

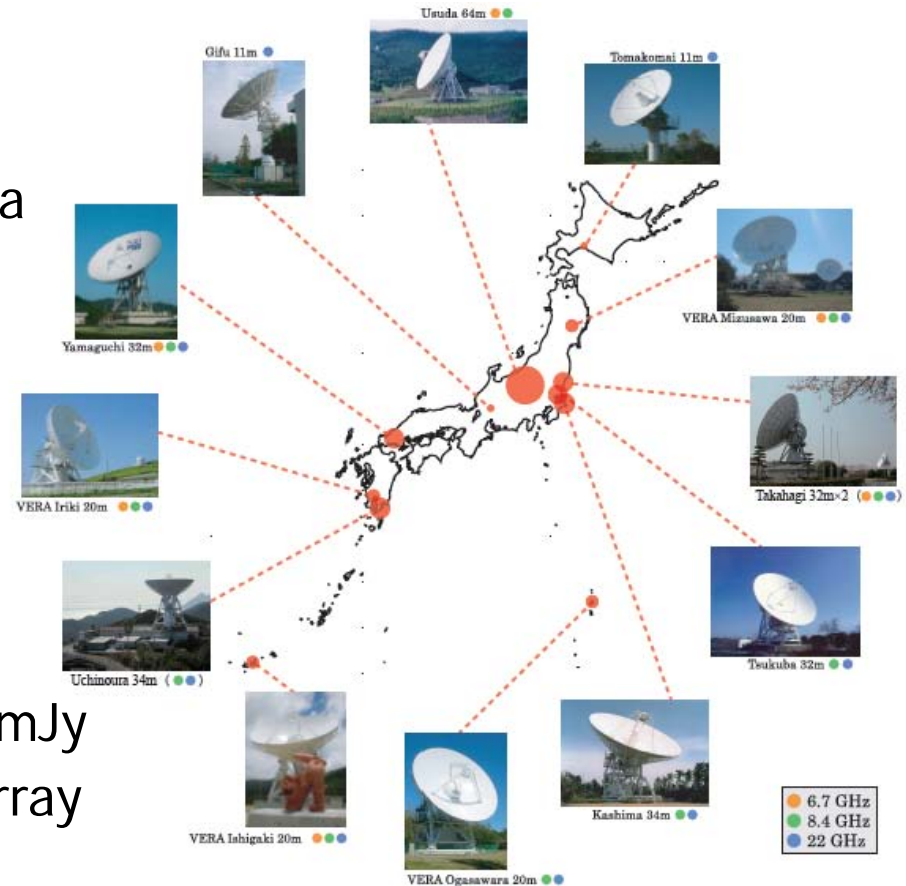
# Japanese VLBI Network (JVN)

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# Japanese VLBI Network (JVN)

Astronomical VLBI Network since 2004

- Collaboration
  - NAOJ (VERA)
  - Hokkaido, Ibaraki, Tsukuba, Gifu, Osaka-Pref, Yamaguchi, Kagoshima universities
  - JAXA, NICT, GSI
- Specifications
  - 13 telescopes (11m ~ 64m)
  - Baseline 50 - 2500 km
  - Frequency 6.7/8/22 GHz
  - Sensitivities (8 GHz, 128 Mbps) 3 mJy
  - High-Speed e-VLBI (2 Gbps) subarray
- Operation
  - Under collaboration of Universities



JVN 13 Telescopes

# JVN Website



The image shows a screenshot of a web browser displaying the Japanese VLBI Network website. The browser's address bar shows the URL <http://www.astro.sci.yamaguchi-u.ac.jp/jvn/>. The page features a header with the text "JAPANESE VLBI NETWORK" in large, bold, yellow letters. Below the header is a navigation menu with links for "HOME", "Array Status", "Publications", and "Proposing". A welcome message reads "Welcome to the Japanese VLBI Network!". On the left side, there is a language selector for "日本語" (Japanese) and a link to the "Bulletin". The main content area is titled "JVN Bulletin" and contains a paragraph describing the network as a collaborative project of various Japanese institutions. To the right of the text is a map of Japan with several satellite antenna locations marked. At the bottom of the page, a copyright notice states "Copyright © Since 2005, Japanese VLBI Network, All Rights Reserved."

HOME Array Status Publications Proposing

Welcome to the Japanese VLBI Network !

日本語  
[Bulletin](#)

**JVN Bulletin**

The Japanese VLBI Network (JVN) is a collaborated project of universities and institutes which manage VLBI antennas in Japan. The project is led by Hokkaido University, the National Astronomical Observatory of Japan (NAOJ), Ibaraki University, Tsukuba University, the Geographical Survey Institute (GSI), the National Institute of Information and Communications Technology (NICT), the Japan Aerospace Exploration Agency (JAXA), Gifu University, Osaka Prefecture University, Yamaguchi University, and Kagoshima University.

