

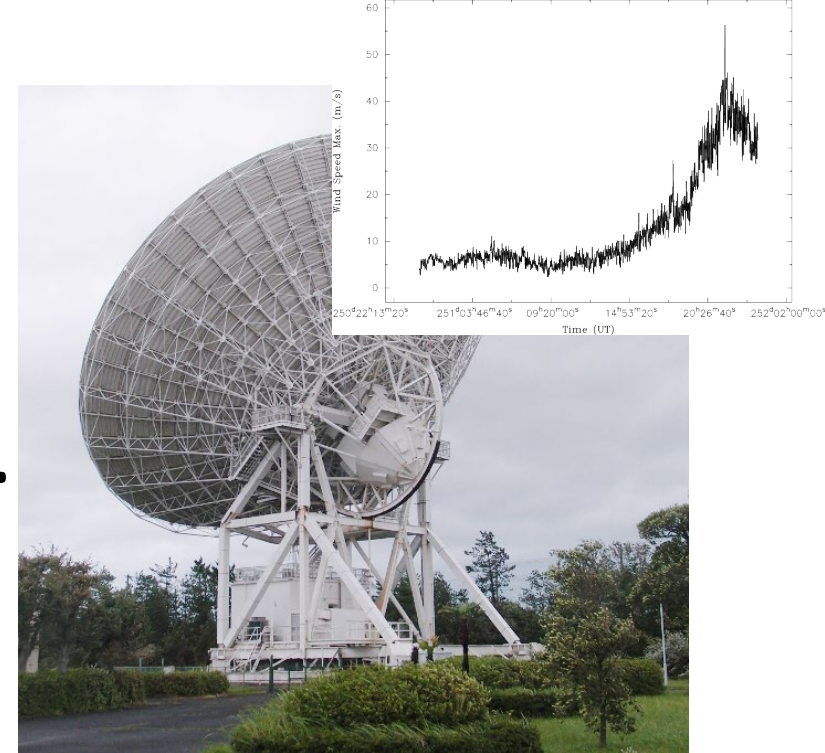
Activity report of NICT

-Update from 2018 to 2022-

Mamoru Sekido, Ryuichi Ichikawa, Eiji Kawai
NICT Space-Time Standards Laboratory

Update from 2018 to 2022

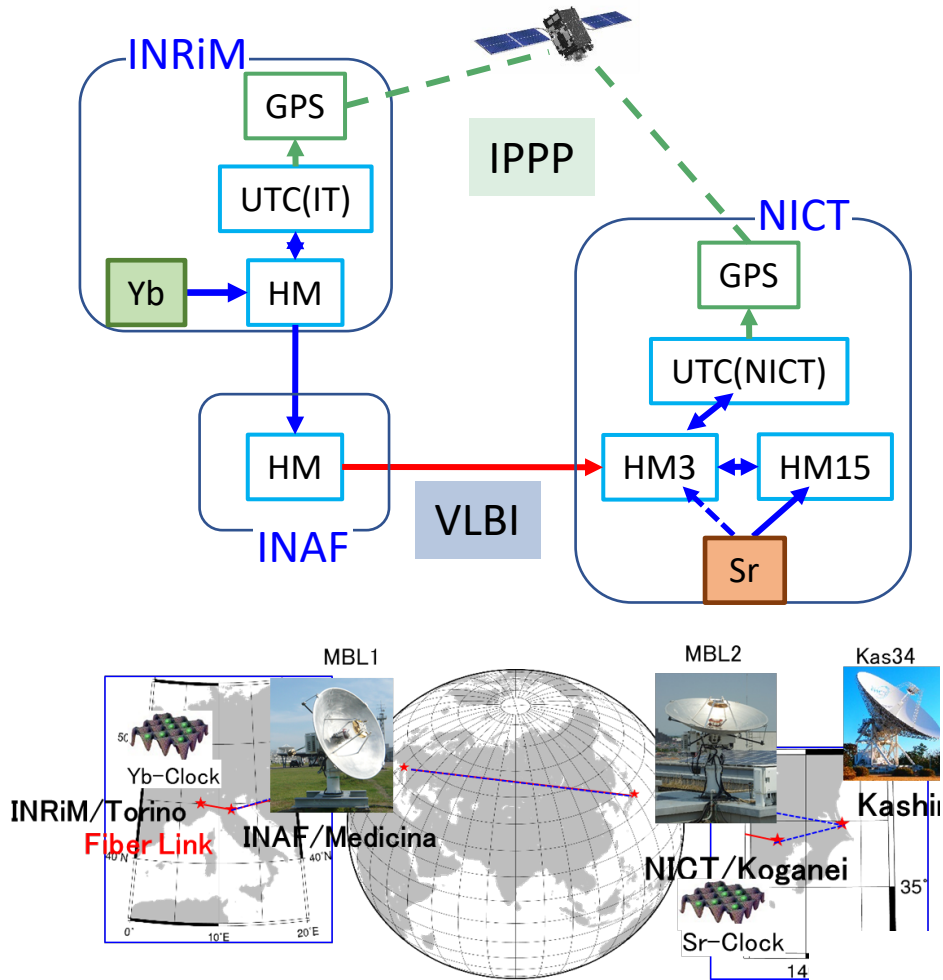
- 9th Sep. 2019: Kashima 34m antenna got fatal damage by typhoon Faxai (**wind:56m/s at Kashima**).
- Although NICT has formally closed VLBI project and Kashima VLBI group was dissolved in Mar. 2021, we continue the geodetic VLBI with Koganei 11m antenna.
- Geodesy and reference frame is tightly related with time and frequency.
- GNSS observation is routinely operated for long distance comparison of frequency standards.



