



EVN TOG Manchester 2026

September 18, 2026 @Nield Bohr common room, UK

Updates from Stations:

40-m Thai National Radio Telescope and Beyond

NARIT: National Astronomical Research Institute of Thailand (Public Organization),

MHESI: Ministry of Higher Education, Science, Research and Innovation, Thailand

Koichiro Sugiyama

Manager of Center for Radio Astronomy and Engineering (CRAE)

On behalf of: N. Sakai, **B. Pimpanuwat**, P. Jaroenjittichai, A. Leckngam, W. Rujopakarn, B. Soonthornthum, S. Poshyachinda (NARIT), B. H. Kramer (MPIfR/NARIT), G. Wieching, E. Barr (MPIfR), P. de Vicente (IGN), Z.-Q. Shen, J.-L. Li (SHAO), T. Hidayat (ITB), Z. Z. Abidin (UM), P. N. Diep (VNSC), and CRAE members at NARIT.

National Astronomical Research Institute of Thailand (Public Organization)

Since July 2024 ~

Center for Radio Astronomy and Engineering

Other
Centers/Divisions/GPs

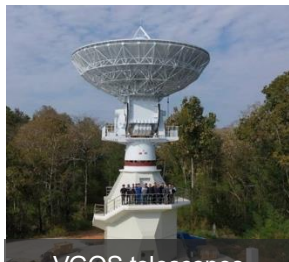


Thai National Radio Astronomy Observatory

Advanced Radio Frequency Laboratory



Thai National Radio Telescope
(TNRT) 40-m



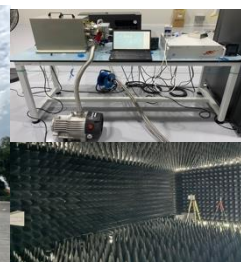
VGOS telescopes



VLBA DiFX correlator
Credit: W. Braken (NRAO)



@NARIT-HQ



TNRO: Thai National Radio Astronomy Observatory

The 40-m

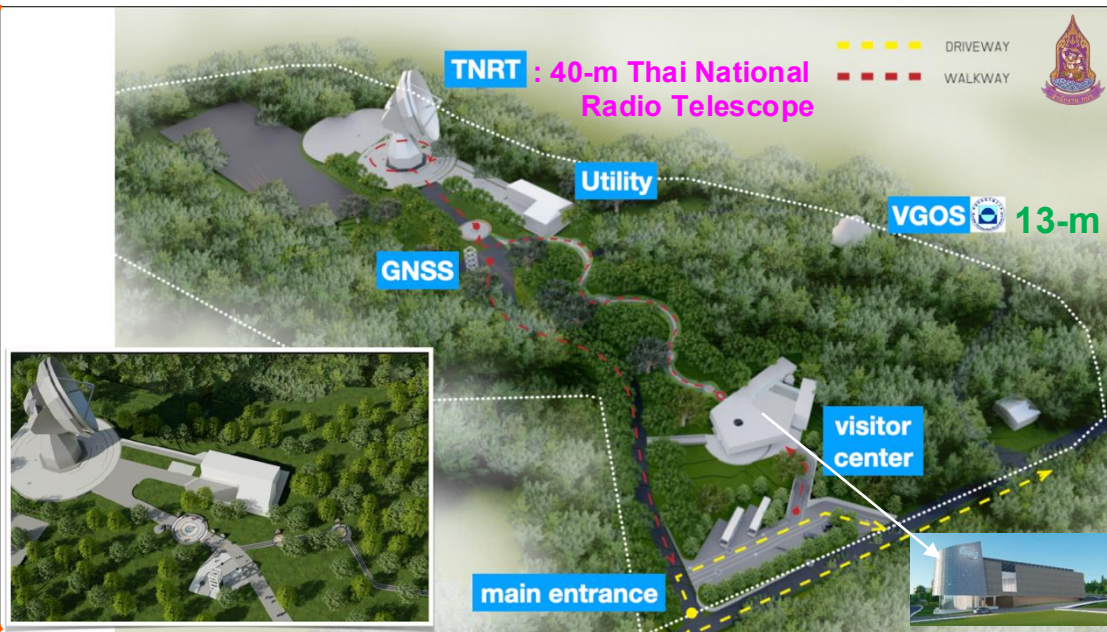
Thai **N**ational **R**adio **T**elescope



Thai National Radio Astronomy Observatory



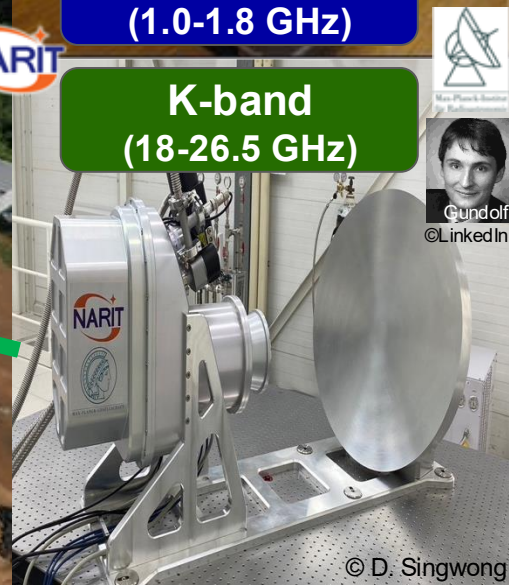
- 40 km away toward NE from NARIT head quarters
- Site is a part of Huai Hong Khrai Royal Development Study Center
- Radio Quiet Zone: less RFI, & Relatively lower water vapor area



