3C 454.3 (2251+158) with VLBA

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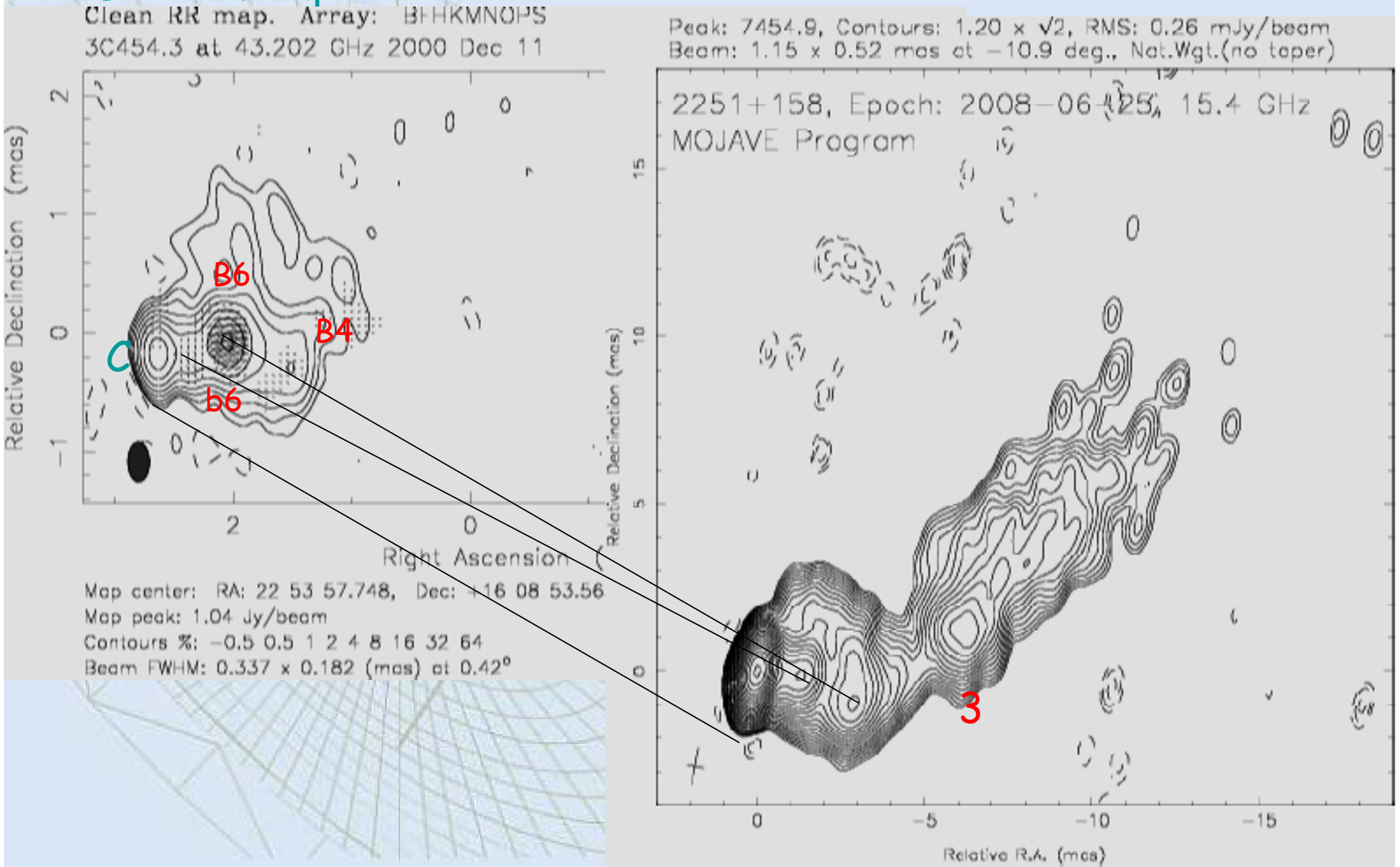
This research has made use of data from the MOJAVE database that is maintained by the MOJAVE team
(Lister et al., 2009, AJ, 137, 3718)