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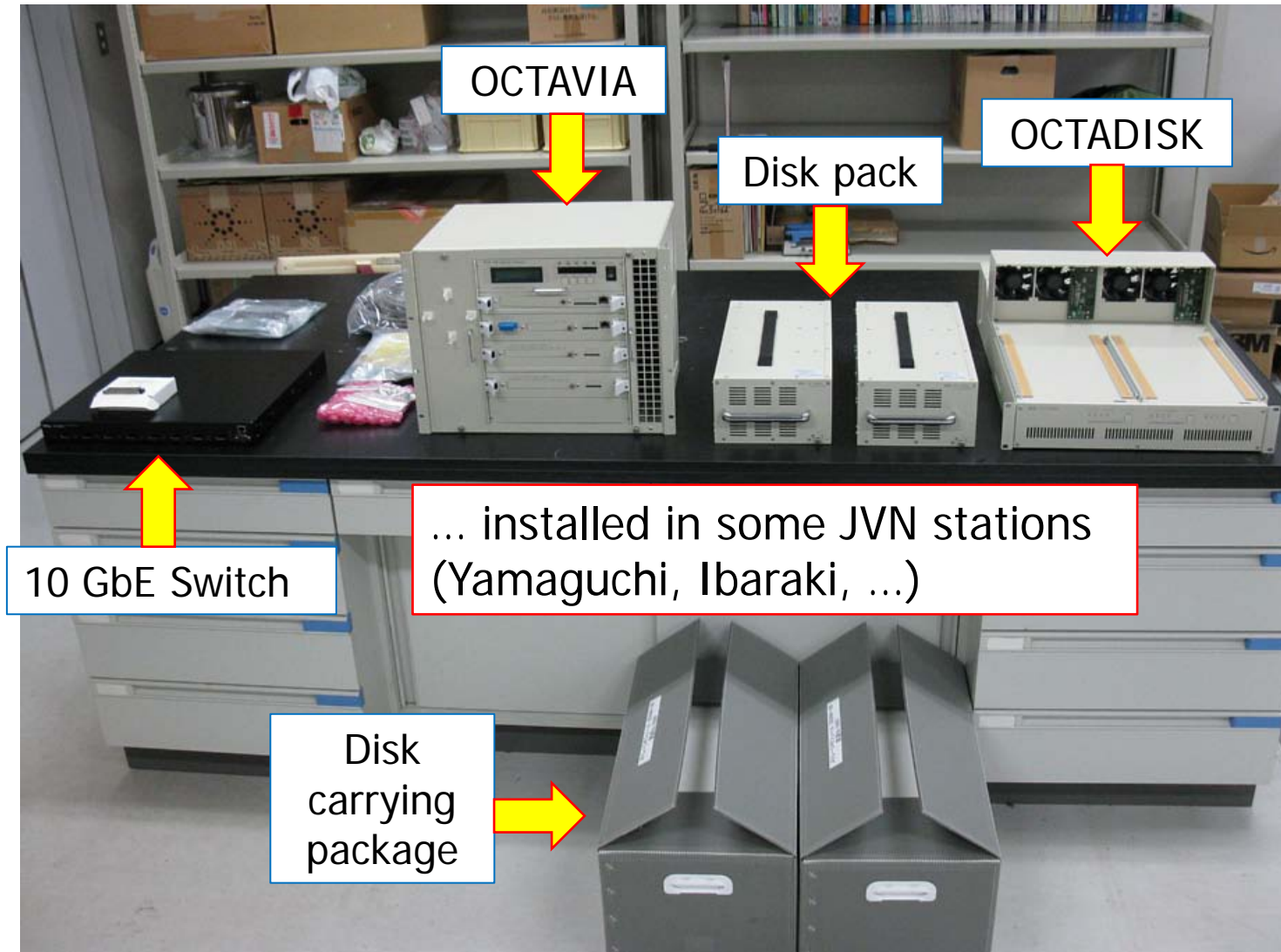
<http://www.astro.sci.yamaguchi-u.ac.jp/jvn/>

# VLBI terminals for JVN observation

- DIR-1000 (VSOP Terminal)
  - Tape based system
  - 128 Mbps (16MHz bandwidth, 2ch, 2bit/sample)
  - Mitaka VSOP-FX correlator
  - Still used for 50% JVN observations, being replaced by OCTAVE
- OCTAVE
  - Disk based system
  - 2 Gbps (various frequency/channel assignment)
  - KJCC or Software correlator
  - Under test phase: fringe detected, image observations to be done near future

# OCTAVE system

VSI based VLBI terminal  
8 Gbps (max) recording capacity  
Mk5B compatible  
East-Asian Correlator (KJCC)



# Published Papers (used JVN)

19 papers have been published so far

AGN (9)	Maser/Star (10)
Wajima et al. (2014)	Sugiyama et al. (2014)
Doi et al. (2013)	Fujisawa et al. (2014)
Niinuma et al. (2012)	Sawada-Satoh et al. (2014)
Kadota et al. (2012)	Fujisawa et al. (2012)
Nagai et al. (2010)	Matsumoto et al. (2011)
Doi et al. (2009)	Sugiyama et al. (2011)
Tsuboi et al. (2008)	Nagayama et al. (2008)
Doi et al. (2007)	Sugiyama et al. (2008)
Doi et al. (2006)	Motogi et al. (2008)
	Sugiyama et al. (2008)

19 papers → 2 papers per year

# Operation status (1 year from 2013 to 2014)

Band	# of Obs	Obs Time (h)	# of Telescopes	Scientific Targets
6.7	8	63	6~7 (VERA, Yamaguchi, Hitachi, Usuda and Shanghai)	EAVN Monitoring
8	12	82.5	6~7 (VERA, Yamaguchi, Hitachi, Tsukuba, Kashima, Usuda)	NLS1, gamma-ray AGN, etc
22	13	80.5	5~6 (VERA, Takahagi, Tomakomai, Gifu)	Sgr A*, DBSM, etc.
Sum	33	226		