The 40 m Thai National Radio Telescope (TNRT) since 2022~



L-band
(1.0-1.8 GHz)



K-band
(18-26.5 GHz)



“Upgraded” version of IGN’s Yebes 40-m Radio Telescope
With Prime-Focus Tetrapod Head Unit (THU)

0.3 – 115 GHz : **P/L/C/X/Ku/K/Q/W**-bands

150 μm (rms) total surface accuracy

Beam size: 13.4 arcsec – 1.43 degree

Pointing: 2" (no wind), 6" (5 m/s wind)

Slew: AZ 3 deg/s, EL 1 deg/s



The 2nd Call for Proposals with TNRT, Cycle 1

❑ Deadline: **7th February 2025, 16:00 UT**

❑ **Received 14, and Accepted 11 Proposals**

❑ Based on the **Assessment scientifically by (external) assessors**



[Webpage](#)

❑ What's new?

- Upgraded spec. : **Perfection of dynamic pointing tuning, & Mitigation of RFI impacts**
- Frequency range : 1.63 – 1.67 GHz → **1.0 – 1.8 GHz**, full band in L-band
- Polarizations : V → **V & H** (* NOT “full-stokes of polarimetry” mode yet)
- Observation modes : OH maser lines, Continuum, **+ 21-cm H I line** emissions

❑ Open-use hours : Up to **1,000 hrs/semester**

❑ Note.: Still in Resident Shared Risk Observing for a part of obs. mode

❑ **Privilege for students**, encouraging science proposals from youth!

First Scientific Milestone of the 40-m TNRT: First Detection of OH Masers in Comet 12P/Pons-Brooks



(*TNRT proposals: TNRTDDT_001 & 002*)

(Nobuyuki Sakai, S. Poshyachinda, K. Sugiyama, W. Rujopakarn, et al., 2025, The Planetary Science Journal, 6, 11, 261)

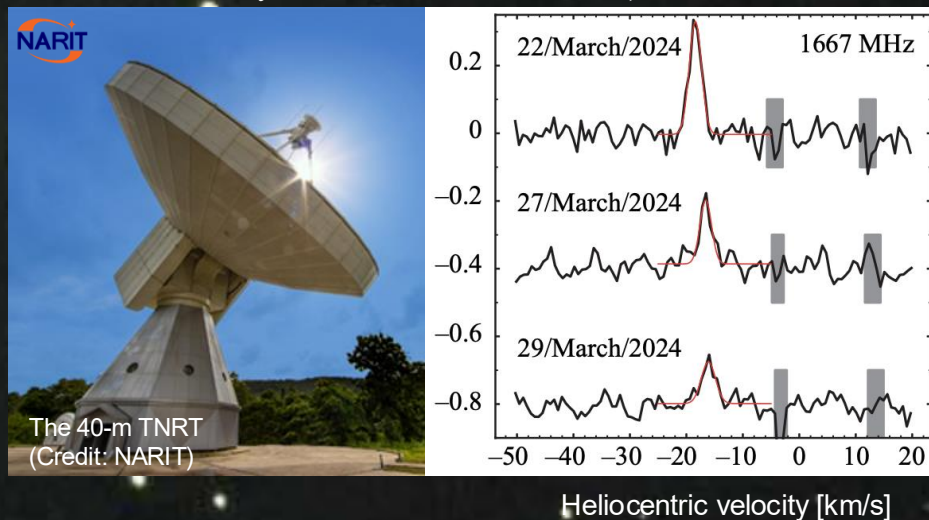


Photo of Comet 12P/Pons-Brooks took at optical wavelength
11 March 2567 (www.NARIT.or.th)

Web-release via NARIT-web: [Thai](#) & [Eng](#) ver.
(N. Sakai, B. Pimpuwat, et al. with the PR div.)

