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H2O maser observations of W3OH using VERA

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Abstract. We have started multi-epoch differential VLBI observations towards W3OH H2O maser source and a reference source J0244+6228 using VERA (VLBI Exploration of Radio Astrometry), which has a dual beam VLBI system. Some results of the observations will be shown. The H2O maser positions are basically consistent to the former ones indicating that the mapping capability of VERA is available for conventional mapping observations. The reference source J0244+6228 was also detected with good S/N ratio and point-like indicating this source is good for reference of differential VLBI. Our VERA system probably has a good performance for VLBI imaging.

1. Introduction

W3 is a typical complex area here massive-star formation is undergoing in Perseus Arm of our Galaxy. The distance is about 2kpc (Humphreys 1978; Imai et al.2000), indicating that 1mas means about 2000AU (see Fig.1). W3OH region is most active region in this area, and emits strong OH masers and methanol masers, which are situated along N-S direction. There is no H2O maser at W3OH itself, however, strong H2O maser situated about 6” east of W3OH. The H2O emission is at another massive star forming region named Turner Weltch object (TW object), which is a dense region with dense gas and dust (Turner & Welch 1984; Wyrowski et al. 1999). Alcolea et al. (1992) performed VLBI observations and showed expanding motion of maser spots, which are probably due to outflow from the central protostar. Reid et al.(1995) found synchrotron enmission from the center of the H2O masers. Hachisuka made differential VLBI measurements of H2O masers and found possible proper motion due to Galactic rotation. This source is good for checking the performance of VLBI system of VERA.

2. Observations

May 20, 2003 using VERA four stations at Mizusawa, Iriki, Ogasawara, and Ishigakijma. A LHCP data was recorded at sky frequency of 22.235GHz. Observation was done centering at W3 TW source near W3OH H2O maser (main target source) and a continuum source of J0244+6228 as a reference source. Angular distance of them is 2.2deg, which is almost near the max value of 2-beam separation VERA mechanically works. We used a band pass calibrator of J0234+285 every 2 hours. A system noise temperature at zenith was 200-300K at Mizusawa, Iriki, and Ishigakijima stations. This value is not bad. However, Ogasawara station was 420-1450K because of rain. The recorder was SONY DIR1000, which was 2-bit sampling and was 128MHz BW. Correlation was done at Mitaka FX Correlator. The UV distribution of main and reference source are nearly ideal because declination of them is 60deg (see Fig.2).

3. Results

(a)W3OH H2O maser

We have got strong fringes for all baselines of VERA at the profile peak. The peak channel was used for mapping of the H2O maser spot. The image of the peak channel was done using AIPS software. The HP size is same as estimated fringe size indicating that the peak channel is point like. The other maser channel was also mapped and positions were determined (Fig. 3). The results are shown on the right lowest panel. The maser spots distribute along S-W direction. The left lowest panel shows a comparison of our results and that of Hachisuka (2000). The spots distribution is not contradict to the former results except for some maser position differences due to difference of observation epoch. That means our results are basically same as the former results.

(b) Continuum reference source

We also detected a strong fringe of J0244+6228. The image of it was mapped using AIPS (see Fig.4). It indicates that image size is comparable to fringe size showing that our source is point like, and we can use it for position measurement.

4. Conclusions

1. We have done simultaneous observations of W3OH H2O maser and reference source J0244+6228 using VERA(VLBI Exploration of Radio Astrometry).
2. Detected good fringes for both W3OH H2O maser and the reference source J0244+6228.
3. Our results are not contradict to the previous results. Our VERA system is probably good for VLBI imaging.

References

Alcolea J., Menten K. M., Moran J. M., & Reid M.J. 1992, in Astrophysical Masers, ed.A.W. Clegg & G. Nedoluha (Berlin: Springer), 225

Humphreys R. M. 1978, ApJ Suppl., 79, 217

Hachisuka K. 2000, Doctral thesis (The Graduate University for Advanced Studies)

Honma M., et al. 2003, PASJ, 55, L57

Imai H., Kameya O., Sasao T., Miyoshi M., Deguchi S., Horiuchi S., & Asaki Y. 2000, ApJ, 538, 751

Menten K. M., Reid M. J., Pratap P., Moran J. M., & Wilson T. L. 1992, ApJ, 401, L39

Reid M. J., Argon A. L., Masson C. R., Menten K. M., & Moran J. M. 1995, ApJ, 443, 238