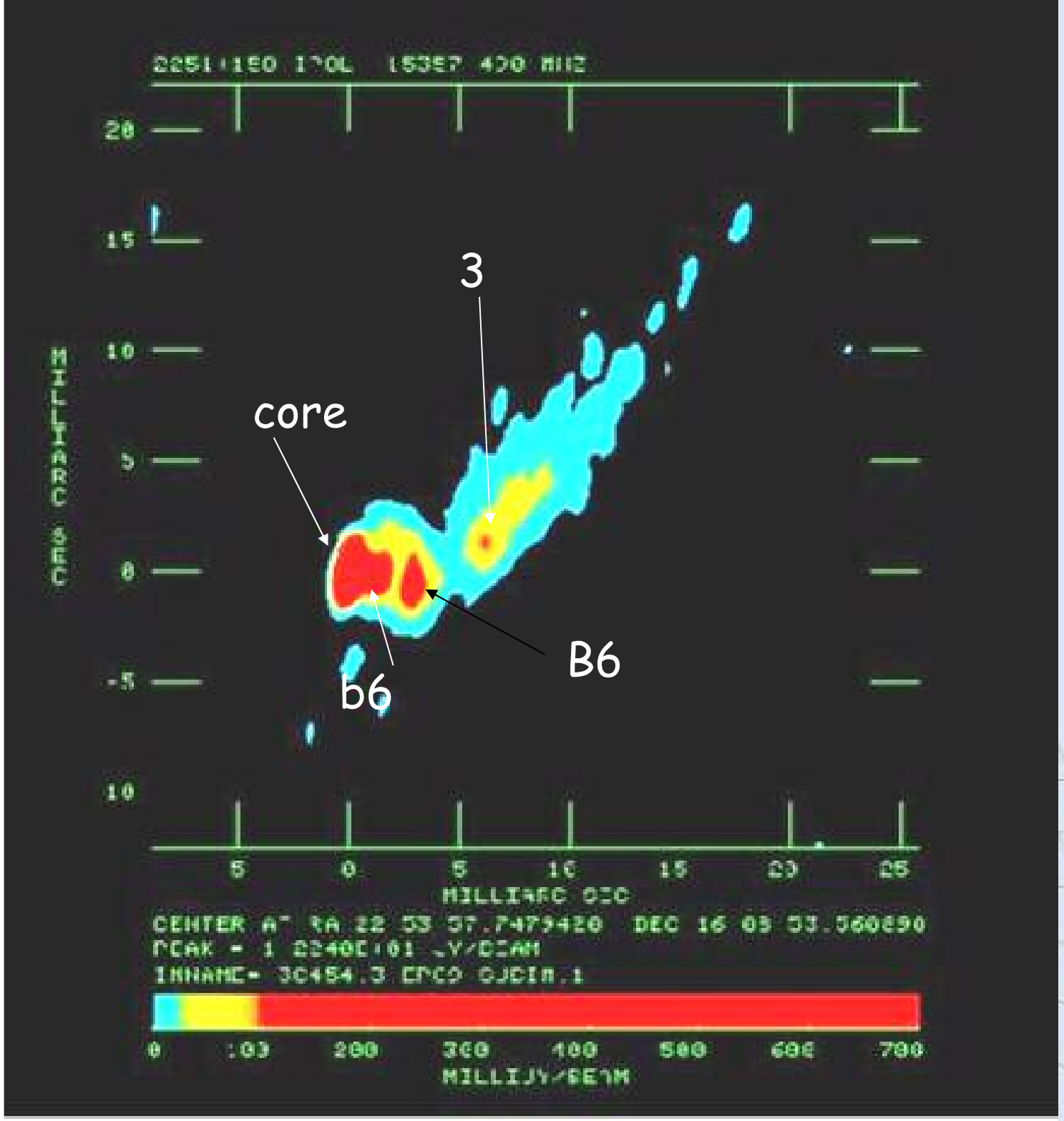
z = 0.859 one-sided flat spectrum

7.70 pc/mas jet structure: shear + spine

Dl 5489 Mpc



2008.8 Epoch



Well studied source; e.g.: Villata et al. 2007; Ghisellini et al. 2007
Vercellone et al. 2008,2009;
Jorstad et al. 2005