World-wide Collaborations for VLBI

- VLBA
- EAVN
- EVN
- LBA
- GMRT

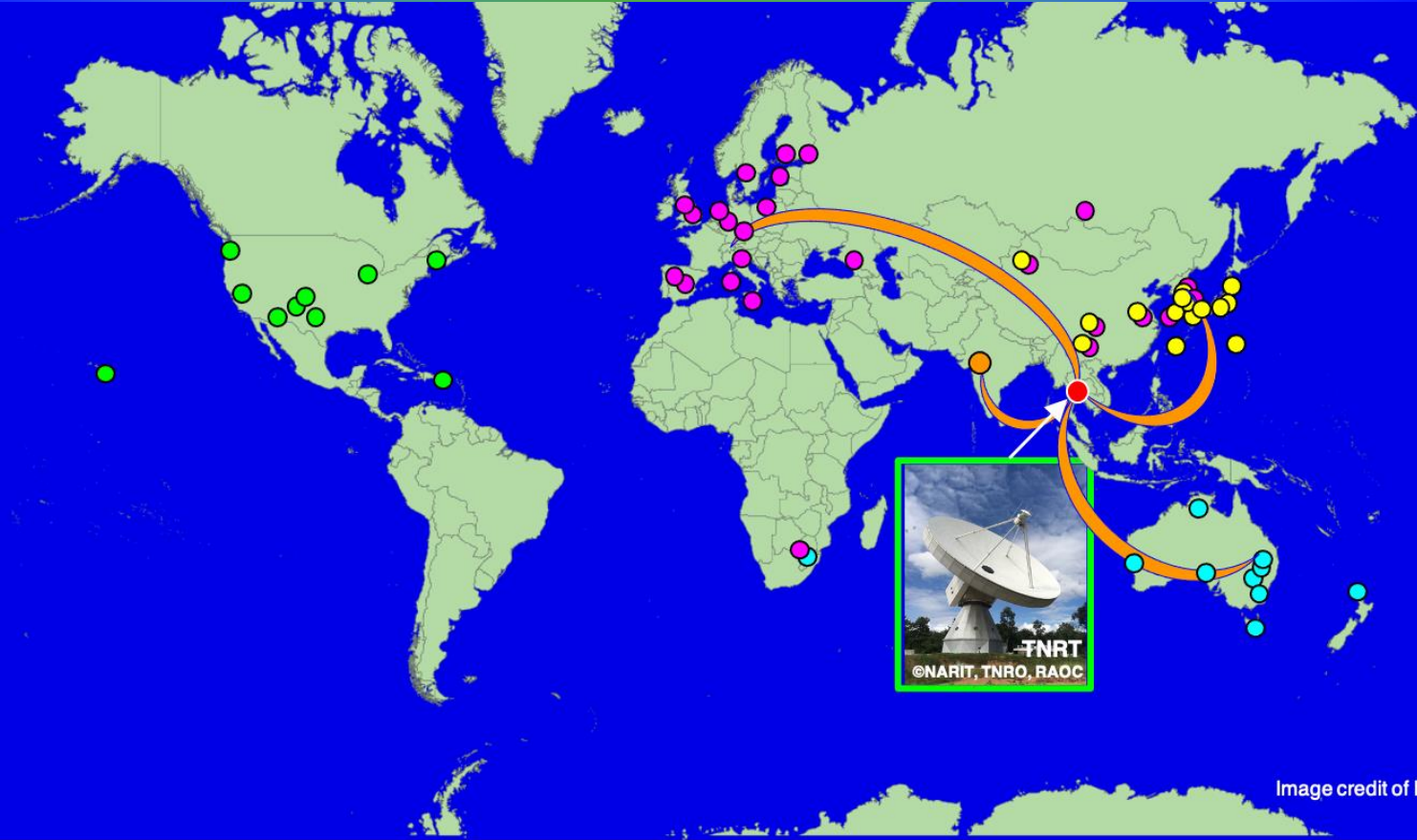
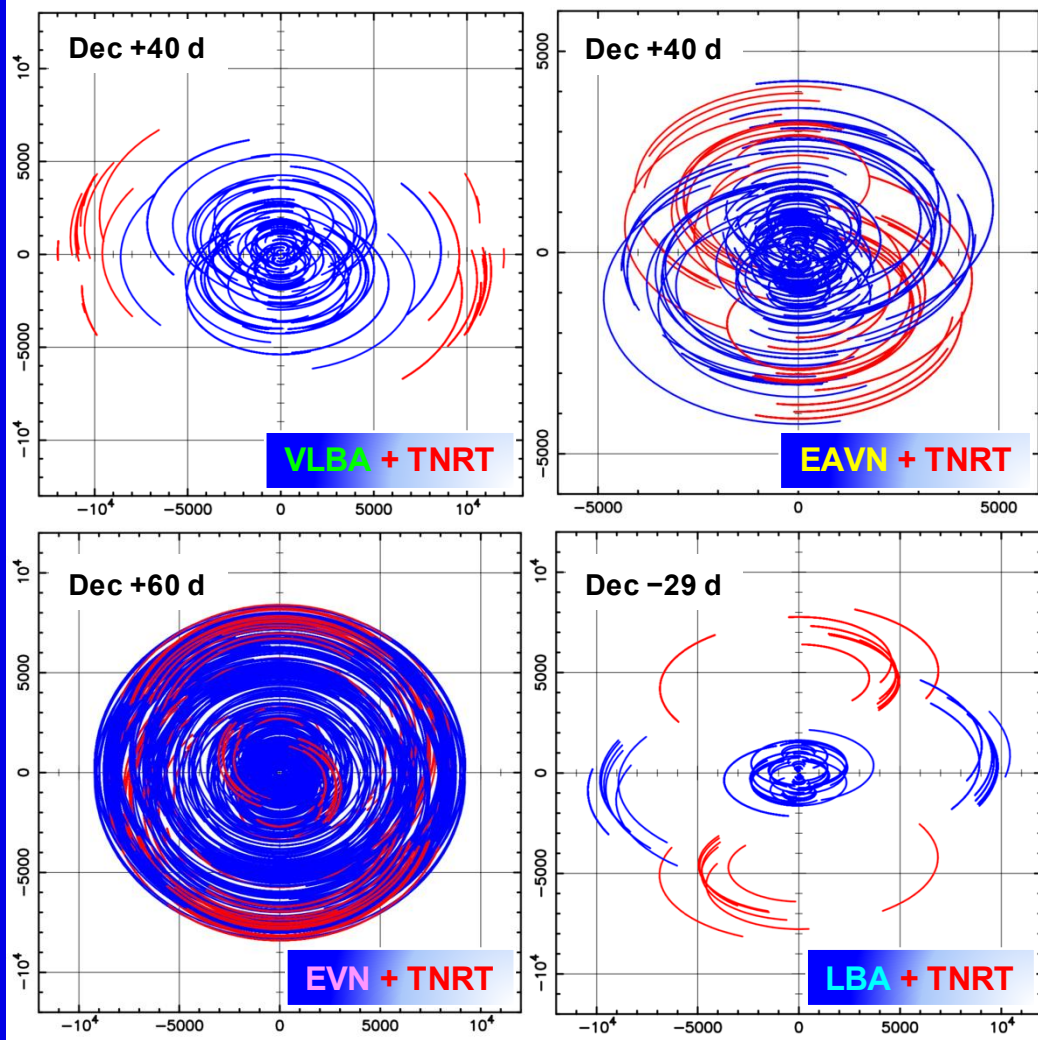


