

2004年 11月 9日 VERA User Meeting [NAOJ/Mitaka]

Rapid Variability in Microquasar Cyg X-3
with Water Maser W75N as a Calibrator [1]:

VERA Observations of Maser Spots in the Star-Forming Region W75N (中間報告)

(2004年 5月 23日 15:15:00-24:50:00UT 観測)



Inoue Makoto (PI: NAOJ),

Honma Mareki (NAOJ),

Kurayama Tomoharu (NAOJ),

Sasao Tetsuo (Aju Univ. & KAO),

Jeong-Sook Kim [金 貞淑]
(Kyunghee Univ. & KAO)

Soon-Wook Kim [金 淳郁]
(Chungnam National Univ.)

VERA Observations of Cyg X-3, W75N & BL Lac

• Calibrator: BL Lac (Quasar) RA = 22^h02^m43.29318^s
 DEC = +42° 16' 39".9799

• Reference: W75N (Water Masers) RA = 20h38m36.902s
 [Beam A] DEC = +42° 37' 36".472

• Target: Cyg X-3 (Micro-quasar) RA = 20h32m25.773s
 [Beam B] DEC = +40° 57' 27".965

W75N and Cyg X-3 are about 2 degree apart from each other

Observational Mode:

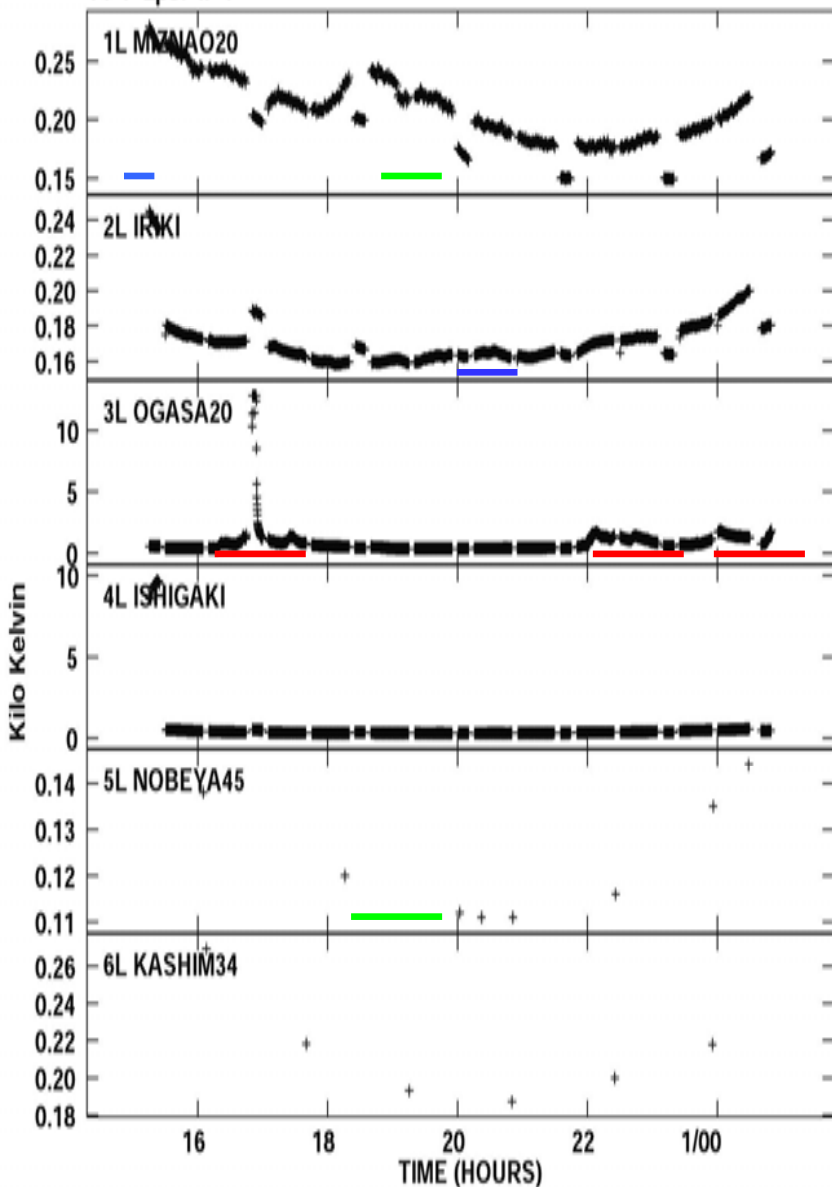
10– 35+35 –10– 35+35 –10– 35+35 –10– 35+35 –10– 35+35 –10 –30+30– 10