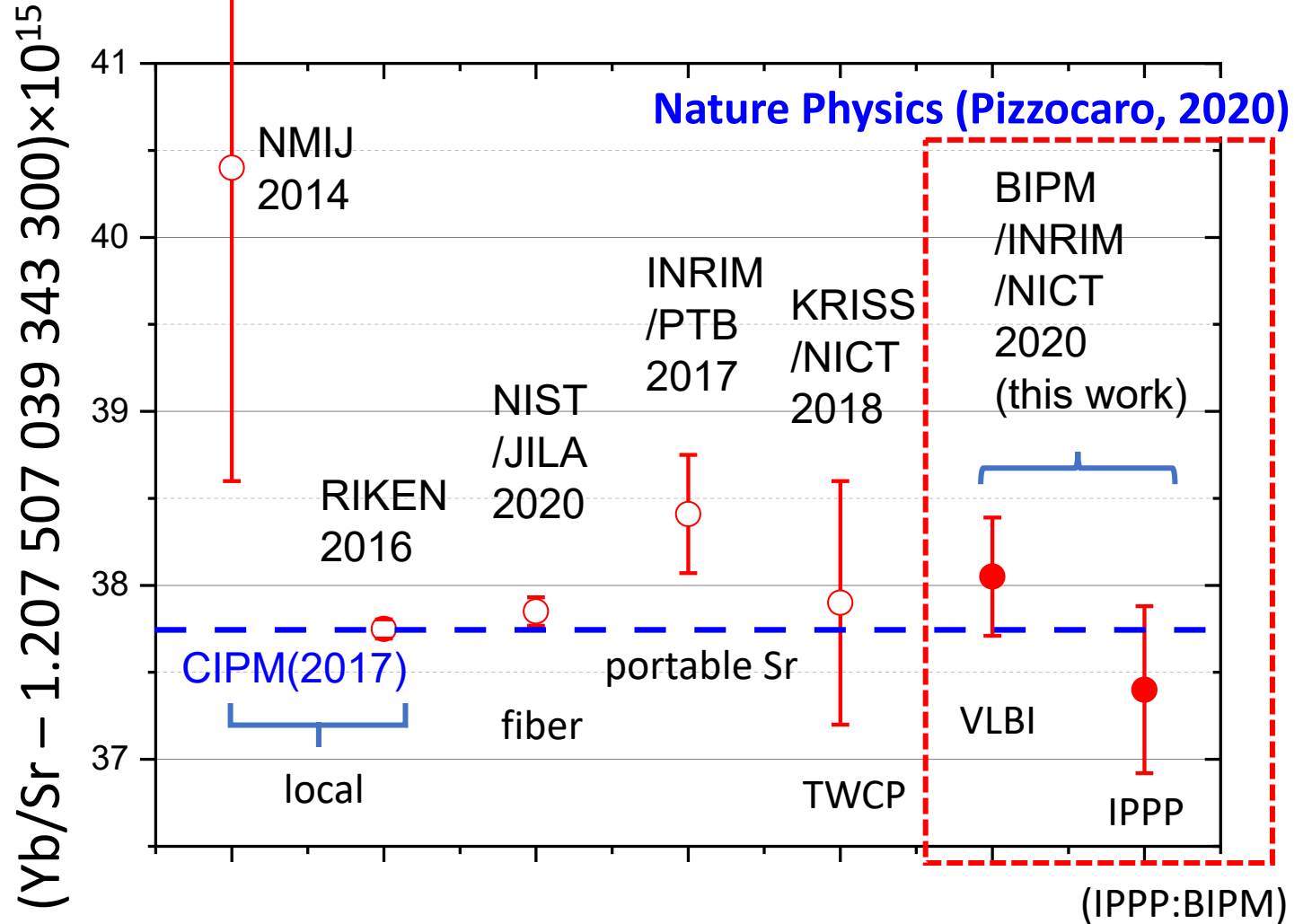
Kashima 34m antenna forced to be tilted over opposite side by strong wind (56m/s), which destroyed Elevation drive mechanics and reflector backup structure.