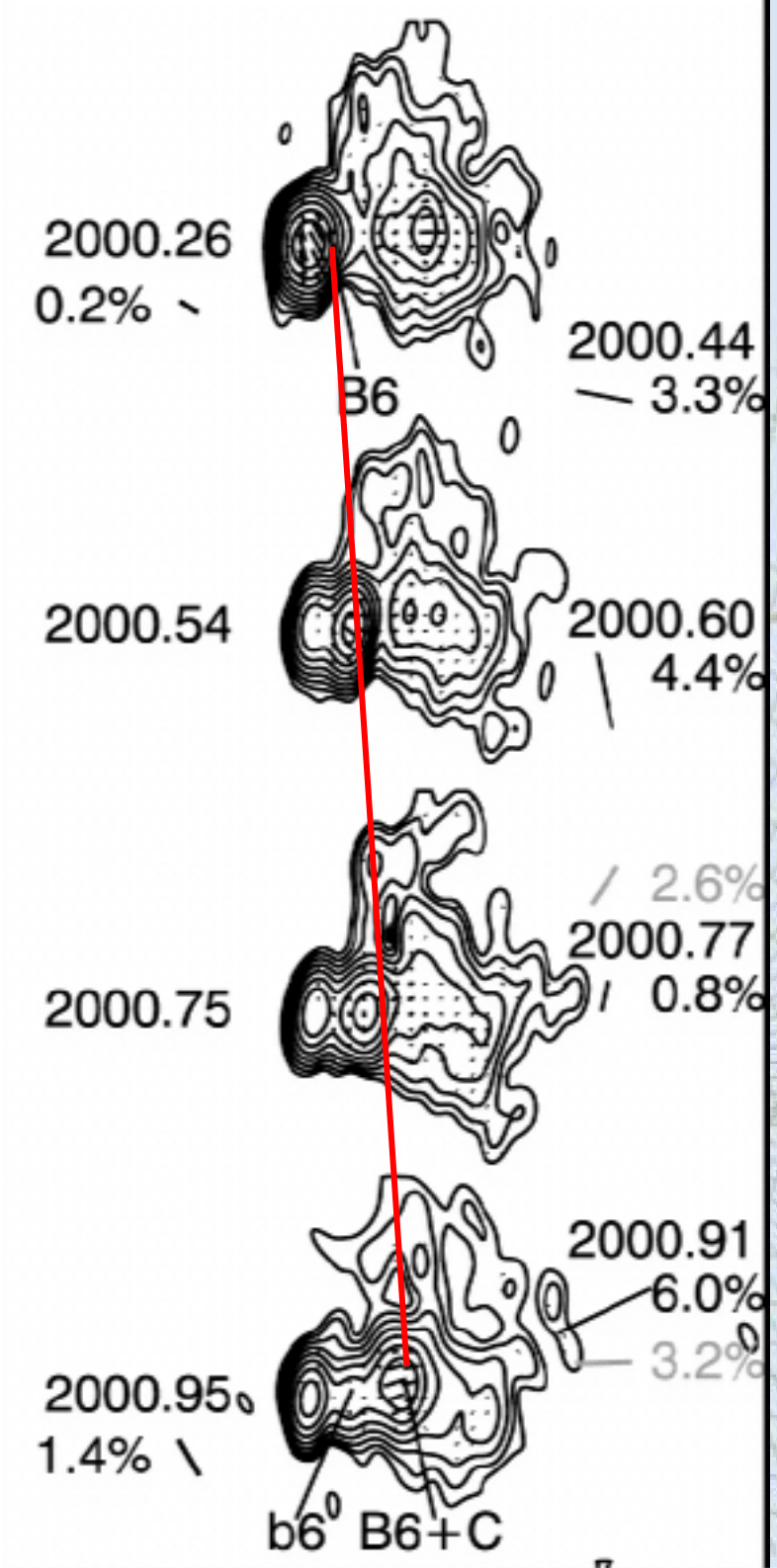
I will start from the two new components well visible in VLBA at 43 and 15 GHz (Jorstad et al. 2005)