BL **Cyg/W** BL **Cyg/W** BL **Cyg/W** BL **Cyg/W** BL **Cyg/W** BL **Cyg/W** BL

Miz(x)

IRI(x) IRI(x)

Plot file version 26 created 05-SEP-2004 11:49:31
Tsys vs UTC time for CYGX_3.UVDATA.1
TY 1 Lpol IF 1

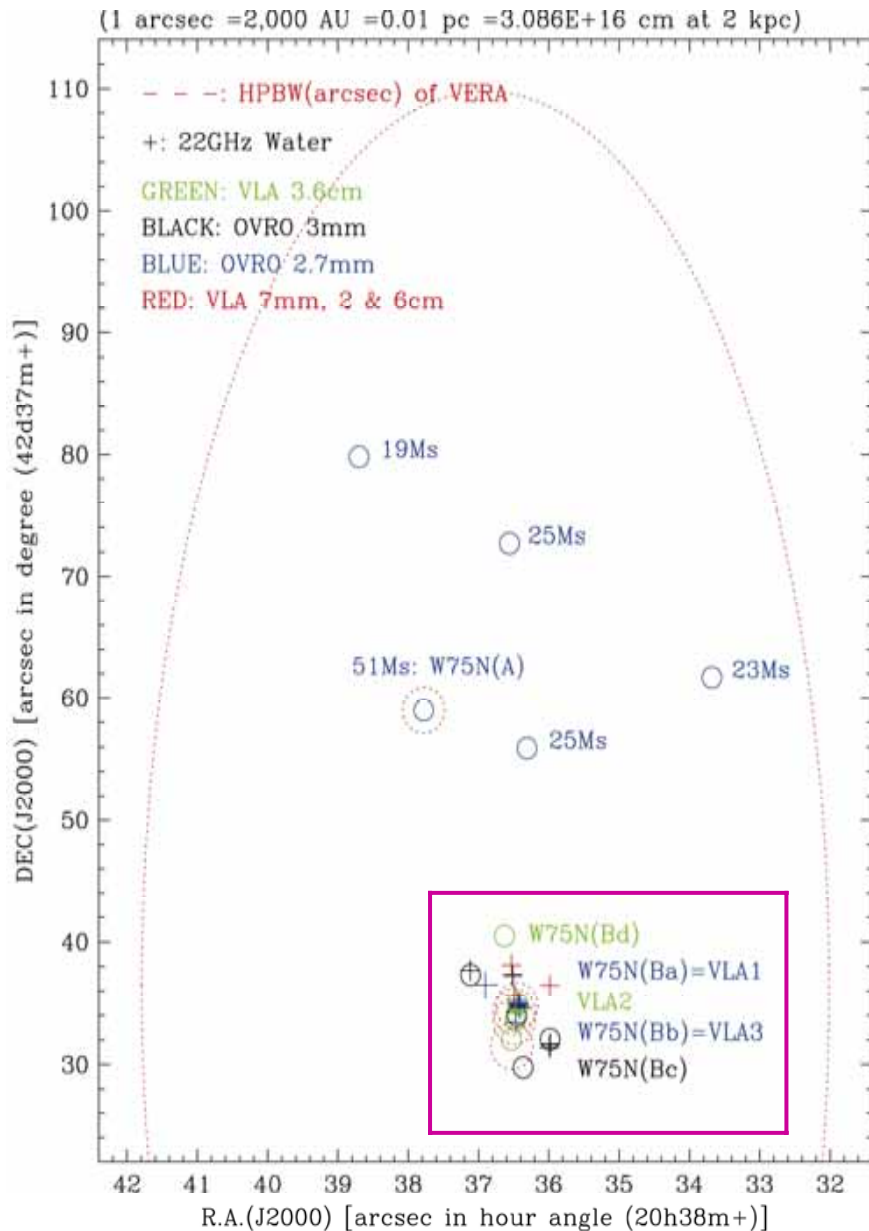


System Temperature

VERA + NRO 45m + CRL 34m

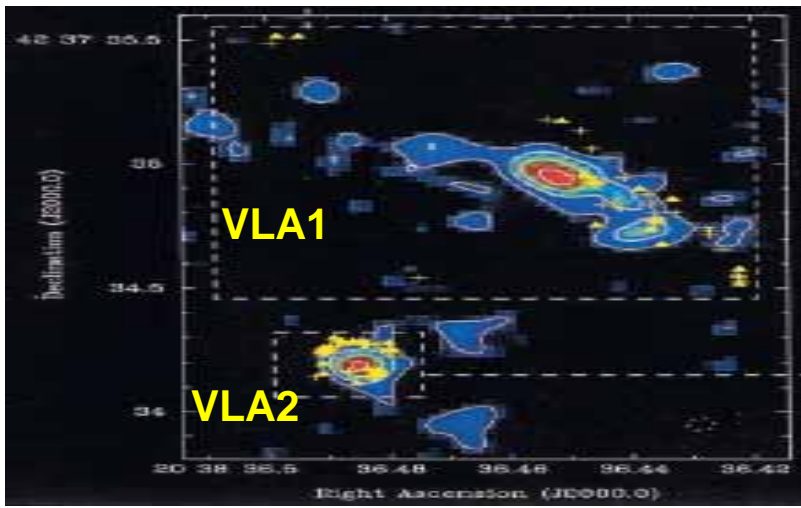
No data due to

- (1) Recording Problem (-)
- (2) Tsys due to Weather (-)
- (3) Elevation (-)



1. W75N: Water Masers