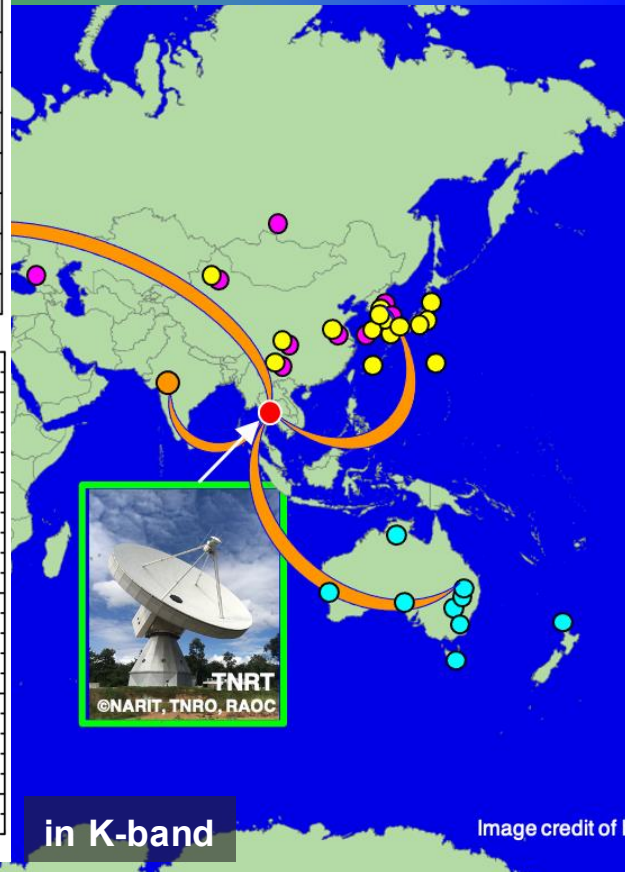
Image credit of background world-map:

Illust AC



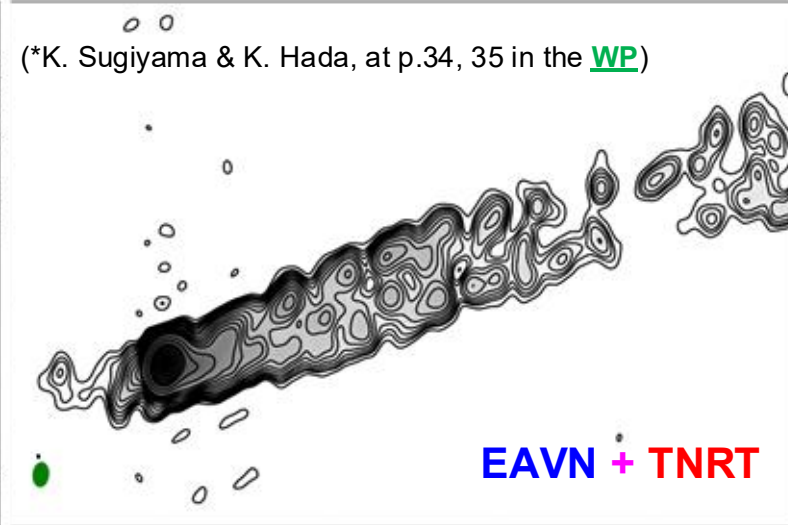
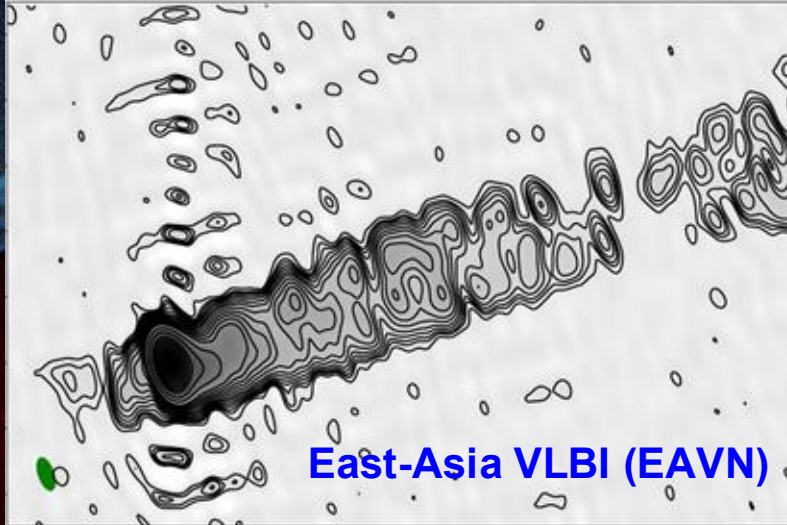
Options for VLBI