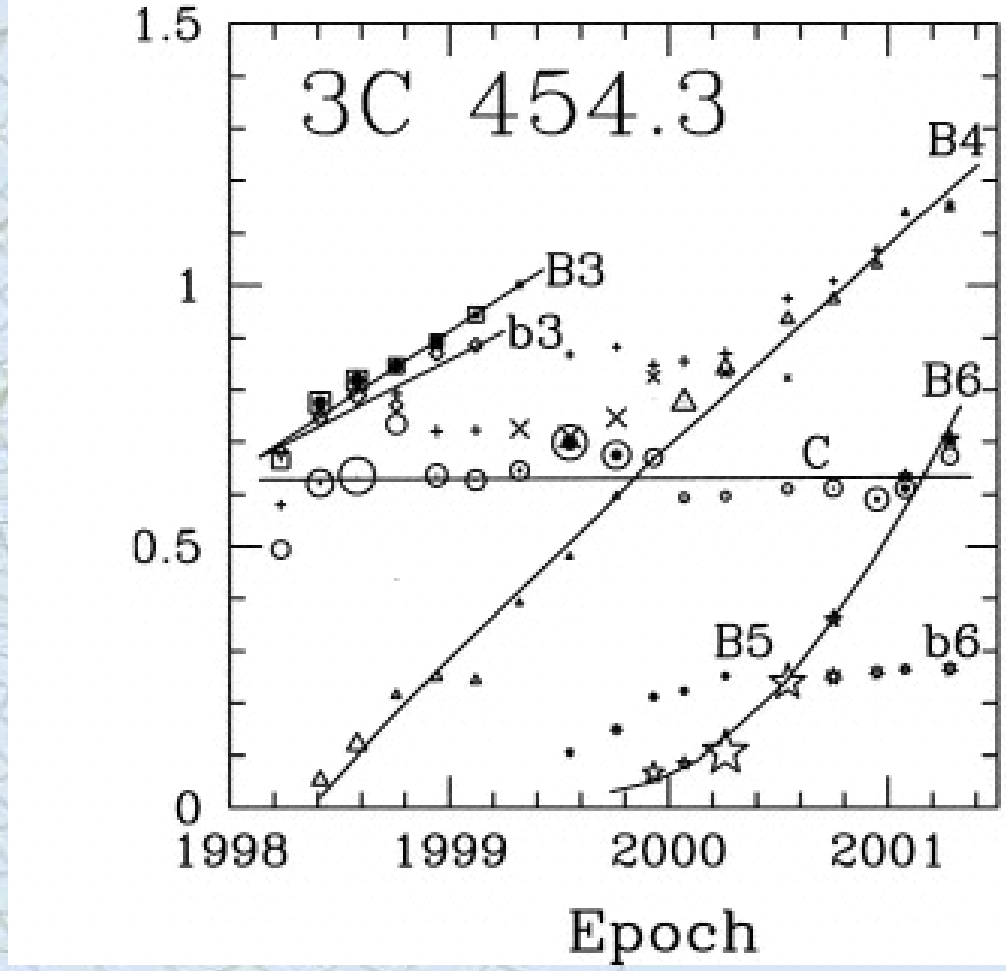
B6: born on 1999.5 in 43 GHz images from 2000.54
15 GHz 2000.5
apparent average velocity at 43 GHz 13.3c (2000 – 2001)
18.8c (2001.0 – 2001.4)