Topic in this term: Yb/Sr Freq. Link: Comparison via VLBI

Best precision for 9000 km distance



$$y(\text{Yb/Sr}) = 2.5(2.8) \times 10^{-16} \quad (\text{VLBI})$$



Members and Activities

Name	Activities	Employ/Location	Maintenance
Mamoru Sekido	IVS/AOV VLBI observation Data management	Research Managr/ Koganei	Koganei 11m Servers, and Network
Ryuichi Ichikawa	IGS GNSS receiver Gravimeter measurement	Research Managr/ Koganei	GNSS receriver Gravimeter gPhoneX Koganei 11m
Kawai Eiji	Communication for IVS/AOV VLBI observations. Remove support related with VLBI.	Temporary Staff/Kashima	

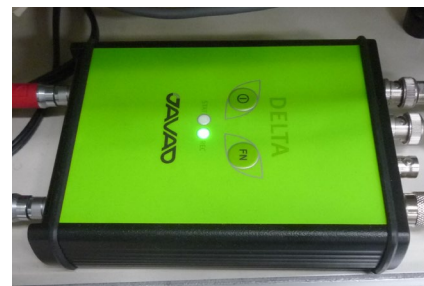
Facilities



Koganei 11m antenna, and IGS-KGNI



Backend of Koganei 11m VLBI Station



GNSS JAVAD receiver

Network:
10Gbps network



Gravimeter gPhoneX

Koganei 11m VLBI station



Receiver: room Temp. LNA

- X-band
 - XL $L_o=7200$ 7700-8200 MHz
 - **XH** **$L_o=7600$** **8100-8600 MHz**
 - T_{sys} : 90-12 K
- S-band
 - **$L_o=3000$ 2212-2360 MHz**
 - T_{sys} : $\sim 150K$

International Geodetic VLBI (IVS and AOV)

