

5-GHz VLBI Imaging Observations of 7 Equatorial AGNs

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Abstract. Since 1992 we have been conducting a 5-GHz VLBI imaging survey of southern and equatorial radio sources. So far, we have published the results of two observing sessions with 26 southern radio sources imaged in total (Shen et al. 1997; 1998). In this paper, we present the preliminary results of the third session of observations of 7 equatorial sources in the sample.

1. Introduction

We have been conducting a 5-GHz VLBI imaging survey of southern and equatorial radio sources to improve the understanding of the collective properties of compact radio sources in the southern hemisphere. The major goals are: 1) to fill the gap in southern hemisphere VLBI imaging observations, 2) to provide ground monitoring of the potential targets for space VLBI (e.g. VSOP) and 3) to search for southern superluminal candidates.

We selected the sources from the one-(intercontinental)-baseline surveys at 2.3 and 8.4 GHz (Morabito et al. 1986) with the following criteria: 1) declination (B1950.0) $-45^\circ < \delta < +10^\circ$, 2) correlated flux densities $S_{2.3\text{GHz}}^c > 0.6$ Jy and $S_{8.4\text{GHz}}^c > 0.6$ Jy, and 3) total flux density $S_{5\text{GHz}}^t > 1.0$ Jy. There are 36 sources that met these criteria (Shen et al. 1997).

In November 1992 and May 1993, we performed two observing sessions using the Southern Hemisphere VLBI Experiment (SHEVE) network consisting of antennas in Australia, South Africa and the Shanghai station of China, which provided better (u, v) coverage for the southern sources. As a result, milliarcsecond (mas) structures were obtained for 26 sources, of which 11 had no previously published VLBI images (Shen et al. 1997; 1998). This has added appreciably to the number of sources showing the bending of jet-like structure between arc-second (kpc) and mas (pc) scales. The misalignment seems to be a common feature in AGNs.

Of the 10 sources left in our 36-source sample, only seven sources (0736+017, 1055+018, 1354-152, 1548+056, 2121+053, 2131-021 and 2318+049) were selected for the 3rd observing session because two of the others (0727-115 and 1749+096) have been imaged with the VLBA and one (3C 279) has been extensively studied with VLBI. Since, except for 1354-152, the other six sources are

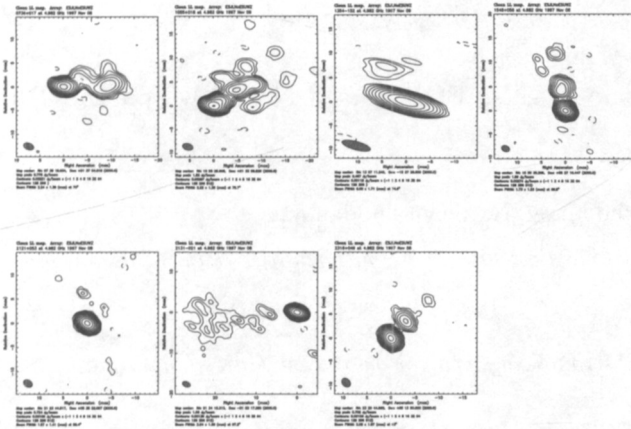


Figure 1. 5-GHz VLBI images of 7 quasars observed in November 1997

located around the equatorial plane, the European VLBI Network (EVN) plus Hartebeesthoek in South Africa is the most suitable for the observations.

2. Observations and Results

The 5.0 GHz EVN observations were carried out on 1997 November 8-9. Sources were observed in a snapshot mode, i.e. 5-12 thirteen-minute scans for each source. The left-hand circular polarized radio signals were recorded in Mark III mode C with a total bandwidth of 14 MHz at each station. The data correlation was done on the MPIfR MK III Correlator in Bonn, Germany with an output averaging time of 4 s. Standard post-correlation data reduction, including fringe fitting, imaging and model fitting, was made using the NRAO AIPS and Caltech Difmap analysis packages. We present the preliminary imaging in Figure 1.

Of the seven equatorial quasars imaged, 5 (0736+017, 1055+018, 1548+056, 2131-021 and 2318+049) showed a core-jet structure while the remaining 2 (1354-152 and 2121+053) were dominated by single compact core emission.

The tentative detection of component superluminal motions in 1055+018 (Attridge, Roberts, & Wardle 1999) were confirmed by our new data. By comparing our observations with the 5 GHz VSOP prelaunch VLBA survey (Fomalont et al. 2000), superluminal motion was inferred for the first time for three other sources: 0736+017 (5.1-10.9c), 1548+056 (3.3c) and 2318+049 (7.5c) (assuming $H_0 = 65 \text{ km s}^{-1} \text{ Mpc}^{-1}$ and $q_0 = 0.5$).

References

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