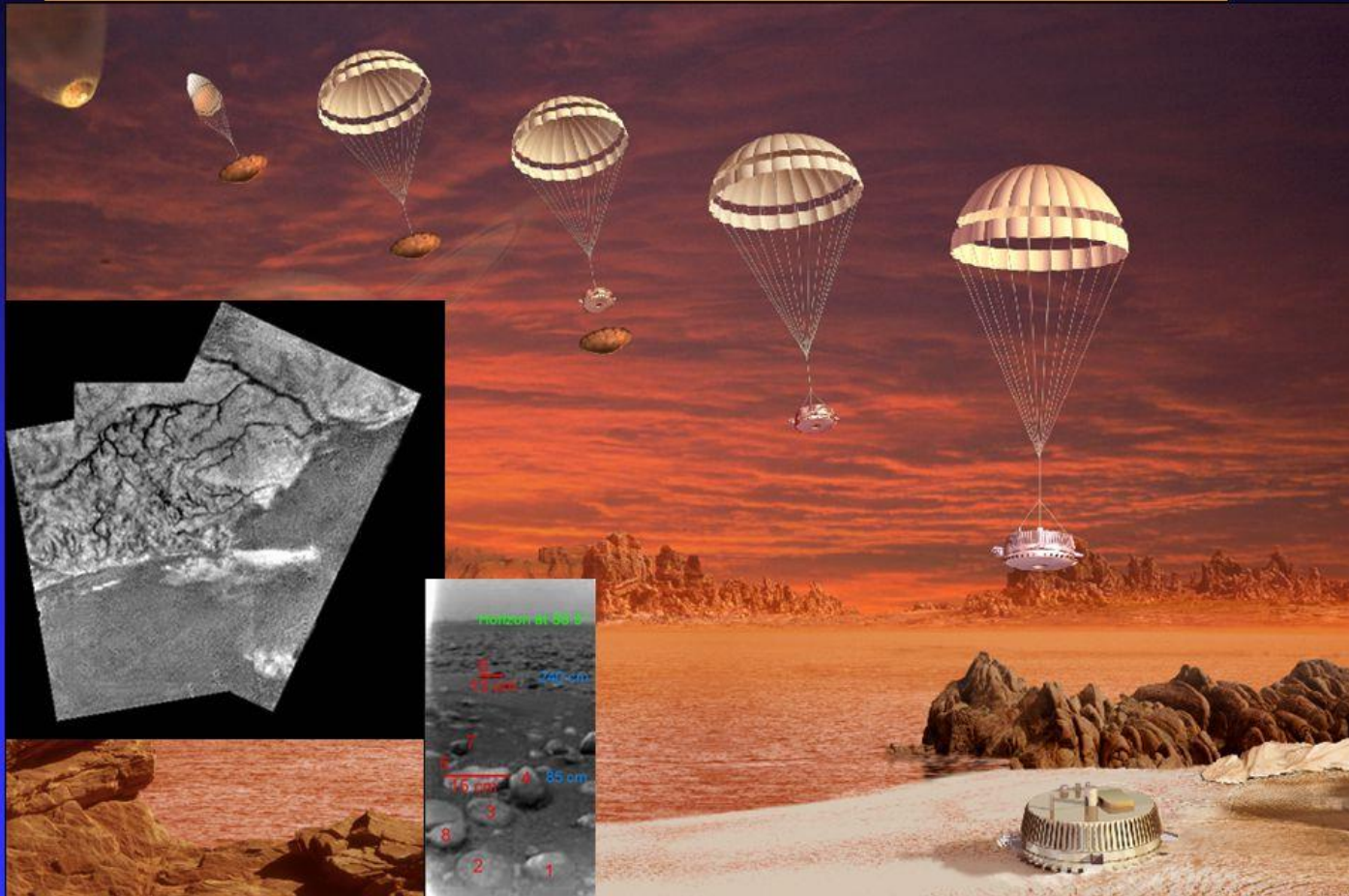


Why Global VLBI?



Why Global VLBI?

