

# Extending the K-band Celestial Frame with Emphasis on the Southern Hemisphere

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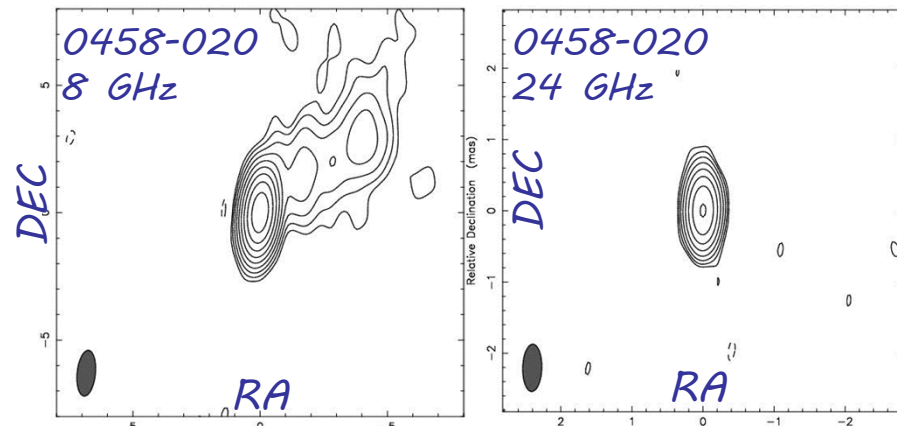
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- First full sky 22 GHz (K-band) catalogue: densify the ICRF at K-band by filling also the south polar cap.
- More accurate astrometric positions with respect to the 'traditional' 8 GHz.



Images: Charlot et al., AJ, 2010

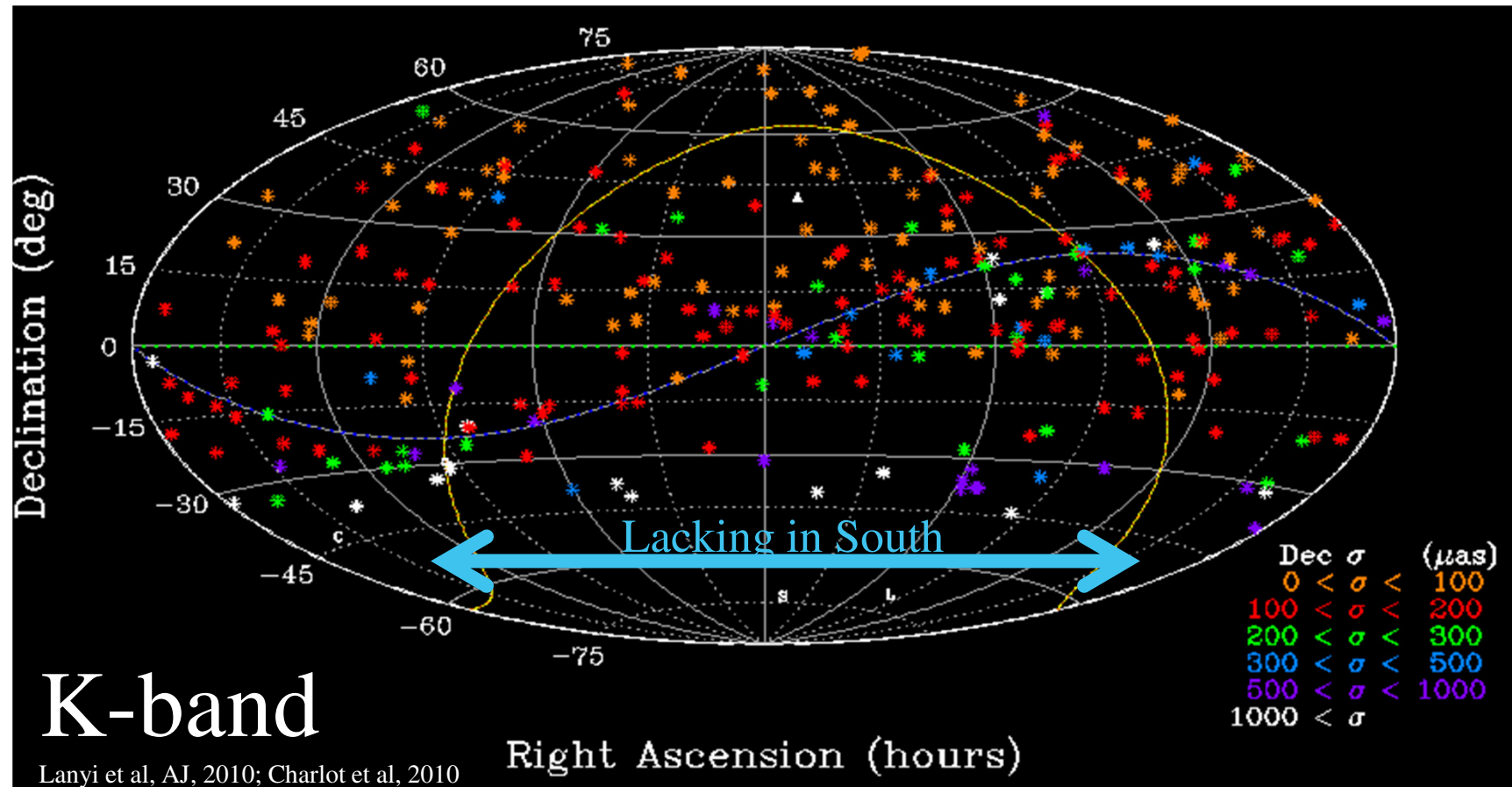
K-band source morphology is more compact than at lower frequencies (S/X) and ...