b6: born on ~ 2000 in 43 GHz images from 2000.95
15 GHz 2001.8

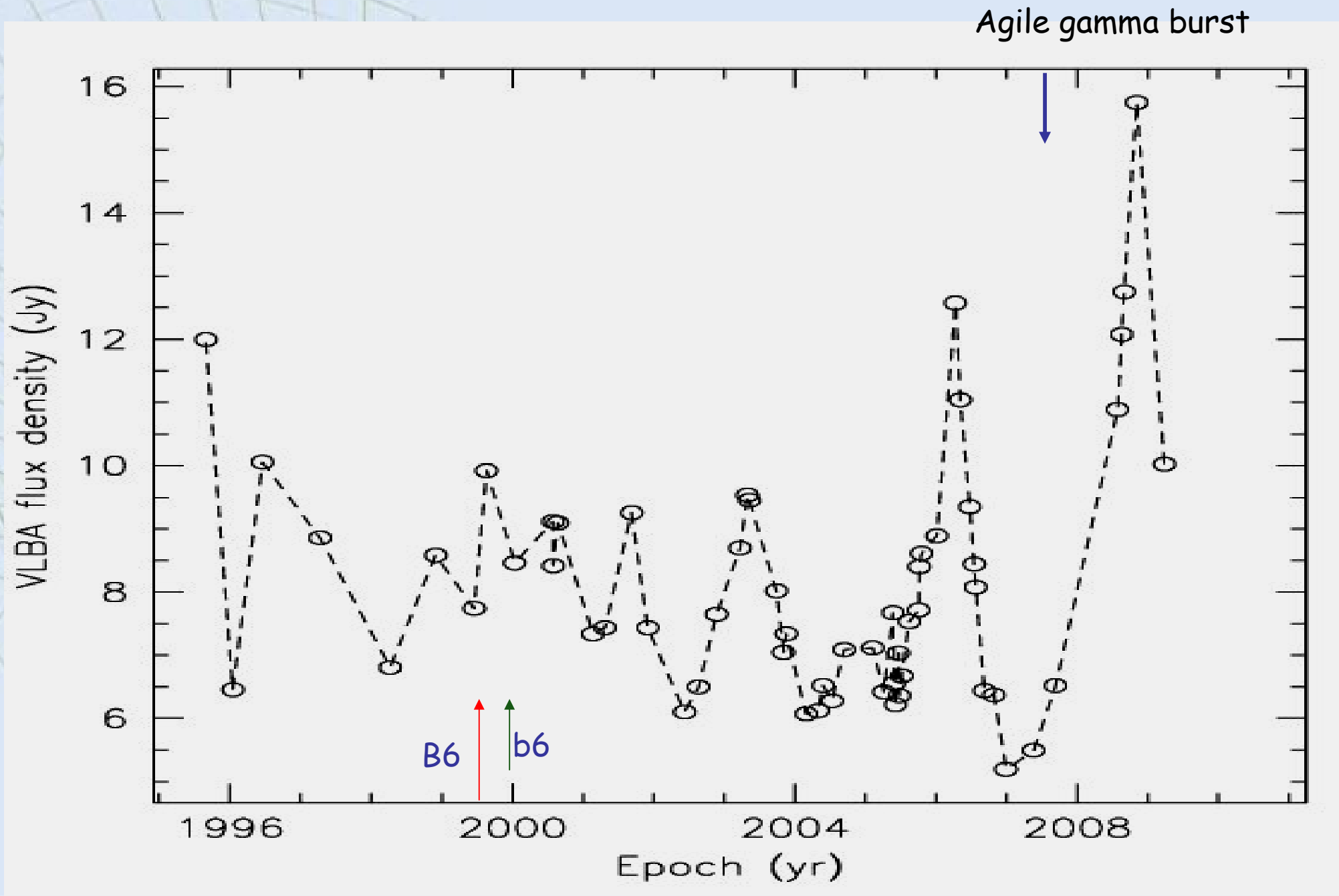
No time to discuss polarization properties