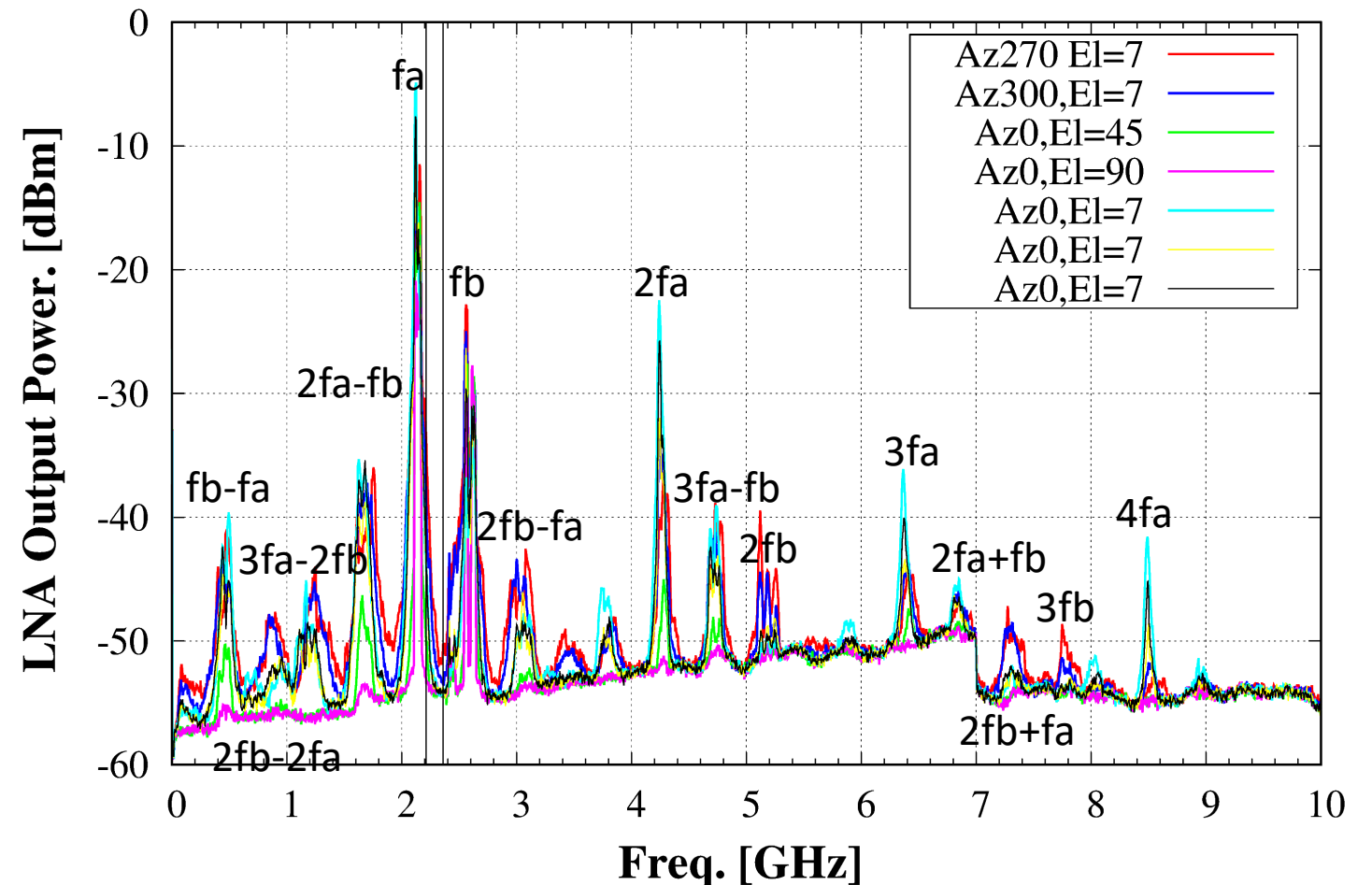
	Kashima 34m	Kashima 11m	Koganei 11m
2018	10/13	13/14	13/14
2019	11/15	7/15	16/16
2020	0	0	17/17
2021	0	0	8/14
2022	0	0	21

RFI problem at Koganei 11m S-band

-Monitoring LNA output at different elevation (Jan. 2022) -

- Radio interference was comir at
fa=2.11-2.17 GHz
fb=2.55-2.57 GHz, 2.60-2.64 G
- Mutual modulated RFI signal of fa and fb was confirmed.
- RFI level depend on the elevation angle. It is stronger lower elevation.

Koganei 11m S-band LNA output



Summary

- Status: Although Kashima VLBI group was closed in Mar. 2021, we are continuing VLBI observation with Koganei 11m(S/X) .
- Staffs: Mamoru Sekido, Eiji Kawai, Ryuichi Ichikawa
- RFI: Strong at S-band. X-band should be safe
- Achievement: Nature Physics (Pizzocaro, 2020), JoG (Sekido, 2021)
- Issue: There is discrepancy of SEFD (X-band) data measured by single dish and VLBI correlator report. Reason is not clear yet. **I suspect that may be due to surrounding trees and mismatch of horizontal-mask between real and model used in scheduling. I am going to update horizontal mask.**

Thank you for attention