- **W75N is a well-known star-forming region with ample of OH and water maser sources.**
- **Our main consideration: the most populated areas of water maser spots: VLA1, VLA2, VLA3, etc. (box with violet)**



Previous VLBI results: 1999 VLBA & 1996 VLA Observation

VLBA: Torrelles et al. ApJ 598, L115

<Maser Spots>

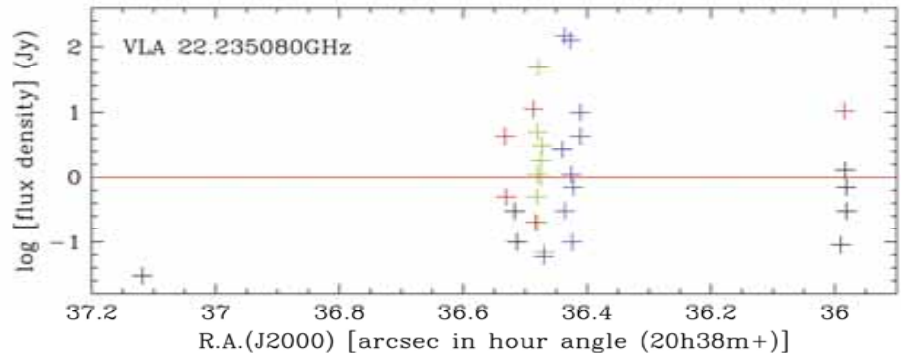
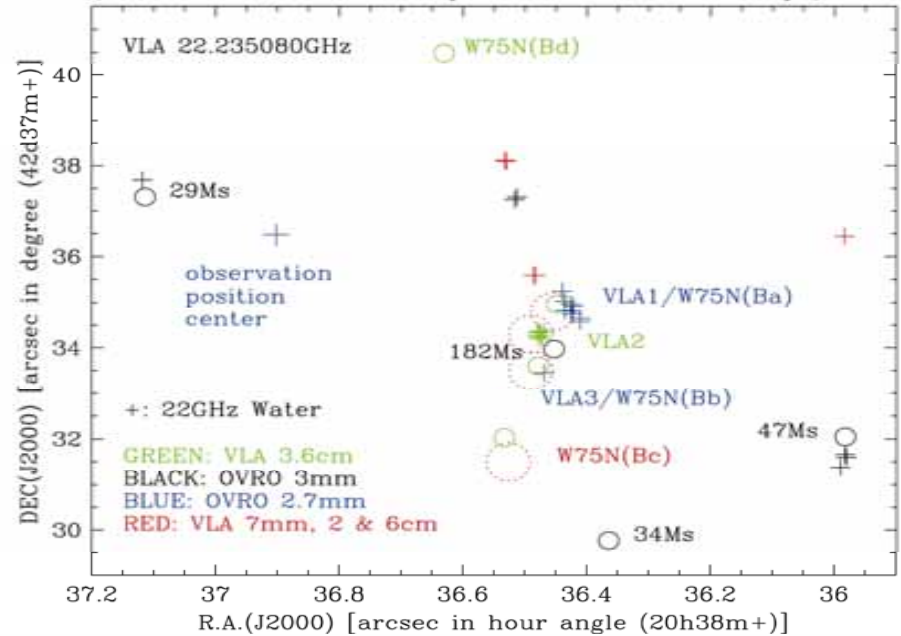
- ~700 spots detected in VLA1 & VLA2, with ~100 Jy for the strongest
- No detection in VLA3