Period : 2013/10/01-2014/09/30

Including e-VLBI observation and test observation

# Publications (last one year)

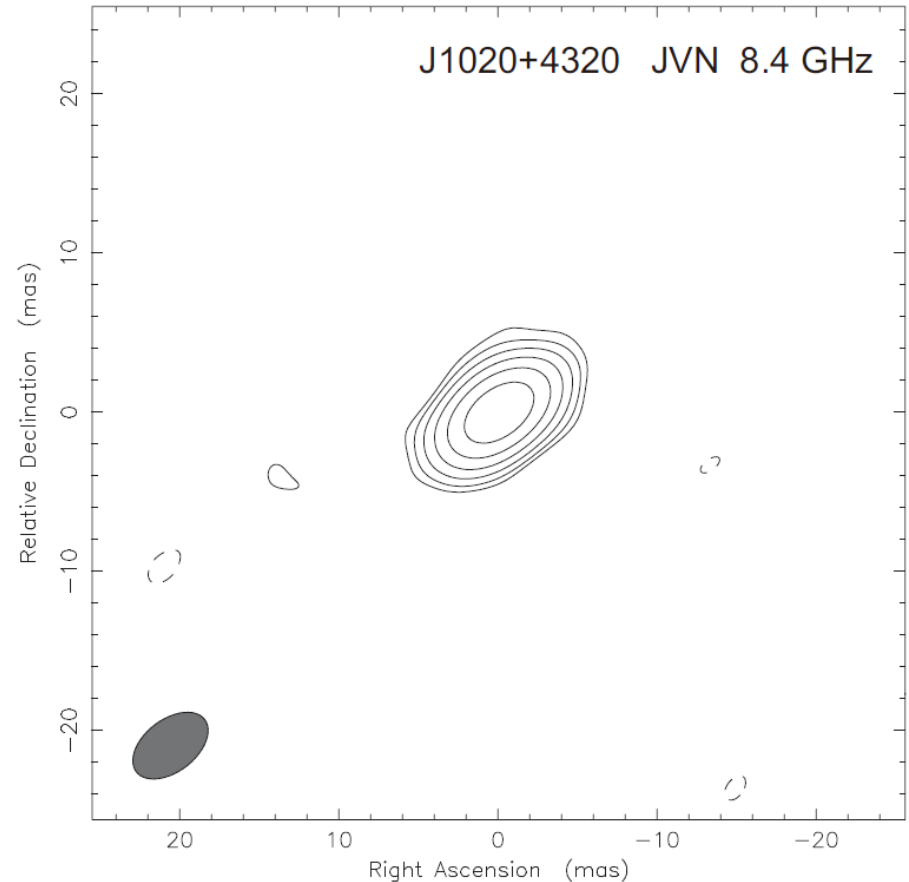
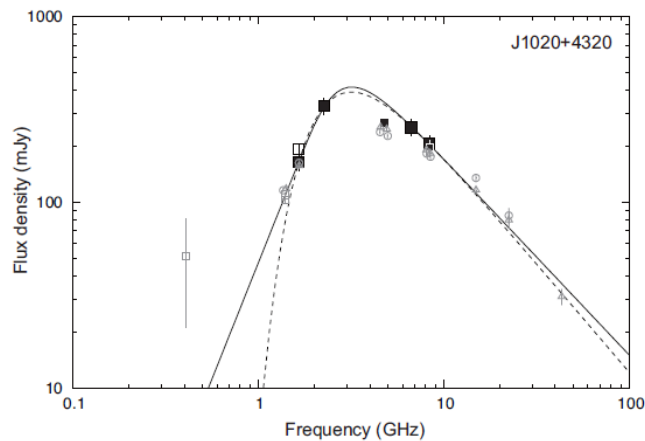
1. Doi et al., (2013) PASJ, 65, 57 (BAL QSO, AGN)
2. Sawada-Satoh et al., (2013) PASJ, 65, 79 (S269, Maser)
3. Fujisawa et al., (2014) PASJ, 66, 31 (EAVN Monitor, Maser)
4. Sugiyama et al. (2014) A&A, 562, 82 (Cep A, Maser)
5. Wajima et al., (2014) ApJ, 781, 75 (NLS1, AGN)



# BAL QSO J1020+4320

Doi et al. (2013)

- Multi-frequency observation
- 1.7 GHz (EVN)
- 2.3, 6.7, 8.4 GHz (JVN)
- Very young jet of 100 yr
- Relation between BAL-outflow and nonthermal jet is studied



**Fig. 1.** JVN image at 8.4 GHz. Contour levels are  $-1$ ,  $1$ ,  $2$ ,  $4$ ,  $8$ ,  $16$ , and  $32$  times  $3\sigma$  of the image rms noise ( $\sigma = 1.2 \text{ mJy beam}^{-1}$ ).