VLBA at 43 GHz, Jorstad et al. 2005



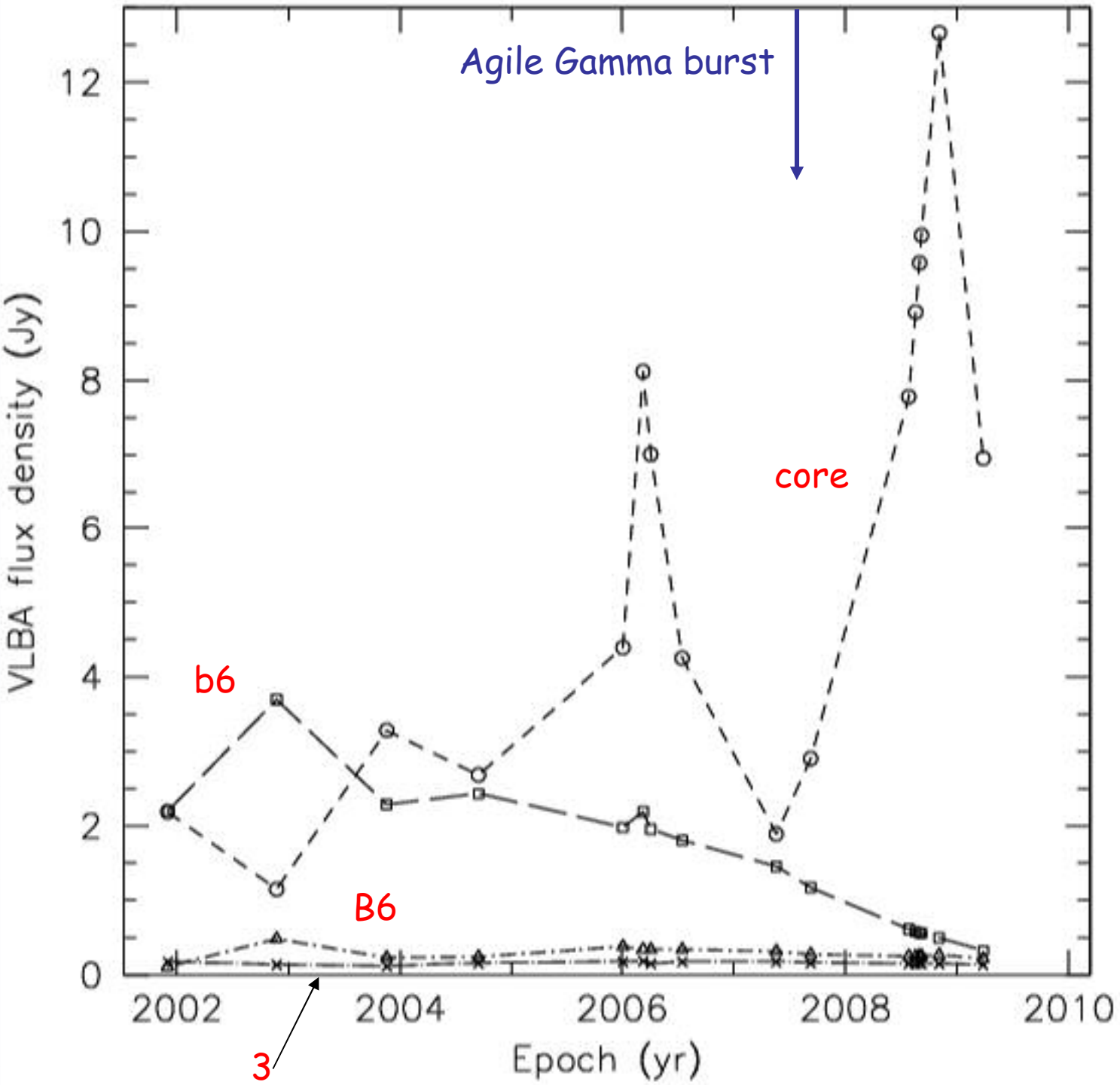


Total VLBI flux density with