No detailed position information available !

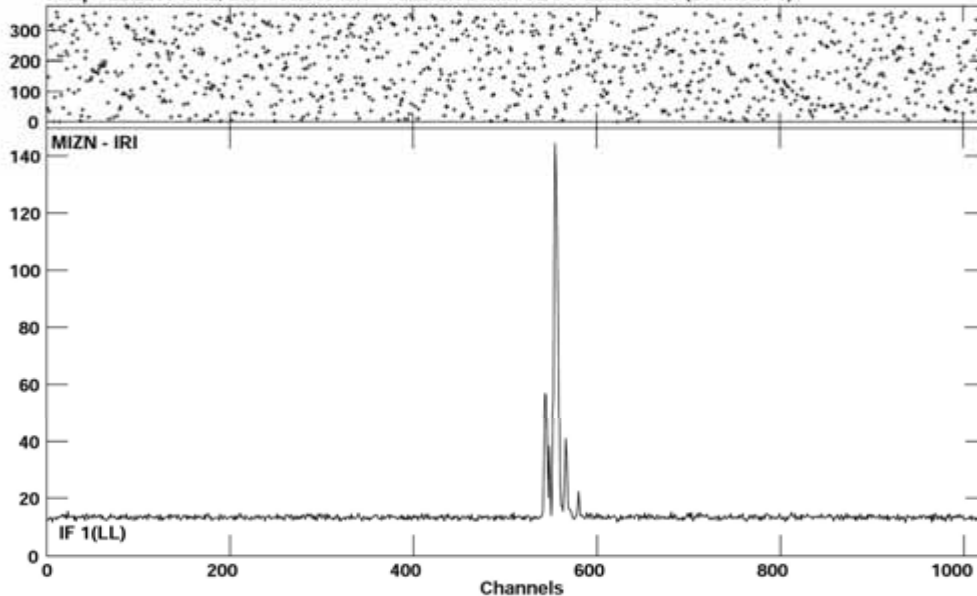
VLA: Torrelles et al. 1997 ApJ 489,744

- known phase tracking center and spot positions !
 - 28 spots found in VLA1 & 2 regions
 - Only one found in VLA3 At 22GHz,
 - VERA's line detection limit > 1 Jy (red line)
- a half of spots in VLA are expected to be detected

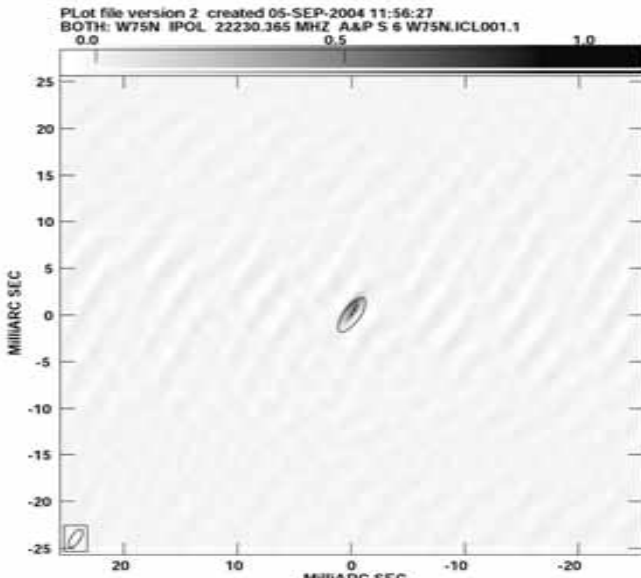
...However, more spots are expected to be found since VERA's resolution is Higher than VLA