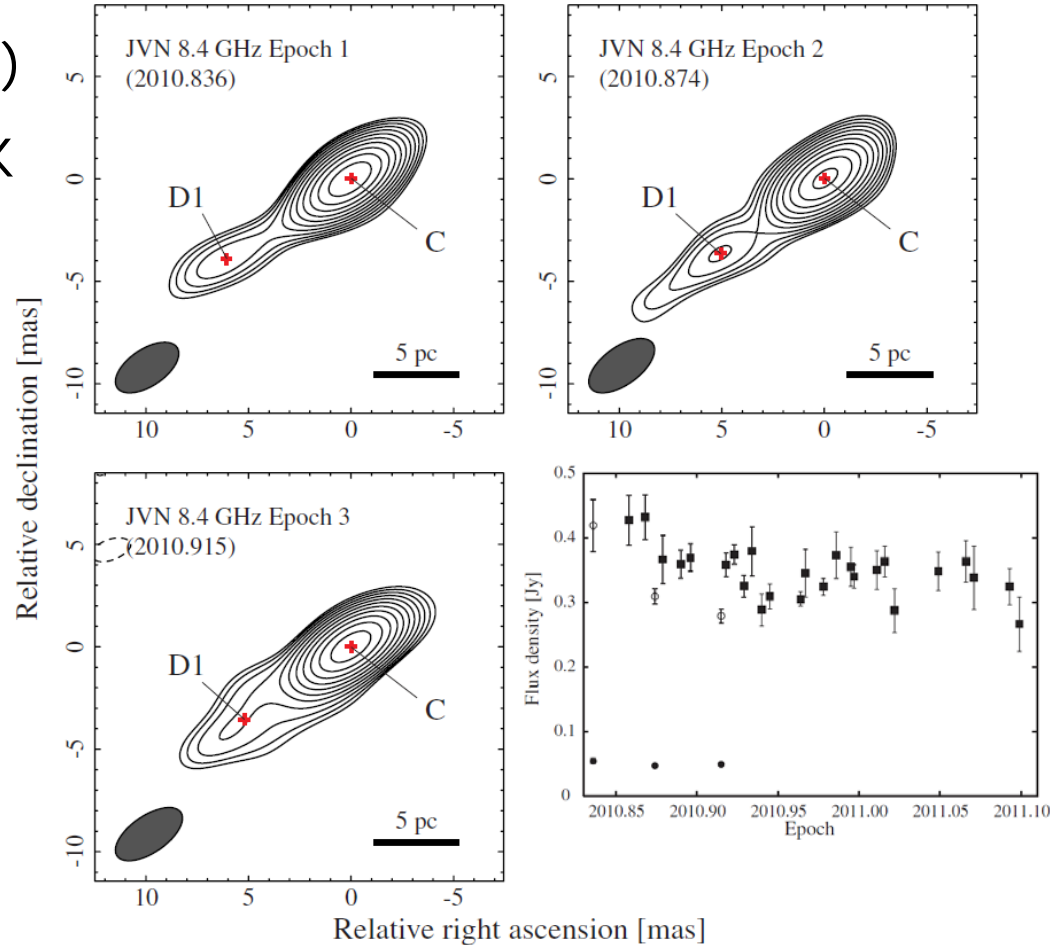
# Gamma-ray emitting NLS1

Wajima et al. (2014)

- Gamma-ray NLS1 (1H 0323+342)
- High brightness  $T_b = 5.2 \times 10^{10}$  K
- Fast variability  $t \sim 30$  days