time at 15 GHz



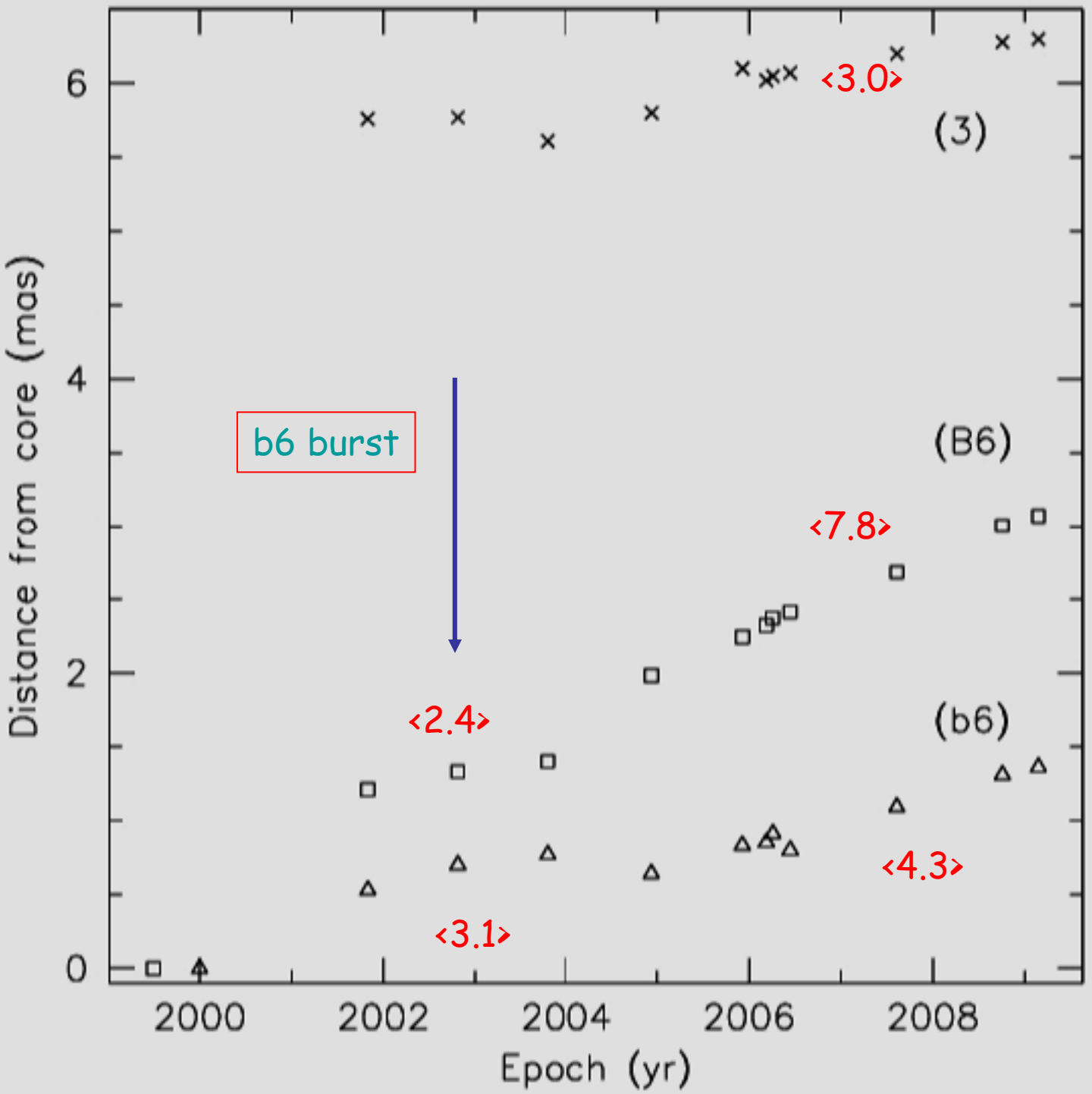
Flux density of different components at 15 GHZ