Plot file version 84 created 13-SEP-2004 16:37:13
W75N W75N.UVDATA.1
Freq = 22.2280 GHz, Bw = 16.000 MH Calibrated with CL # 5 and BP # 3 (BP mode 1)



Lower frame: Milli Ampl Jy Top frame: Phas deg
Scalar averaged cross-power spectrum Several baselines displayed
Timerange: 00/18:00:01 to 00/18:02:01



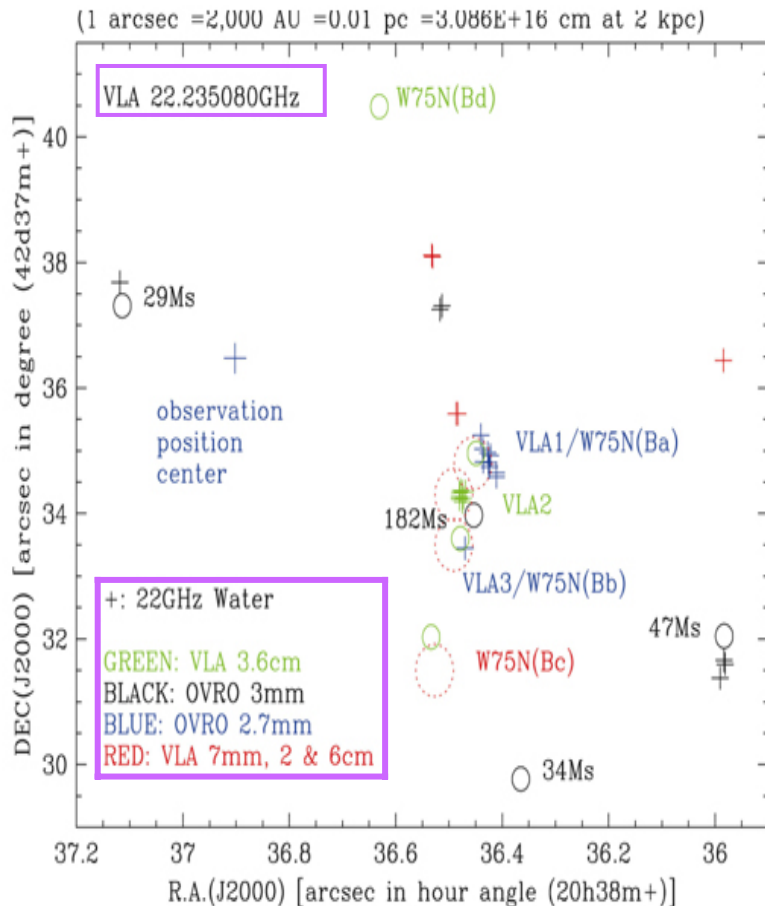
Center at RA 20 38 36.90199999 DEC 42 37 36.4720000
Grey scale flux range = -0.070 1.101 Mega JY/BEAM
Cont peak flux = 1.1009E+06 JY/BEAM
Levs = 1.101E+05 * (1, 3, 5, 7, 9)

W75N: Our Data with VERA

As an example, the AIPS procedure before the spot search steps is shown.

- **(Top)** Correlated spectral line feature for MIZ-IRI [Jy vs. channel]
 - (1) 48 channels at ~533th-580th
 - (2) peak channel at 555th
- **(Bottom)** We made clean Self-Calibrated image [mas vs. mas].

Sciences for W75N



- Search for Water Maser Spots

W75N is bright and VERA clearly detected it at the time of our observation.

(1) in VLA1 & VLA2

→ comparison to VLA & VLBA results

(2) in VLA3 (only one found by VLA)

→ new spot search

(3) in regions other than VLA1, VLA2 & VLA3

- Relative Position Determination of W75N with Cyg X-3 (if available with DIR2000)

- OH Maser Spots

→ relative positions of known OH to our water masers detected and their physical relationship

END

Thank you !

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