Huygens entry, descent and landing: 14 Jan 2005



Antennas (EVN
in-beam
ns: 3.7
m (34,000
0 km/sec

6 Mar 2010, day 6187 ~ 16 years after the explosion

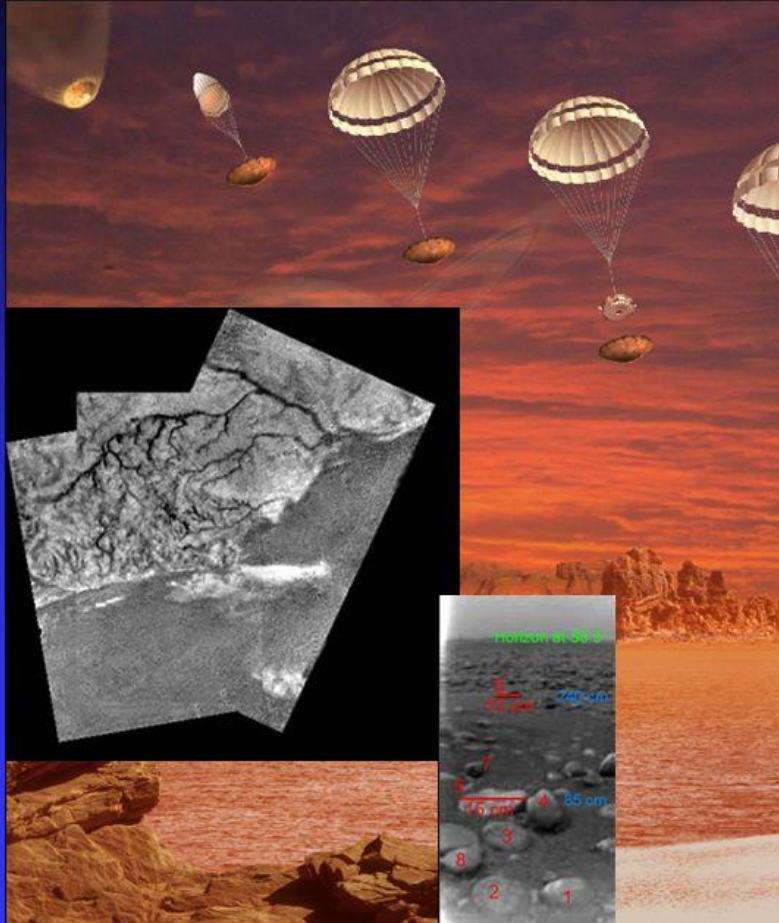
10

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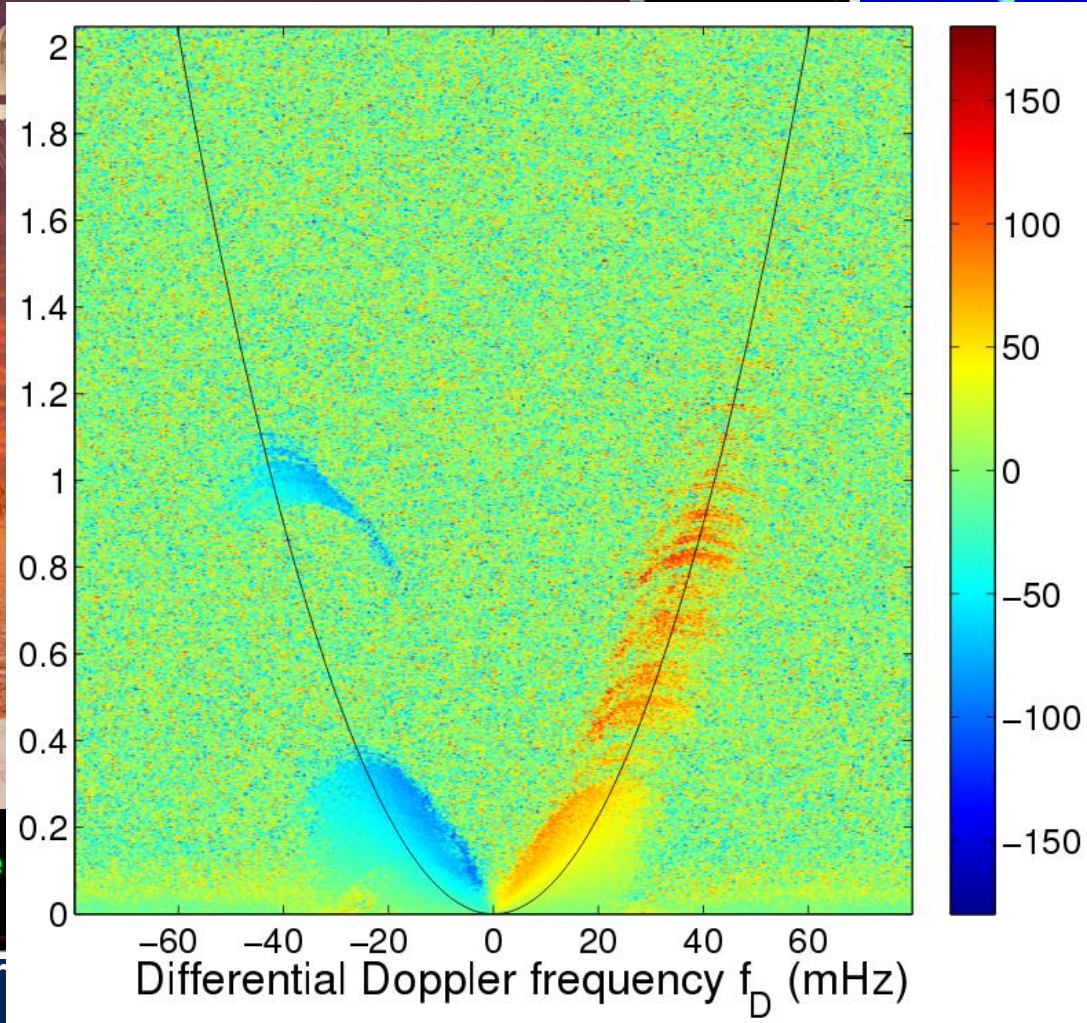
Why Global VLBI?

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6 Mar 2010, day 6187 ~ 16 ye

Insert



Global infrastructure with clear niches

Justifiable applications

- High fidelity imaging at mas scales
 - Gravitational lens is great example
- Highest ground-based resolution at given wavelength
- Continuous monitoring / time-critical events
 - Huygen's probe
- Highest instantaneous sensitivity at mas resolution
- Fidelity + instantaneous sensitivity + resolution = ability to monitor quickly evolving objects

- Diverse, unique, scientific applications
 - Possibly critical capability in ngVLA / SKA / LSST / ELT / TMT era

Global VLBI is not for everything

- Quest for integrated sensitivity
 - Long integration on VLBA or EVN may be more practical
- Wide-field imaging
 - Mix of antenna diameters limits utility
- Low declination sources
 - Minimal sub-array overlap
- Applications requiring many epochs at fixed cadence
- General (debatable) thought: Use of single instrument (EVN, VLBA, LBA, EAVN, ...) may be best option, even if observing time is 3 or 4 times longer, except for special cases.

Difficulties...

- Proposal cycle
 - Possibly mismatched proposal deadlines
 - Multiple TACs with different priorities
- Data transport
 - E.g., EU moving to eTransfer, US stuck on disks
- Scheduling
 - Session-based or continuous
 - Dynamic- or fixed-scheduling
 - Zenith angle restrictions (e.g., for Arecibo, FAST)
 - Other observatory commitments
- Policy alignment: data access, science program/abstracts, ...

Some statistics

- Over past 3 years:
 - 34 EVN+VLBA+ or EVN+GBT+VLA+Arecibo proposals
- In years 2015, 2016:
 - 21 proposals
 - 11 fully scheduled
 - 3 partially scheduled (not all requested US antennas)
 - 6 declined
 - 2 uncertain
 - Reasonably high acceptance rate!

Visibility and outreach

- Good science is the primary goal
- Can global VLBI be used to raise the visibility of radio astronomy, VLBI in particular?
 - PIs should boast their results: Press releases, public talks, ...
 - Worthy secondary goal
- Major change in global VLBI capability a good opportunity to re-brand
 - “World Array”?