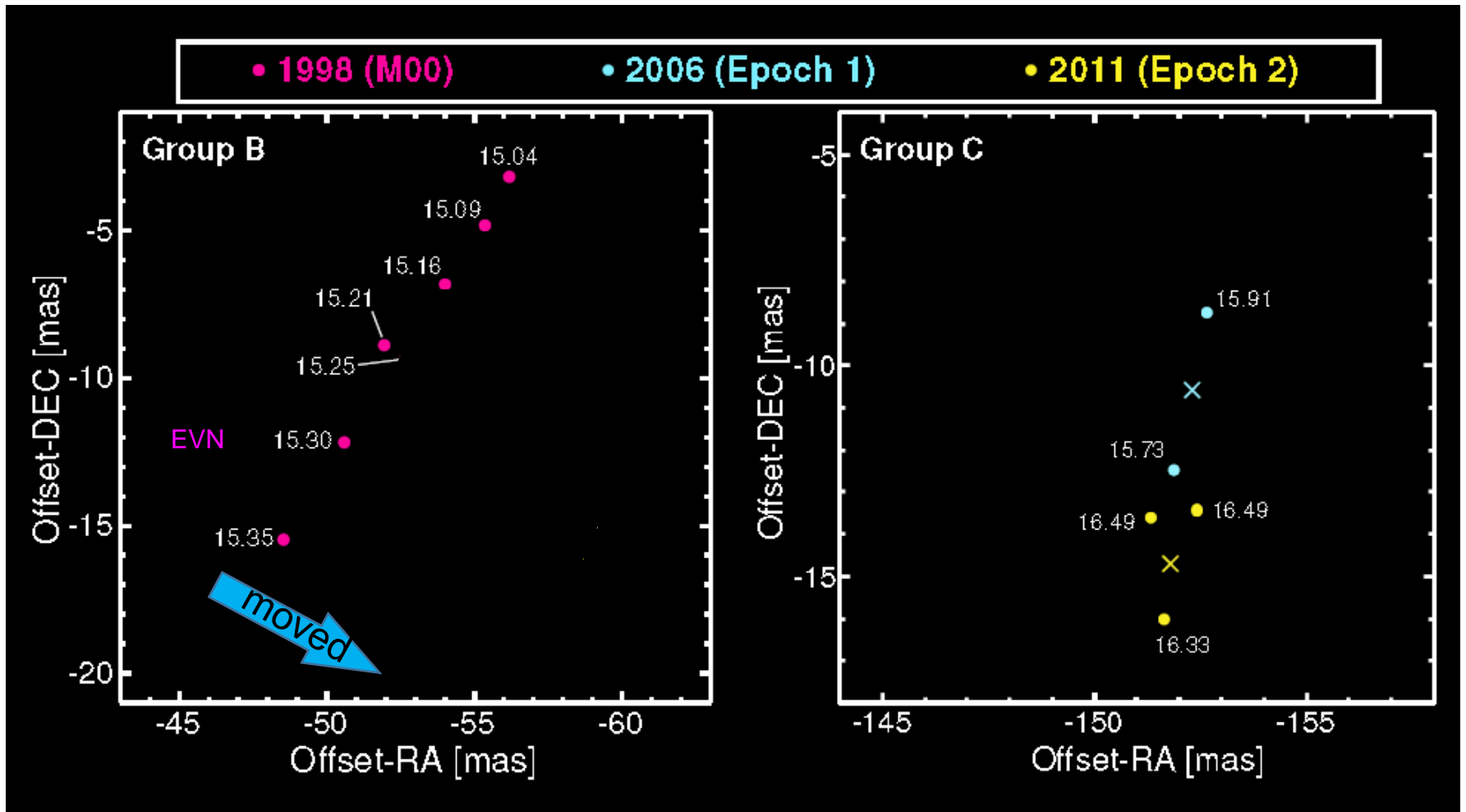


- Doppler boosting with  $\delta \sim 2$ , but intrinsic Radio Loud NLS1
- Jet / particle acceleration ongoing near the core



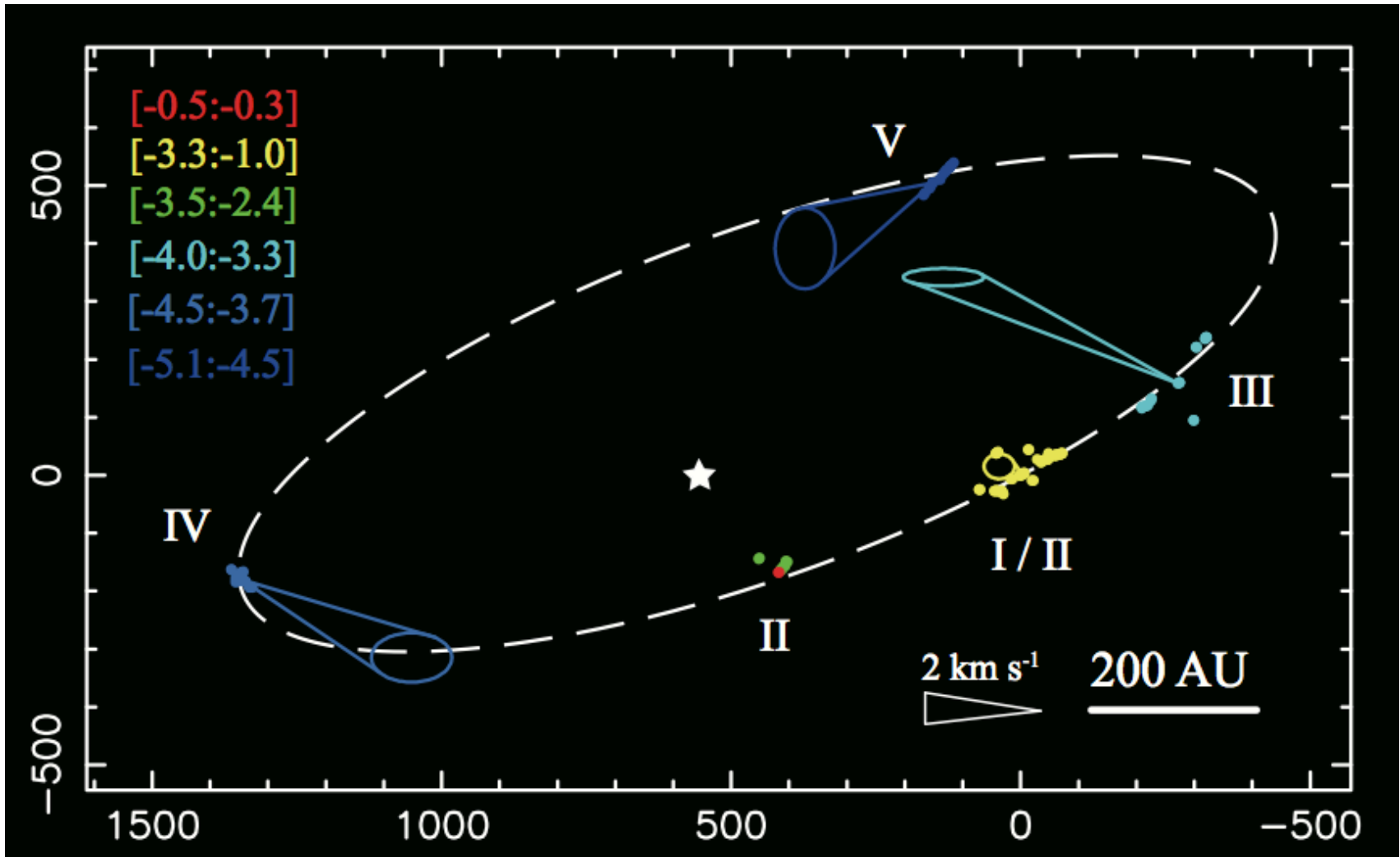
# Internal Motion of 6.7-GHz Methanol Masers in HII Region S269

