HIGH RESOLUTION OBSERVATIONS OF LOW FREQUENCY VARIABLES AT 932 MHZ

Lars B. Bååth
Onsala Space Observatory
S-439 00 Onsala
Sweden

ABSTRACT. Fifteen sources known to be varying at low frequencies have been observed at six epochs during 1983-84 with a global VLBI array. Some of the sources show structural variations similar to the superluminals. Beaming effect may therefore play an important role at low frequencies as well as at higher.

A global VLBI array consisting of Kiruna(Sweden), Jodrell Bank(UK), Arecibo(Puerto Rico), and Green Bank and Owens Valley(USA), has been used to map fifteen low frequency variable radio sources at 932 MHz. The frequency was chosen to give maximum resolution while still being able to observe in the low frequency domain. The resolution achieved was 5 milliarcseconds (FWHM) with a typical noise of 30 milliJansky in the maps. Fifteen sources were observed at six epochs during 1983-84. The sources were selected for low frequency variablity in a declination range suitable for Arecibo. Eight of the sources have so far been mapped at three epochs. Work is progressing on the rest of the sample.

Some of the sources were nearly unresolved with a weak halo or a small extension to one side. Among these are OJ287 and DA406, both with small extensions. 0735+178 and 3C454.3 also had compact structures, but with extensions which are extrapolations from the structures at higher frequencies.

Other sources showed more complicated structure. CTA102 was the first in the sample to be mapped at several epochs. Two of the three components in the core separated from each other with an apparent speed of 0.65 ± 0.15 millliarcsec./year or $(18\pm4)h^{-1}c$ (Bååth 1987). Other sources also showed structure resembling that of the superluminals. 4C21.50 (Fig. 1 top) had a jetlike structure changing with time. 1117+14 (Fig.1 bottom) had at least three distinct components where two components seemed to move away from each other with time.

The flux variations in compact continuum radio sources at low frequencies can basically be intrinsic to the source, extrinsic, or a combination of both. Among the extrinsic models are noncosmological redshifts. Sholomitskii (1965) suggested in the original paper on flux variations that CTA102 was a Galactic object by comparing the angular size to the linear size implied by the time scale of the variations.

M. J. Reid and J. M. Moran (eds.), The Impact of VLBI on Astrophysics and Geophysics, 117–118.

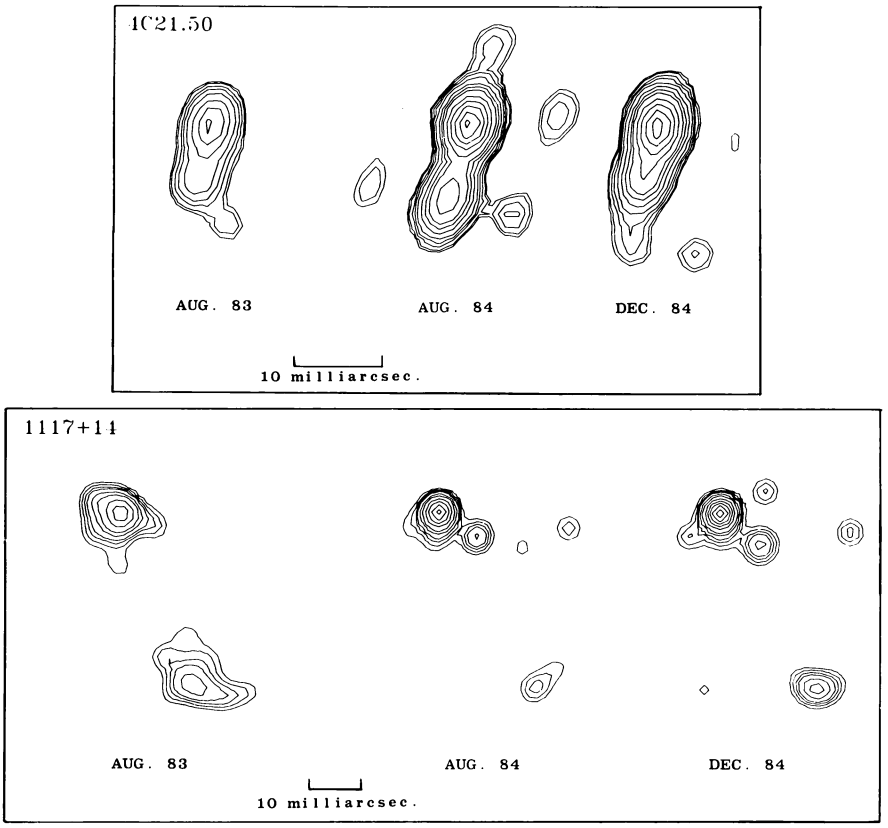

Figure 1. Hybrid maps of 4C21.50 (top) and 1117+14 (bottom). The contour levels are: 3*(7,8,10,12,15,20,25,30,40,50,60,70,80) mJy/beam area in the top panel and 2.5*(15,20,25,30,40,50,70,80,110,130,150, 170) mJy/beam area in the bottom panel.

Later years discussion has centered on slow, refractive scintillation caused by the interstellar medium as a possible extrinsic model for the flux variations (Ricket *et al.* 1984). Such scintillation may play the major role for the variations in the flux density of the very compact sources observed here (DA406,0J287,3C454.3,0735+178). The superluminal motion in CTA102 and the structural changes in the more complex sources (4C21.50,1117+14 and others) indicate that intrinsic models as beaming effects play an important role at frequencies below the intermediate frequency gap (1 GHz) as well as at high frequencies.

REFERENCES:

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Sholomitskii,G.B. 1965, *Astron. Zh*, **42**,673