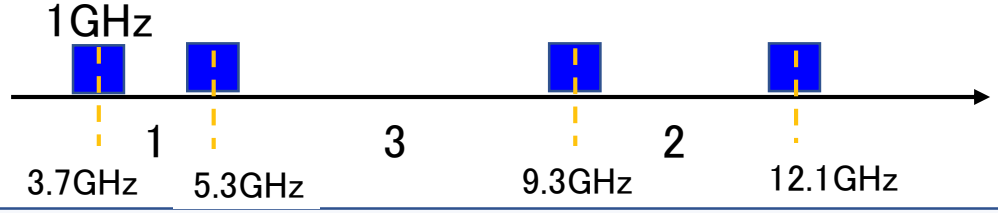
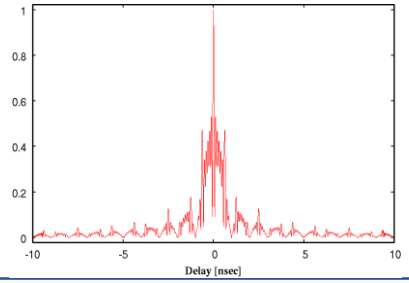
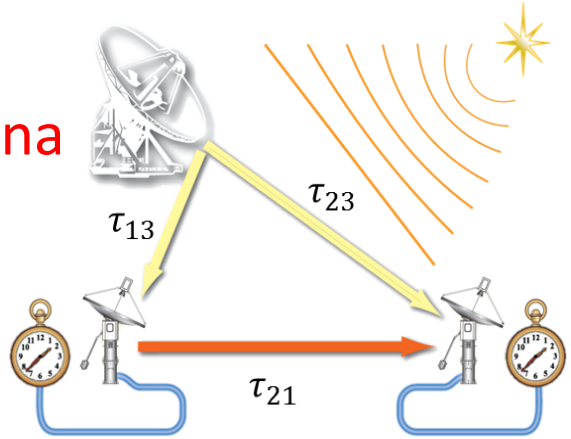
“A Broadband VLBI experiment with transportable station between Japan and Italy” by M.Sekido(NICT) et al.

Motivation: High precision frequency comparison over intercontinental baseline toward re-definition of SI-second.

- Broad Radio Frequency：3.2-14 GHz (Almost VGOS compatible)
- Transportable Station: Node-Hub Style(NHS) VLBI with 2.4m antenna
- High data-rate acquisition： 4 band (1024MHz width/band)
  - Effective Bandwidth：3.3GHz (10 times wider than conventional)
  - Absolute delay :Free from ambiguity



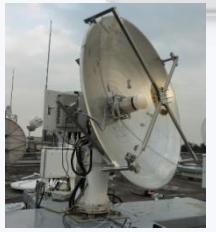


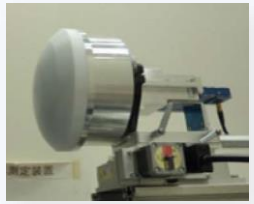


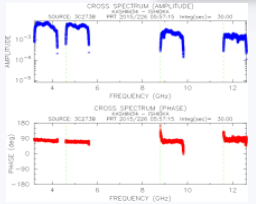
$$\tau_{21} = \tau_{13} - \tau_{23}$$

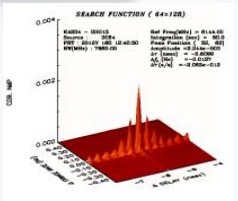
Broadband Feed for Cassegrain → RF-Direct Sampler → VDIF Stream → Recording → Correlation GICO3 → Broadband Synthesis → Mk3DB → Calc/Solve

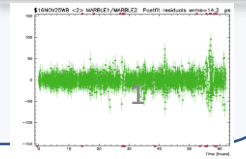
Compatible with Mk6, Flexbuf (jive5ab)