Turner J. L., & Weltch W. J. 1984, ApJ, 287, L81

Wyrowski F., Schilke P., Walmsley C. M., & Menten K. M. 1999,ApJ, 514, L43

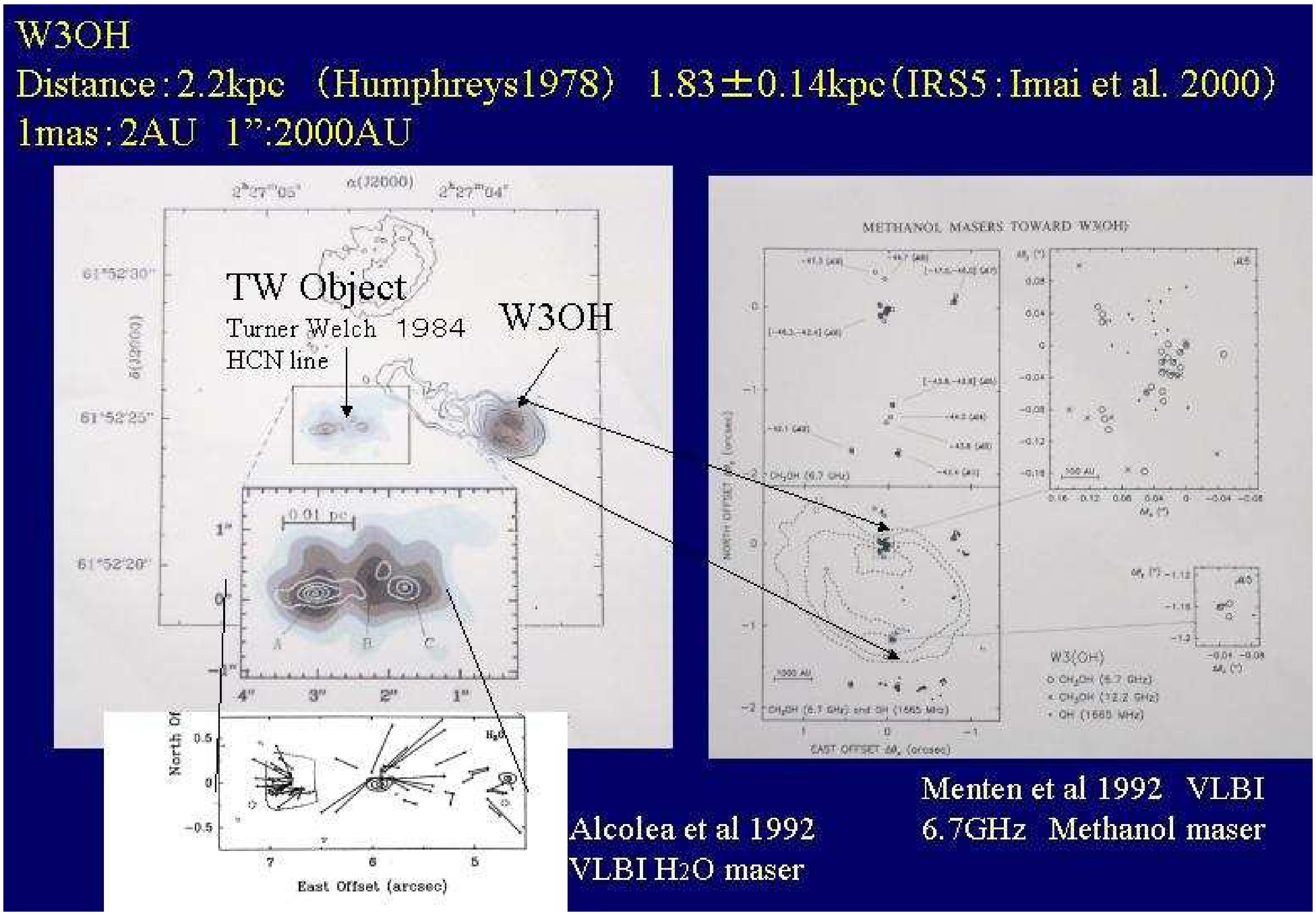

Fig. 1. The W3OH region.