K-band source core-shift is less than that at lower frequencies.

- Tie the Gaia optical frame with the VLBI frame.

As Chris Jacobs showed:

K-band (24 GHz) CRF: 275 sources



*At the moment we use:*

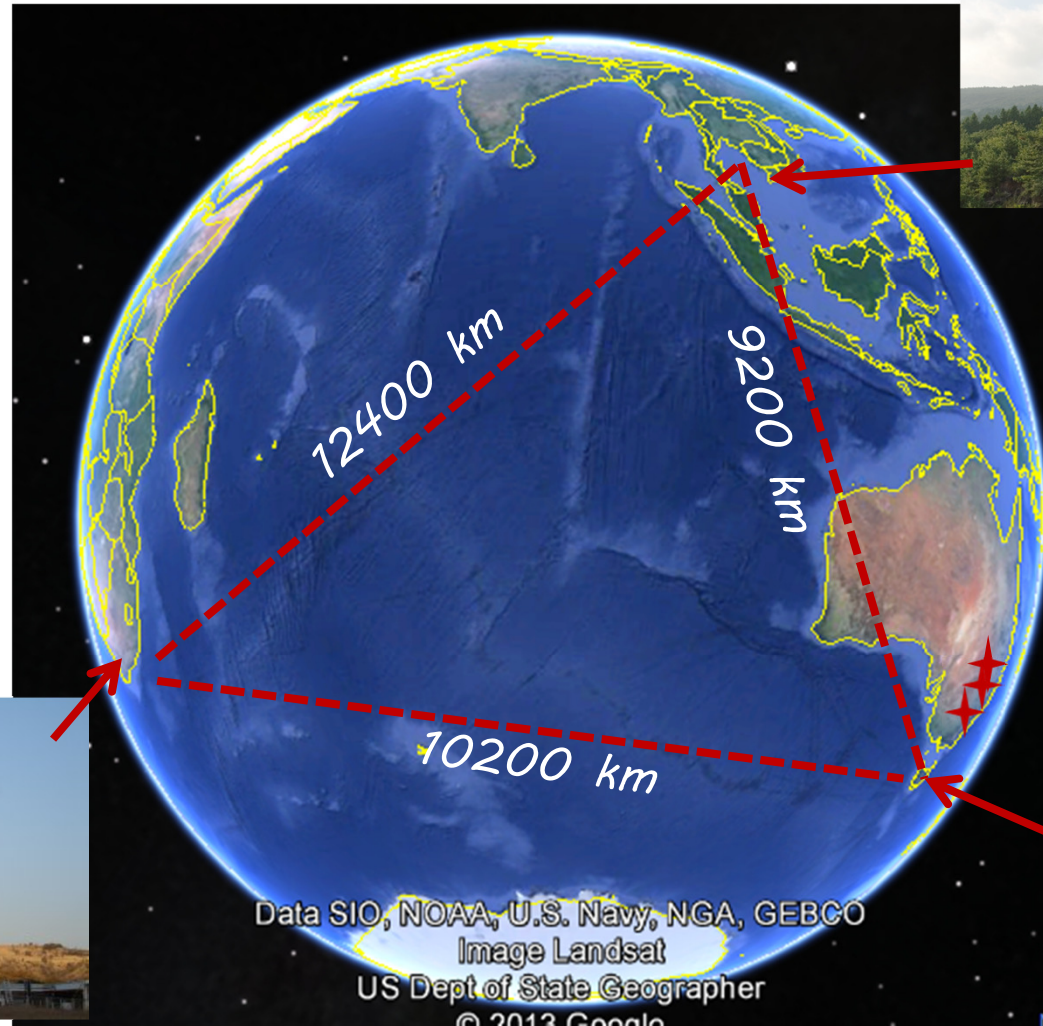
KVN (Tamna)	21 m	Korea
HartRAO	26 m	South Africa
Hobart	26 m	Tasmania