Sawada-Satoh et al. (2013)



# Proper Motions of 6.7 GHz methanol maser

Accretion with rotation motions in Cep A (Sugiyama et al. 2014)



# Internal proper motion survey project:

EAVN observation of 6.7 GHz methanol masers  
for 36 high-mass star forming regions

Goal:

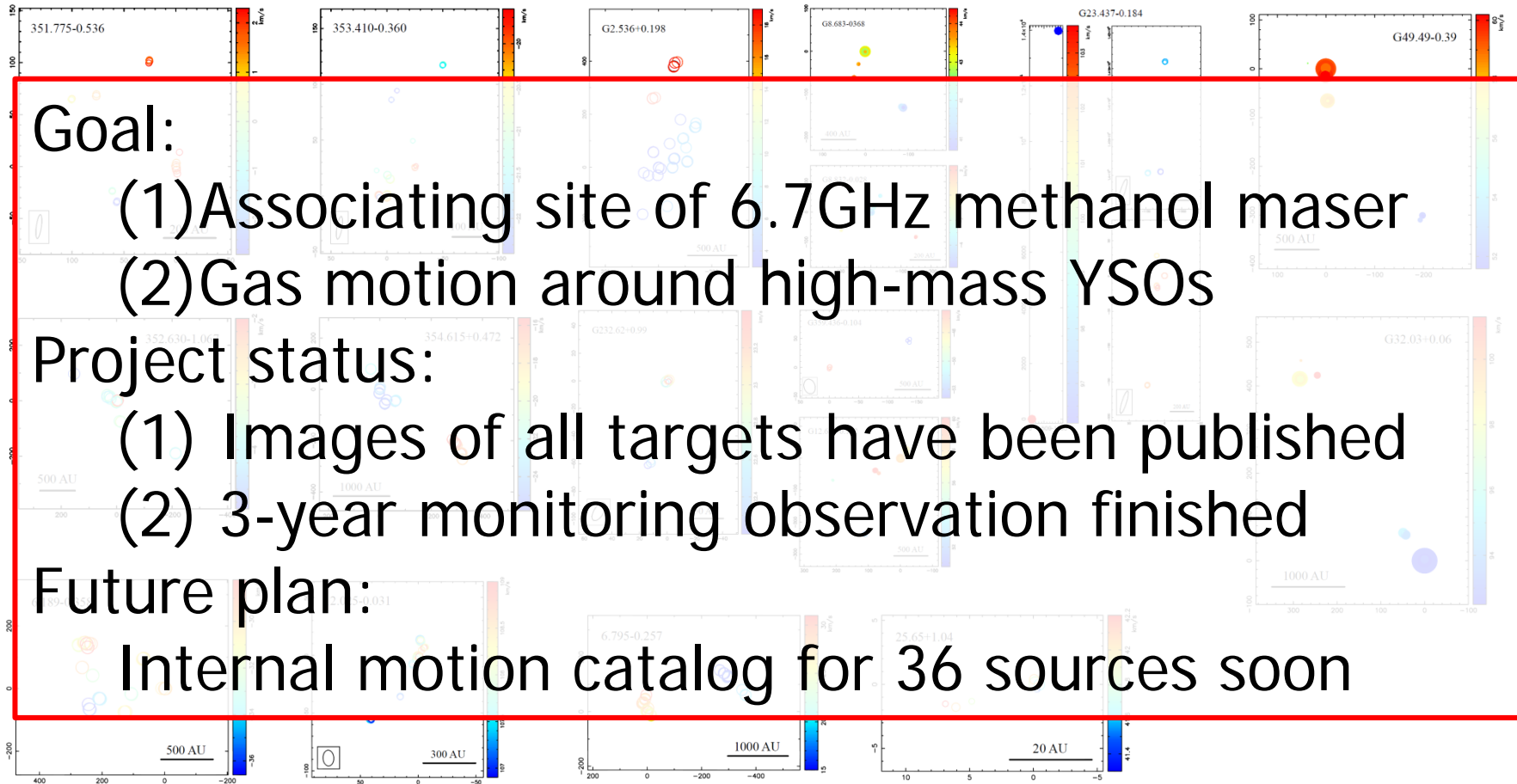
- (1) Associating site of 6.7GHz methanol maser
- (2) Gas motion around high-mass YSOs

Project status:

- (1) Images of all targets have been published
- (2) 3-year monitoring observation finished

Future plan:

Internal motion catalog for 36 sources soon



# Telescopes for the survey



Shanghai 25m



Usuda 64m



VERA 20m x 4



Ibaraki 32m (Hitachi)