- VLBA
- EAVN
- EVN
- LBA
- GMRT

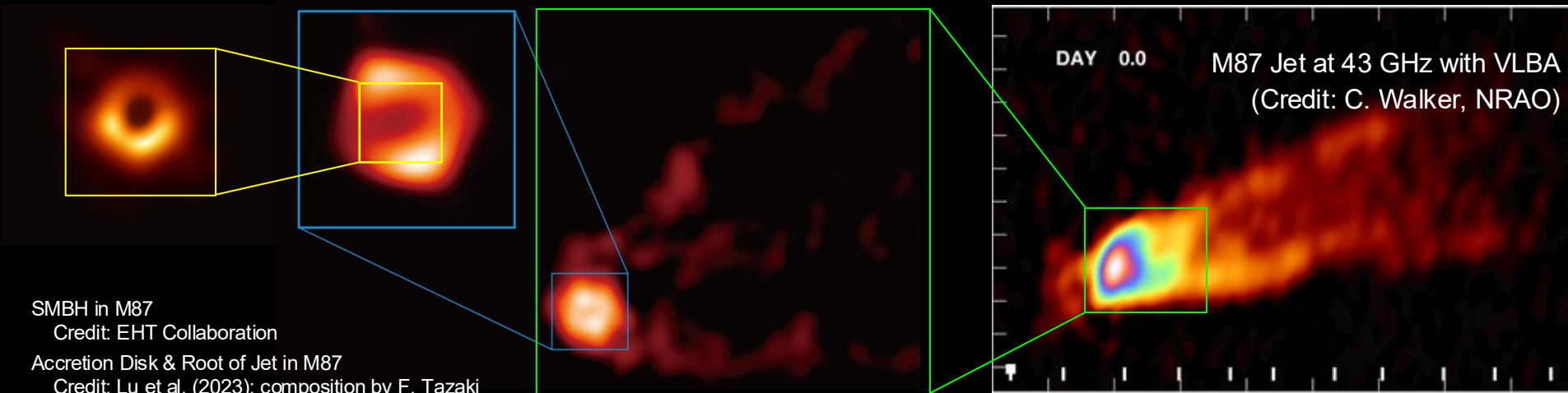


in K-band

Image credit of background world-map:
Illust AC



Simulated results of VLBI obs case towards Active Galactic Nucleus M87 at 22 GHz in K-band.



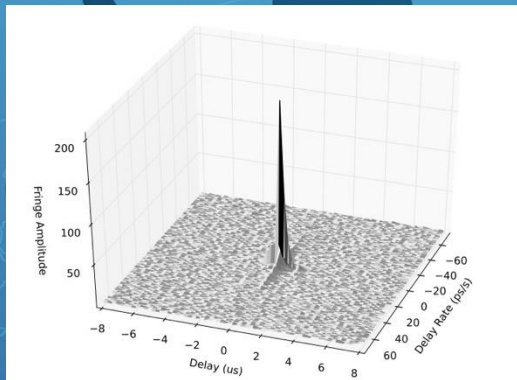
Milestone of the 1st VLBI Fringe Detection of TNRT with Effelsberg 100m in L-band, 16th May 2024



Effelsberg Radio Telescope
(100-m)



~8,500 km



Thai National Radio Telescope
(40-m)



ก้าวไปอีกขั้น! กล้องโทรทรรศน์วิทยุแห่งชาติ
เชื่อมต่อกับกล้องของเยอรมนีด้วยเทคนิค VLBI
สำเร็จเป็นครั้งแรก

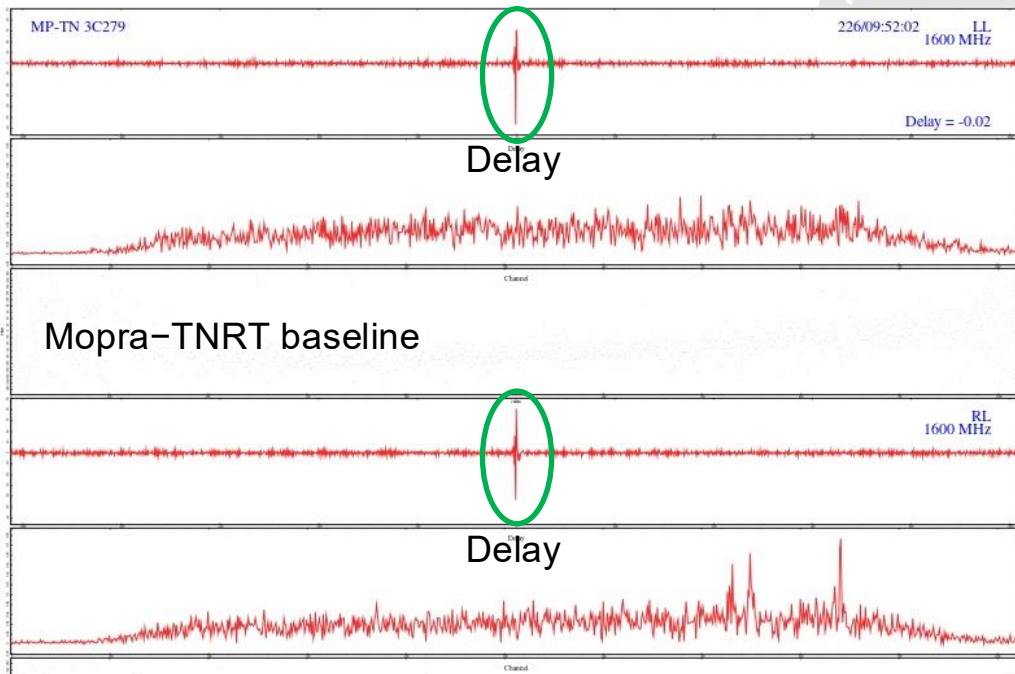
NARIT: [Eng ver.](#), [Thai ver.](#), [Facebook](#); **MPIfR:** [Eng ver.](#), [German ver.](#)