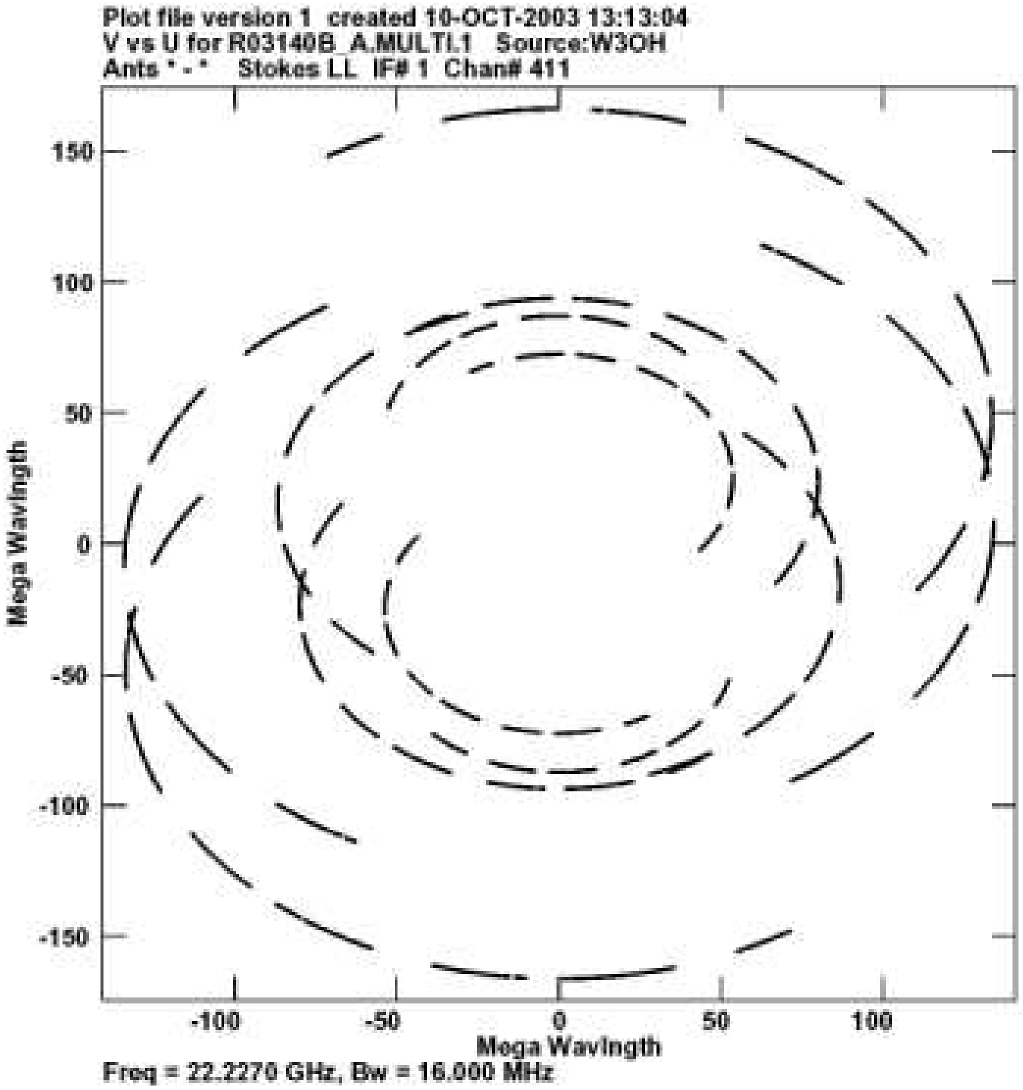

Fig. 2. The UV distribution of the reference source.

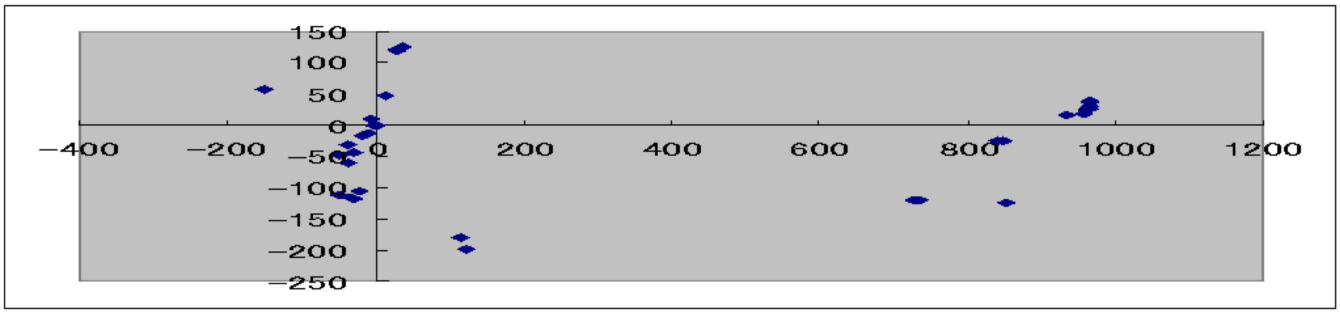

Fig. 3. Maser distribution. X axis is R.A. offset in msec, and Y axis is dec offset in msec. The origin is the position of the maser peak.