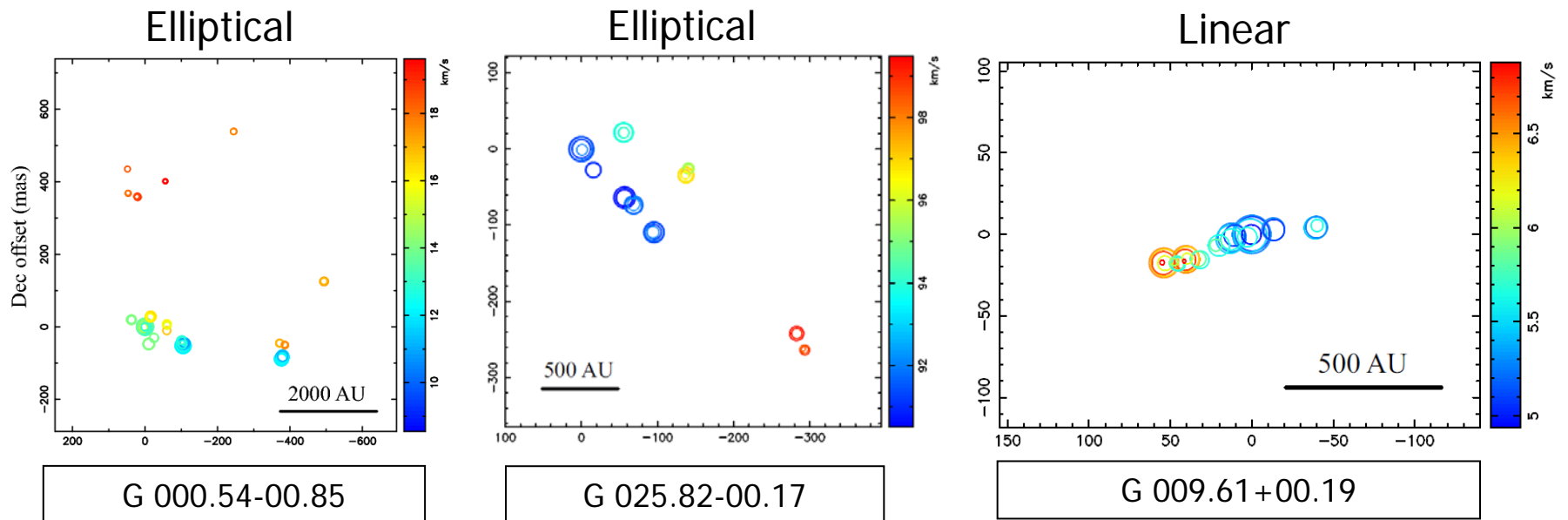


Yamaguchi 32m

# Interesting spatial morphologies

- Spatial morphology: Elliptical, Arched, Linear, Paired, Complex

Candidates of associated with rotating disk

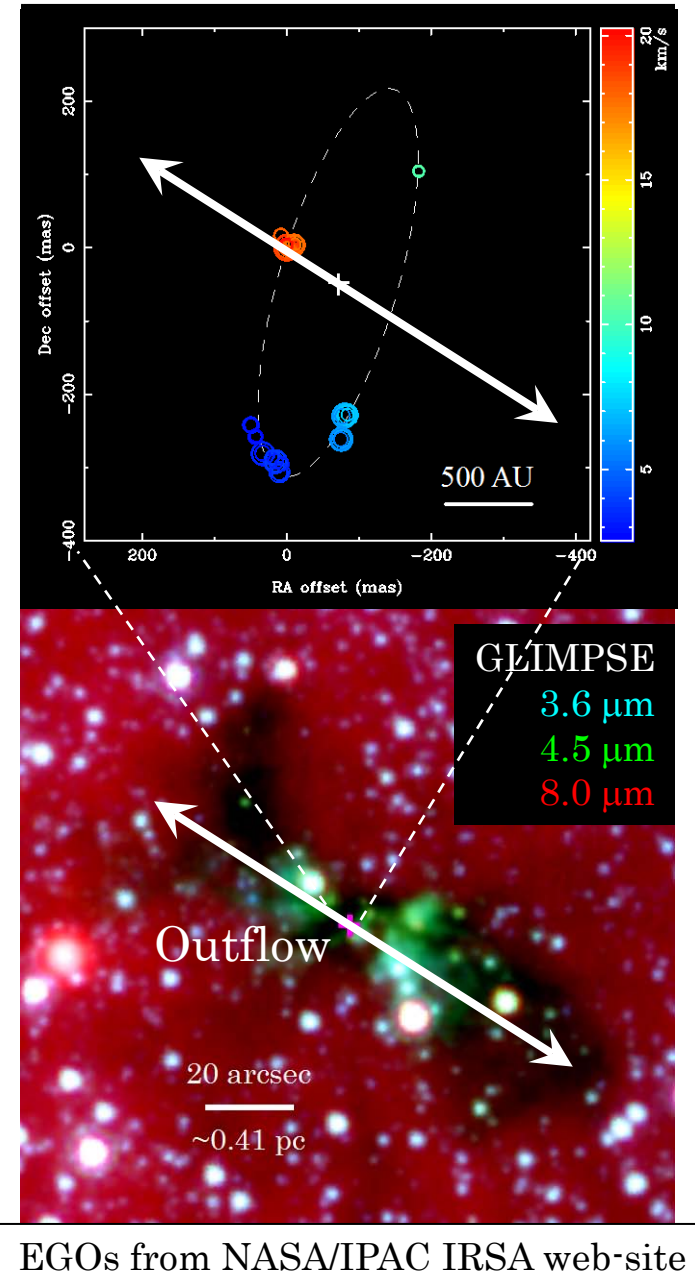


By Sugiyama-san

# Comparison with EGOs

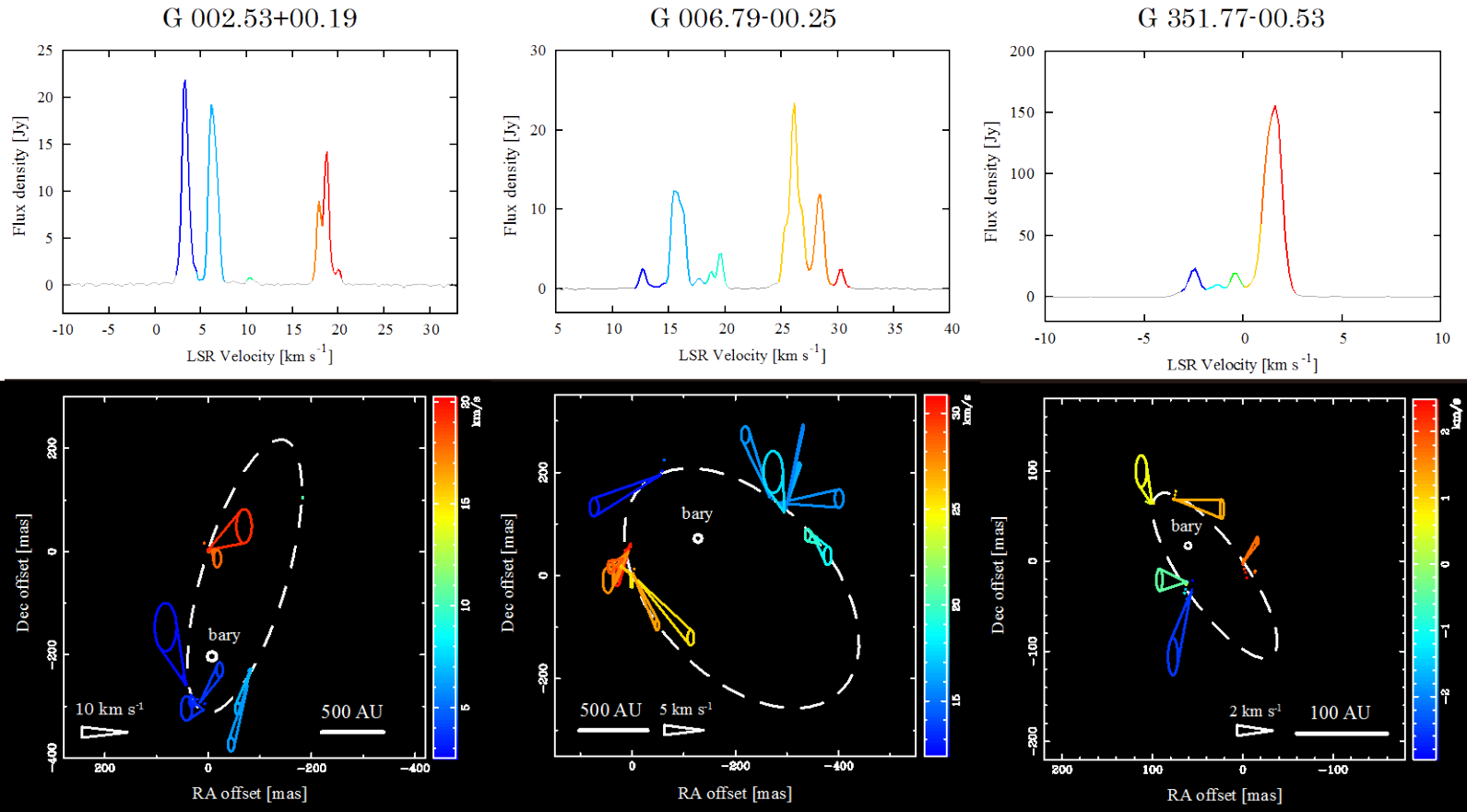
- Extended Green Object
  - Cyganowski et al. (2008)
  - Extended emission at 4.5 mm
  - Shock/Reflection light by outflow from earlier YSO
- Some sources are associated with EGO, and the major axis of the elliptical structure is **perpendicular to the EGO's extension**

Can be good candidates associated with rotating (accretion) disk!





# Measured Internal Proper Motions: Rotating with Expansion?



Preliminary results of Proper motions detected in the EAVN monitor project  
(Sugiyama et al., submitted)

# KaVA and JVN

- 22/43 GHz or higher : KaVA (KVN and VERA Array)
  - Open-use for East-Asia started
  - High-performance at high-frequencies
  - Good imaging capability (7 telescopes)
- 6.7/8 GHz : JVN (and EAVN)
  - Opened for group members
    - Proposal is acceptable from outside if it includes a member of JVN as CO-I
  - Good capability for 6.7 GHz methanol maser
  - 8GHz imaging is also good

# VLBI Networks in East Asia → EAVN