The Long Baseline Array

The First VLBI Fringe for TNRT in the Southern Hemisphere!, with Mopra/Parkes

Harnessing the science of very long baseline interferometry to see our Universe at the highest resolution

- CSIRO radio telescopes
- CSIRO managed NASA telescopes
- University of Tasmania telescopes
- AuScope telescopes
- Site of AuScope and University of Tasmania telescopes



Test on 14th Aug 2025

Correlated at DiFX by,
Chris Phillips & Cormac Reynolds (ATNF/CSIRO)



- Australia Telescope Compact Array
Gomeri Country
- Mopra radio telescope
Gamilaroi Country
- Parkes radio telescope, Murrumbidgee
Wiradjuri Country
- Canberra Deep Space Communication Complex
Ngunnawal and Ngambri Country

radio telescope
Country

Hobart radio telescopes
Paredarmerne Country

©ATNF/CSIRO

Correlated at DiFX by Chris Phillips & Cormac Reynolds (ATNF/CSIRO),
Plot Credit: C. Phillips, C. Reynolds, Phil Edwards, Nobuyuki Sakai, Yu-an Chen, Teep Chairin, KS, et al.



VLBI Experiments Planning afterwards, e.g., JIVE.

- Fringe test with **MeerKAT (+ LBA)**, in August 2025
(C. Phillips, C. Reynolds, N. Sakai, K. Sugiyama, G. Wieching, +)
 - 64/128 Msps for the first time with the TNRT
 - On-going data correlation at CSIRO for MeerKAT – TNRT...
- Planning for a fringe test with **JIVE**
(A. Slowikowska, B. Campbell, M. Verkouter, B. Marcote, Z. Paragi, J. Oh, N. Sakai, K. Sugiyama, et al.)
 - Kick-off online meeting on 4th Dec 2025
 - Data format, transfer scheme, scheduling, objectives, correlation, policy of data protection, publicizing, etc.
 - Had an invitation for the next experimental VLBI in May/June 2026, but could not cause of the on-going severe issues...
- Move forward to evaluate VLBI data quality on FITS format basis through data reducing via AIPS/CASA, with preparing essential calibration tables, etc.

The Long Baseline Array

Harnessing the science of very long baseline interferometry to see our Universe at the highest resolution

©ATNF/CSIRO



Hobart radio telescopes
Paredarmerre Country

December 4th, 2025 (Thr)

Kick-off Meeting for a VLBI demonstration between JIVE/EVN and NARIT in L-band

Date/Time: December 4th, 2025 (Thr), 09:30-10:30 CET (= 15:30-16:30 TST)

Venue: Online (Zoom)

Participants:

- JIVE: Bob Campbell, Marjolein Verkouter, Benito Marcote, Zsolt Paragi
- NARIT: Koichiro Sugiyama, Nobuyuki Sakai, Teep Chairin, Bannawit Pimpanuwat, Kritsada Angkaw

Agenda:

1. Current issues of L-band system on the 40-m Thai National Radio Telescope (TNRT)
2. Steps of testing
3. Policy of data protection: Because VLBI mode of TNRT is still under commissioning, and it is better to concrete this policy when initiates the join fringe-detection observations in obs allocated in an official session,
4. Data transfer
5. Sampling rate: Cause that there are still limitation at TNRT,
6. Compatibility of data format
7. Data storage server: HDD at JIVE correlator center,
8. Publicizing
9. Contact points: JIVE, EVN, CBD, etc.
10. etc.

● CSIRO radio telescopes
○ CSIRO managed NASA telescopes
● University of Tasmania telescopes
● Australia telescopes
○ Site of Jive and University of Tasmania telescopes

Katherine radio telescope
Jawyn Country

ASKAP radio telescope
Wajarri Country

Yarragadee radio telescope
Amangami Country

Ceduna radio telescope
Wirangu Country

Australia Telescope Compact Array
Gomerri Country

Mopra radio telescope
Gamililarri Country

Parkes radio telescope, Murriyang
Widjadjuri Country

Canberra Deep Space Communication Complex
Ngunnawal and Ngambri Country

TNRO: Thai National Radio Astronomy Observatory

VGOS Radio Telescopes



Grand Opening of VLBI Global Observing System (VGOS) telescope in Chiang Mai, on **16 May 2025!!**



Apichat
Leckngam



In collaboration with **Shanghai Astronomical Observatory, Chinese Academy of Sciences, China**



Credit
Facebook of NARIT,
and [Web-page](#)

Big Lift of VGOS in Nakhon Si Thammarat, on 22 Sep 2025!!