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*In the future, for imaging possible extended structure, we wish to have also:*

Tidbinbilla	70 m	Australia (already accepted)
Parkes	64 m	Australia (to be asked for)
ATCA	6 x 22 m	Australia (to be asked for)
KVN (Ulsan)	21 m	Korea (to be asked for)
KVN (Yonsei)	21 m	Korea (to be asked for)





*KVN Tamna*

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*HartRAO*  
Credit: M Gaylard



*Hobart 26 m*



## Source selection:

- $\text{dec} > -45^\circ$  for HartRAO - Tamna - Hobart (Lanyi et al, AJ, 2010 and Charlot et al, AJ, 2010).
- south polar sources for HartRAO - Hobart (C. Jacobs Ka-Band list).

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## Frequency coverage:

22210 MHz to 22488 MHz (spanned 350 MHz).

## Mode:

- 8 dual sideband (LSB/USB) BBC channels
- 16 MHz BBC channel width
- 2 bit sampling
- Single polarization (RCP)

1 Gbps  
recording  
speed

*Weather on day of observation:*

*HartRAO: Rain*

*Hobart: Rain*

*Tamna: Rain*

*Bonn: Sunny 28 degrees, perfect K-band weather*

*... pity that Bonn is a correlator site!*

*Nevertheless.....*

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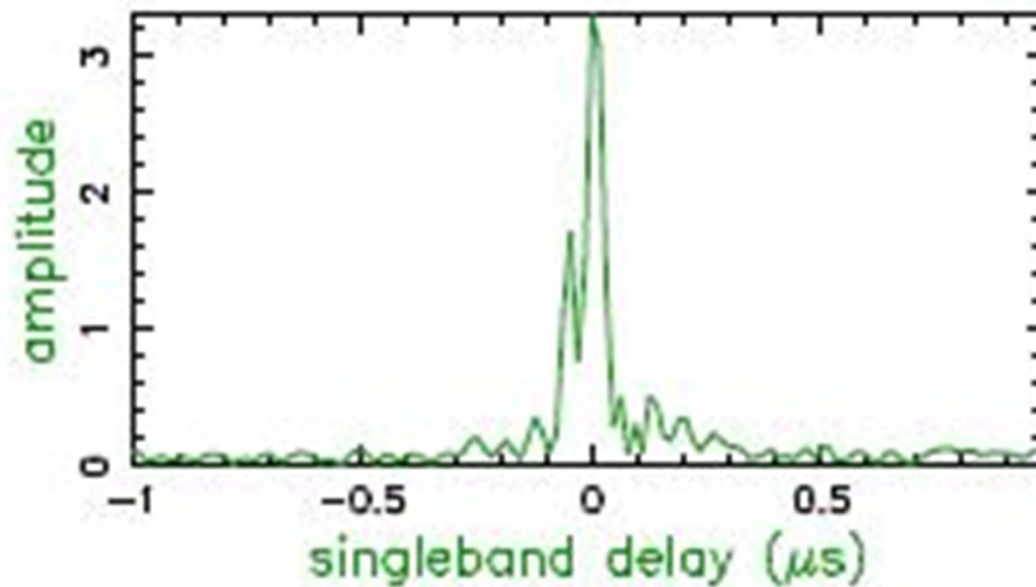


Baseline: HartRAO - Hobart26

Source: PKS J1427-4206

Flux density: 1.6 to 2.8 Jy at K-band (ATCA)

**SNR ~ 78** in 120 s





## Summary:

- Sources are better at 22 GHz than at 8 GHz
- The pilot test demonstrated that we have FRINGES!

## Outlook:

- Full sky celestial reference frame
- More than 500 sources
- Precision of  $< 70 \mu\text{as}$  ( $1 \sigma$ ) to match Gaia predicted accuracy at  $-18$  mag quasars