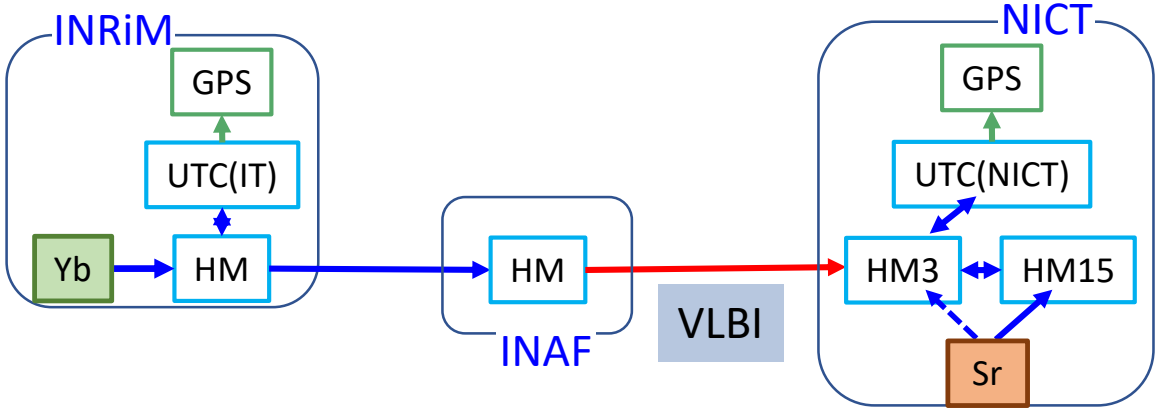


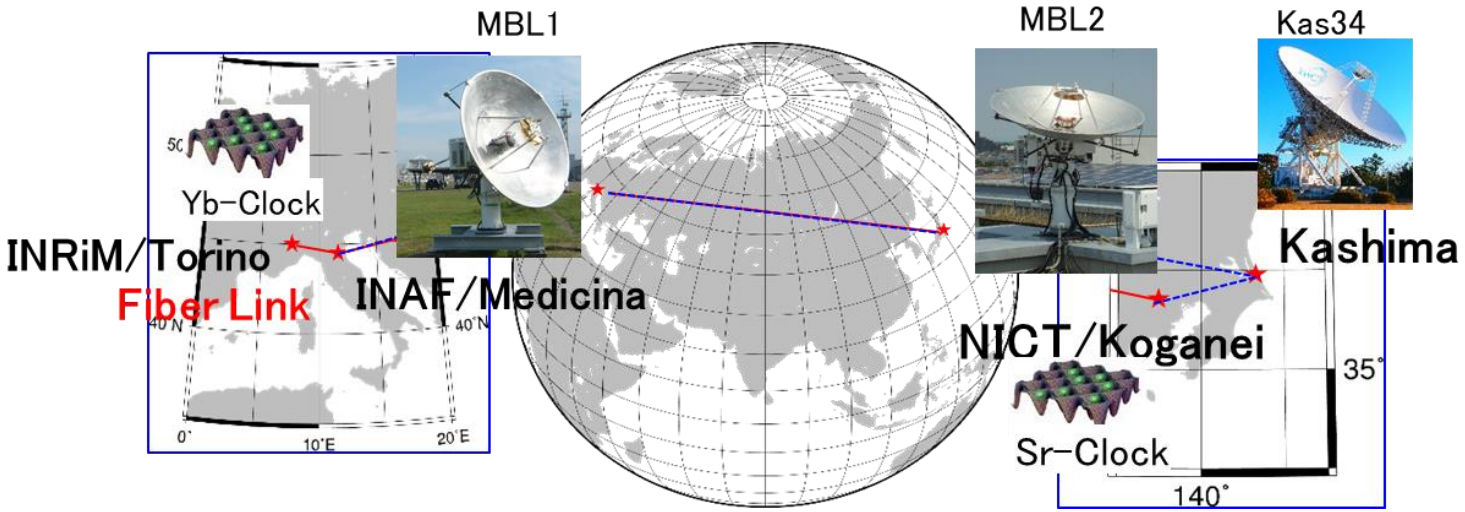
Broadband VLBI System Development

Main Results: Transportable VLBI for Metrology and Geodesy

Yb/Sr Optical lattice clock Freq. Link by VLBI over 9000 km distance

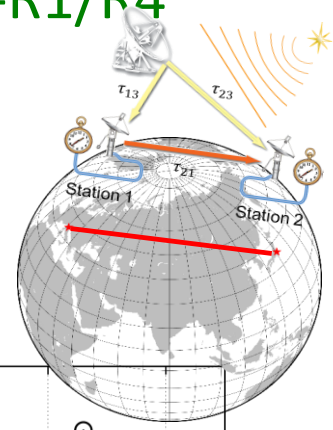
$y(Yb/Sr)=2.5(2.8)\times10^{-16}$

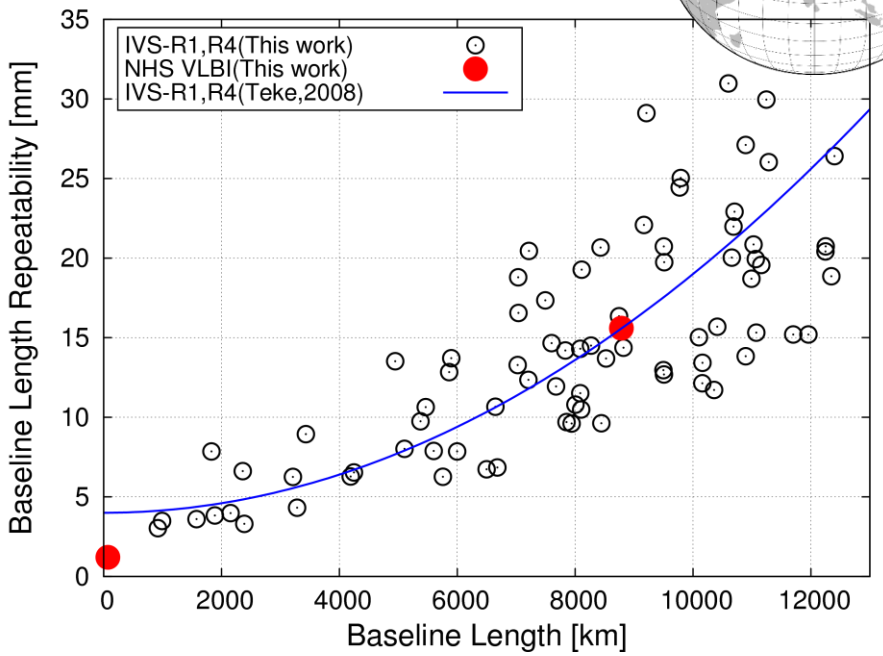




Baseline Length Repeatability: (15mm @ 8700 km)