President of Walailak Univ.
Prof. Dr. Sombat Thamrongthanyawong

Executive Director of NARIT
Dr. Wiphu Rujopakarn

Credit: [Facebook of Walailak University](#) and [NARIT](#), & [Web-page](#)

แผนดำเนินการติดตั้งกล้องโทรทรรศน์วิทยุแบบวิกอสในประเทศไทย

Thai National VLBI Array (TVA), Phase 1



กล้องโทรทรรศน์วิทยุแห่งชาติ

Thai National Radio Telescope (TNRT)

ขนาดเส้นผ่านศูนย์กลาง 40 เมตร

รับสัญญาณได้ในช่วงความถี่ 0.3 - 115 GHz

Operation since 2023

กล้องโทรทรรศน์วิทยุแบบวิกอส

VLBI Geodetic Observing System

Radio Telescope (VGOS)

ขนาดเส้นผ่านศูนย์กลาง 13 เมตร

รับสัญญาณได้ในช่วงความถี่ 2 - 14 GHz



VGOS
telescopes



Operation since 2025



เชียงใหม่ Chiang Mai

ที่ตั้ง: หอสังเกตการณ์ดาราศาสตร์วิทยุแห่งชาติ
ภายในศูนย์ศึกษาการพัฒนาห้วยฮ่องไคร้
อันเนื่องมาจากพระราชดำริ
อ. ดอยสะเก็ด จ. เชียงใหม่

Eurasian
Plate

Sunda
Plate

Big lift on 22 Sep 2025

Nakhon Si Thammarat

นครศรีธรรมราช

ที่ตั้ง: มหาวิทยาลัยวลัยลักษณ์
ต. ไทยบุรี อ. ท่าศาลา จ. นครศรีธรรมราช

Songkhla

สงขลา On-going building

ที่ตั้ง: หอดูดาวเฉลิมพระเกียรติ
7 รอบ พระชนมพรรษา สงขลา
ต. เขารูปช้าง อ. เมืองสงขลา จ. สงขลา
มีกำหนดติดตั้งกล้องในเดือนธันวาคม 2568

VLBI Data Correlation Center

at Center for IT, NARIT



Installation Success

on Aug 14, 2025.

Supported by
NARIT CIT, SimpleHPC company,
 and Director of NARIT Wiphu, &
SHAO correlator GP leader (F. Shu)



Slide Credit: Yu-An Chen (Victor)

Preliminary Correlation Result

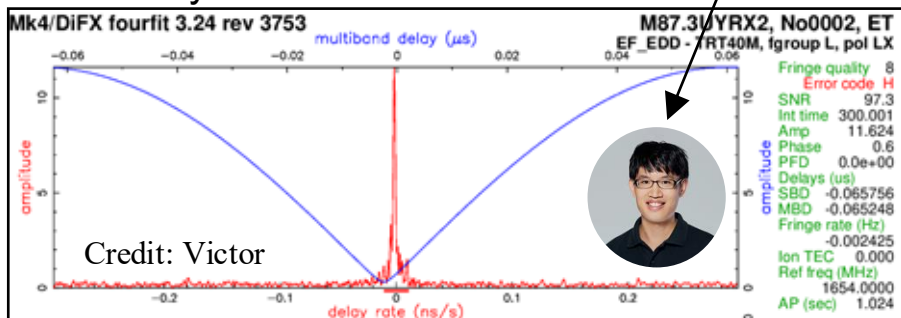


Figure 1. Fringe Detection Plot Generated from NARIT Correlator

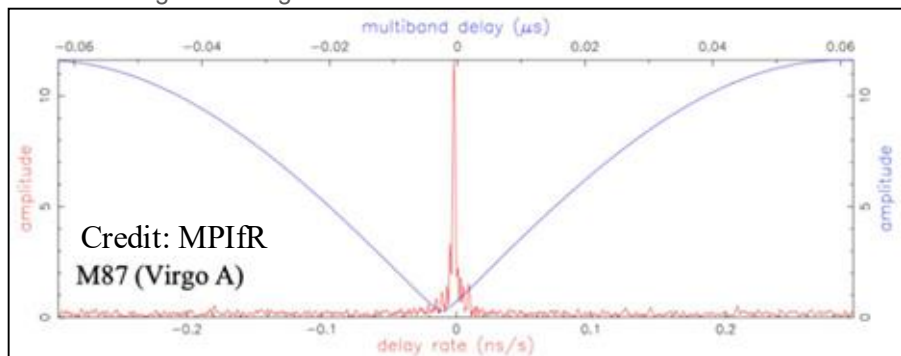
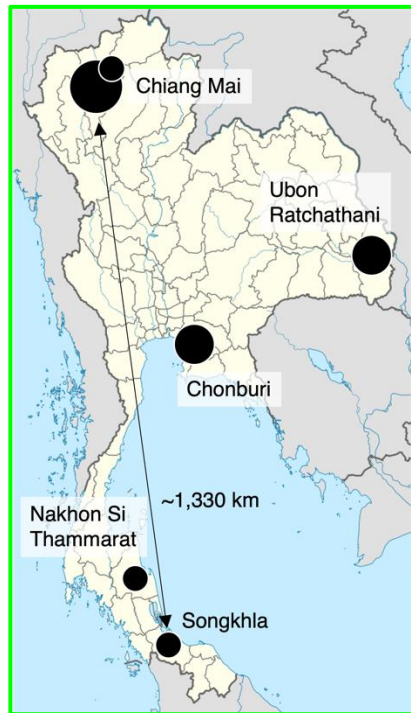