Two thought experiments

- VLBA joins EVN
 - Full eMERLIN too? If so, arrays of 35+ antennas could be scheduled
 - Would simplify time allocation process: 1 deadline, 1 TAC
- VLBI resource consolidator (design-an-array)
 - Largely a web interface to existing instruments
 - Maybe some improved inter-agency communication
 - Like “cheapairfare.com”
 - Allow users to specify requirements; the tool then returns a list of instruments and/or combinations of instruments, with corresponding deadlines and informational links, that meet the needs

What's going on in US?

- VLASS
 - 2-4 GHz sky survey with JVLA
 - 120 μ Jy at 2.5'' resolution north of -40dec
 - Three epochs; half of first epoch complete
- ngVLA (see next slide)
- VLBA to rejoin NRAO (Oct 1, 2018)
- JWST launch: spring 2019
- Decadal survey 2020
 - Chance to promote science and instrumentation concept
- LSST full science to begin in 2021
- *These items are all strong influences on VLBA plans*

Next Generation VLA

(Not yet funded, but momentum is growing)

- Concept: 220 antennas
 - 18m diameter
 - 8-120 GHz; options for 1-8 GHz
 - Baselines to 1000 km
 - Early science by 2028?
 - To engulf PT, LA, KP, FD
- Long baseline option
 - Concept: replace/augment VLBA w/ ngVLA equipment
 - Stations of ~5 ngVLA antennas
 - Maybe include island stations, maybe not
 - Meeting at Texas Tech Mar 12-13 to discuss
- Big science meeting: June 26-29 in Portland Oregon

What do users want

(Hint: this is a good forum for users to speak up!)

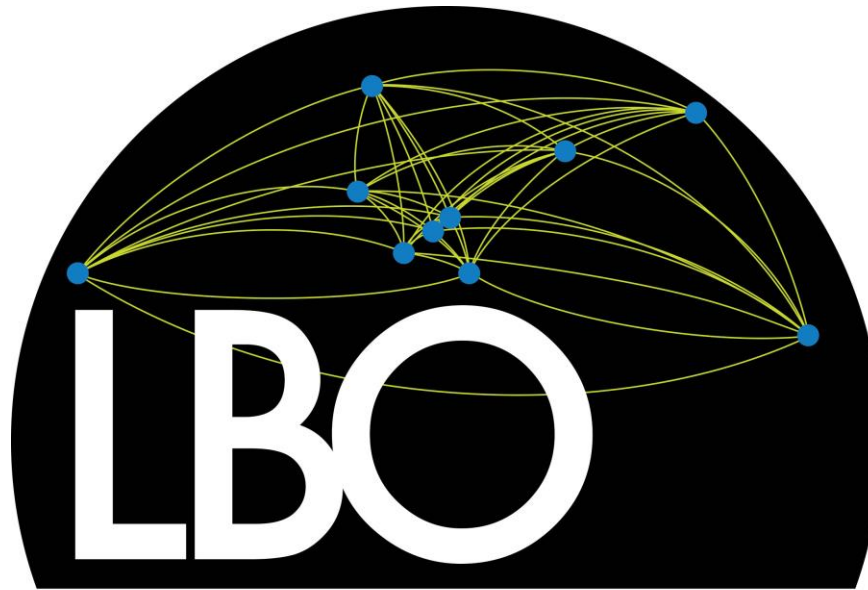
- Easier interface to VLBI as a whole?
 - To global VLBI?
- More time available for global VLBI?
- More agility in scheduling global VLBI?
- Flexibility in choosing resources (design-an-array)?
- Timely referee process and rapid access to correlated data?

- Is there a perception that global VLBI time is too hard to obtain?

- How to use EWASS and/or EVN symposium to get feedback?

Conclusions

- Global VLBI is a powerful tool
- It is not a good match for all VLBI science
- Goal: find solution that maximizes scientific impact and retains maximal capability
- Don't squander the opportunity to promote VLBI!



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www.lbo.us

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