The same level with IVS-R1/R4 with **2.4m antenna**

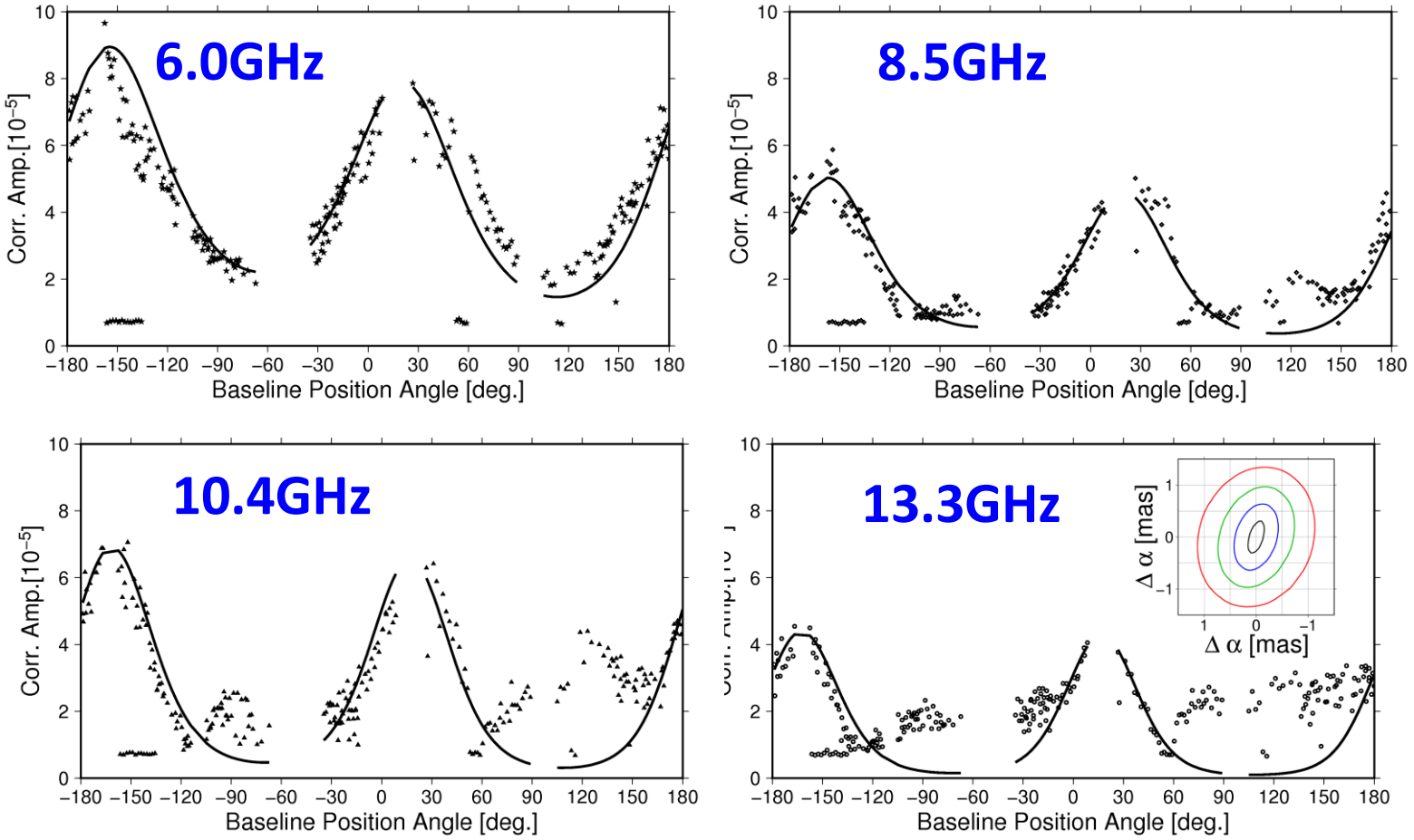




Uncertainty Budget of our Broadband VLBI

- **Frequency dependent** source structure and barycenter shift cause **group delay error.** In addition, it also couple with **ionospheric TEC.**
- **NHS VLBI has potential to mitigate source structure effect.**

Radio Source:1928+738



Atmospheric delay correction with VMF3 works effectively.

Error Source	uncertainty
Sensitivity (∝1/SNR)	6.4 ps
Instrumental	12.7 ps
Atmosphere	7.9 ps
Ionosphere	1.7～17 ps
Radio Source Structure	22-33 ps