Figure 2. [Fringe Detection Plot Generated at MPIfR in 2024](#)

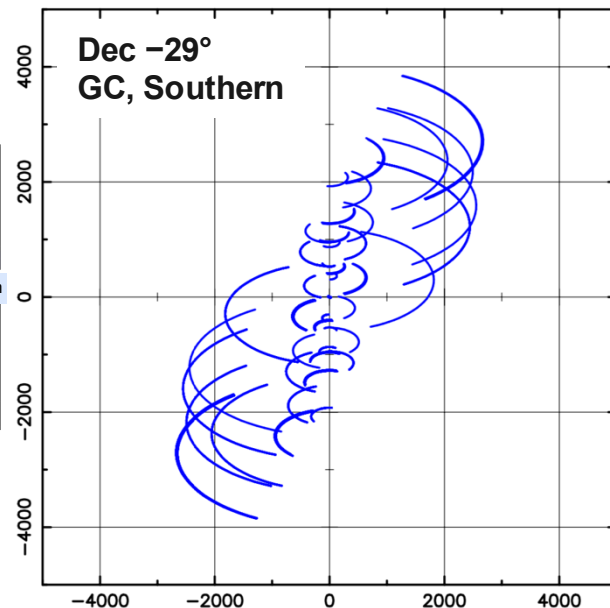
Server Specifications

Compute	> 48 cores: Intel Xeon Gold CPU @2.80GHz
Memory	> 263 GB
Storage	> System: 446 GB - RAID1 > Data: 163 TB - RAID6
Networking	> Infiniband: 56 Gbps > Fiber Optic Bond Connection: 2x10 Gbps
System Softwares	> CentOS7 > DiFX, HOPS, nuSolve, SKED, PGPLOT

Vision for the Future: **South-East Asian VLBI Network** in C/X/Ku/K-bands, 2027-2028 (?) ~



Background © NordNordWest in Wikipedia



Two issues constrain TNRT readiness

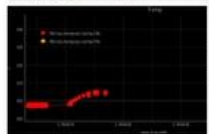
Restore receiver cryogenics and stabilize critical-room cooling before normal operations resume.

Issue 1 Receiver cryogenics

Receiver restoration in progress



The coldhead run with loud sound



The temperature is increased after run > 30 min

Action: we change the new compressor to maintain the coldhead
Result: It still running with loud sound and the temperature is ramp up.

Plan to Maintenance 6/30 cold head:

Already have the service kit for maintenance the cold head 6/30



Action:

Have a plan to maintenance the coldhead. Waiting permission from manager to teardown the coldhead

K-band receiver behavior and cold-head service kit. Credit: Dan Singwong

Impact — L-/K-band cannot cool below ~20 K; one L-band polarization path is down.

Evidence — SL18 helium leak, failed LNA, & degraded or overdue cold heads.

Next — Replace an LNA; Cold-head cleaning with MPIFR: K-band will be restarted from mid-Sep 2026

Issue 2 Air-conditioning

Facility repairs in progress



TNRT control-building service area. Credit: Nikom Prasert

Impact — Backend, control, and UPS rooms face thermal risk.

Evidence — Units failed on 22 Mar, 24 Mar, and 16 Apr 2026.

Next — Close DFMS repairs; on-going verify cooling capacity and redundancy, will be restarted early-Sep

Decision focus Set owners and dates for monitoring the receiver AC conditions to reduce those risks any more

CXKu-band Development with CETC16-CAS & MPIfR



CETC16-CAS, China:

Wideband low-noise CXKu-band receiver, 4.55-13.65 GHz



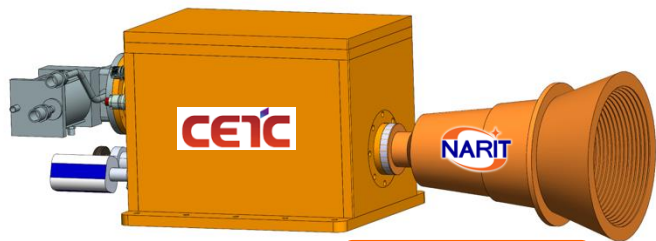
NARIT, Thailand:

Colgate feedhorn and Mirror for CXKu-band system



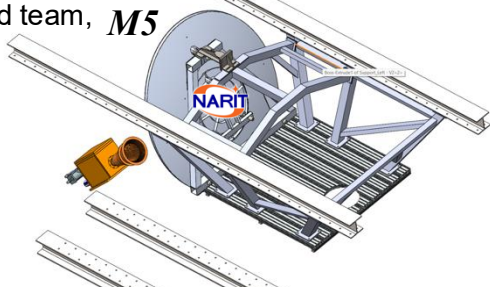
MPIfR, Germany:

Backend of D/C and EDD (Annex since Sep 2024 ~)



Preliminary

Credit: Dan, Pichate,
with his frontend team, *M5*
NARIT, MHESI



Credit: CETC16, CAS

CXKu-band receiver setup

K band
receiver

CXKu band
receiver

Feed Horn CXKu band
for 4.55-13.65 GHz

M5 mirror
offset parabolic mirror

CXKu-band
Receiver

Receiver Table and
Its Supporting Structure

Supporting structure