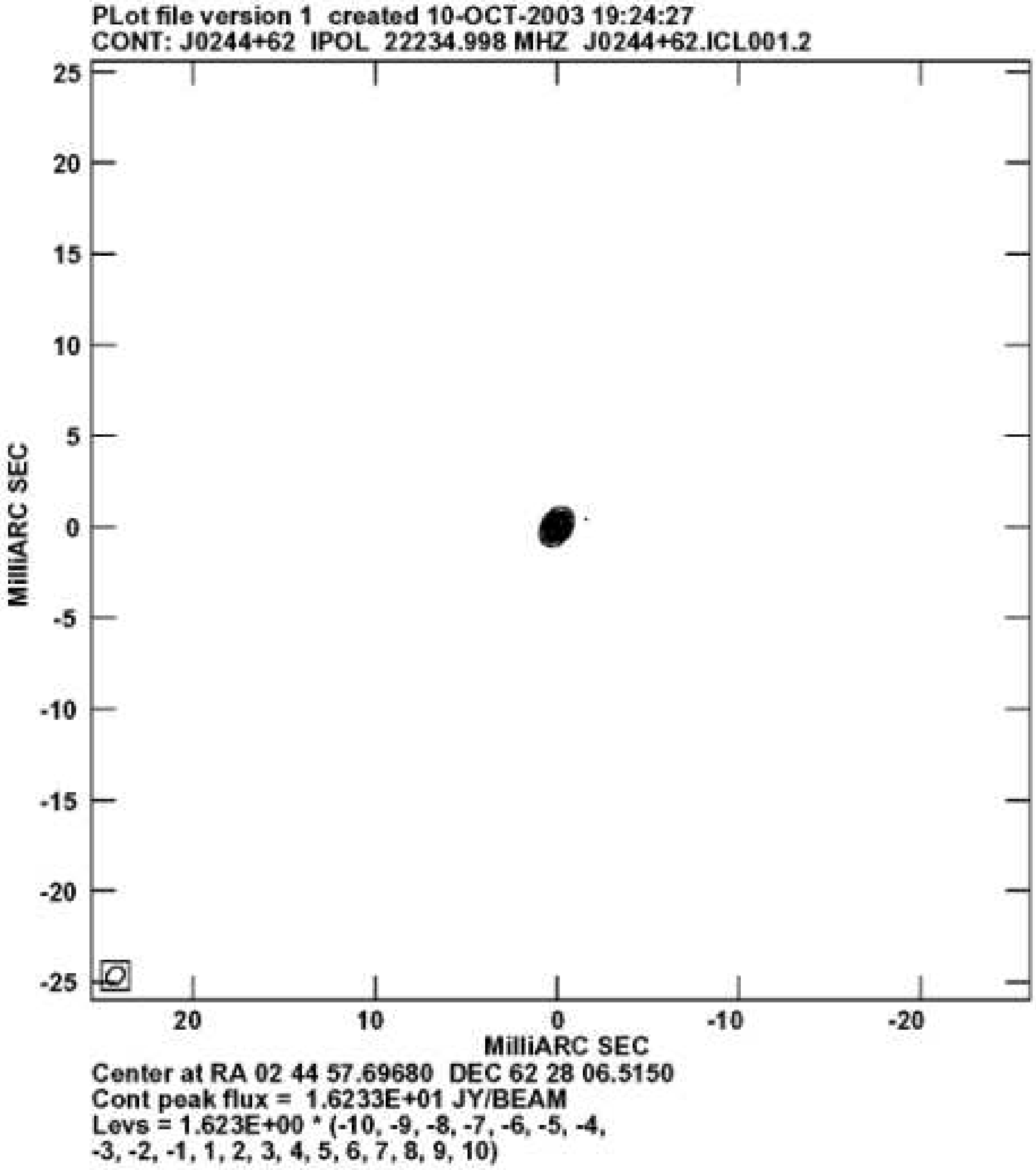

Fig. 4. The image of J0244+6228.