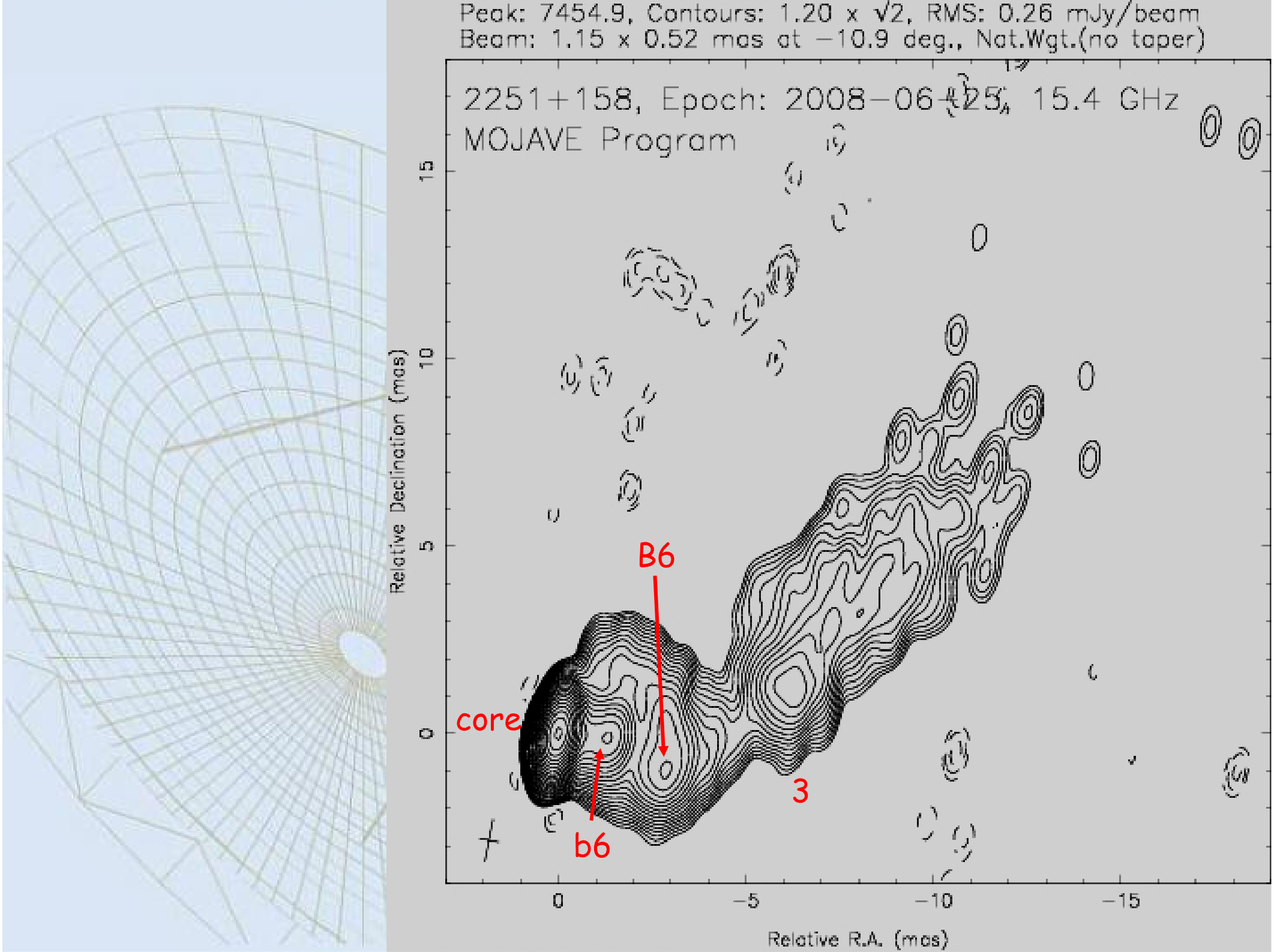
Note that on 2003 b6 was brighter than the C
On 2000.5 the brightest component was B6

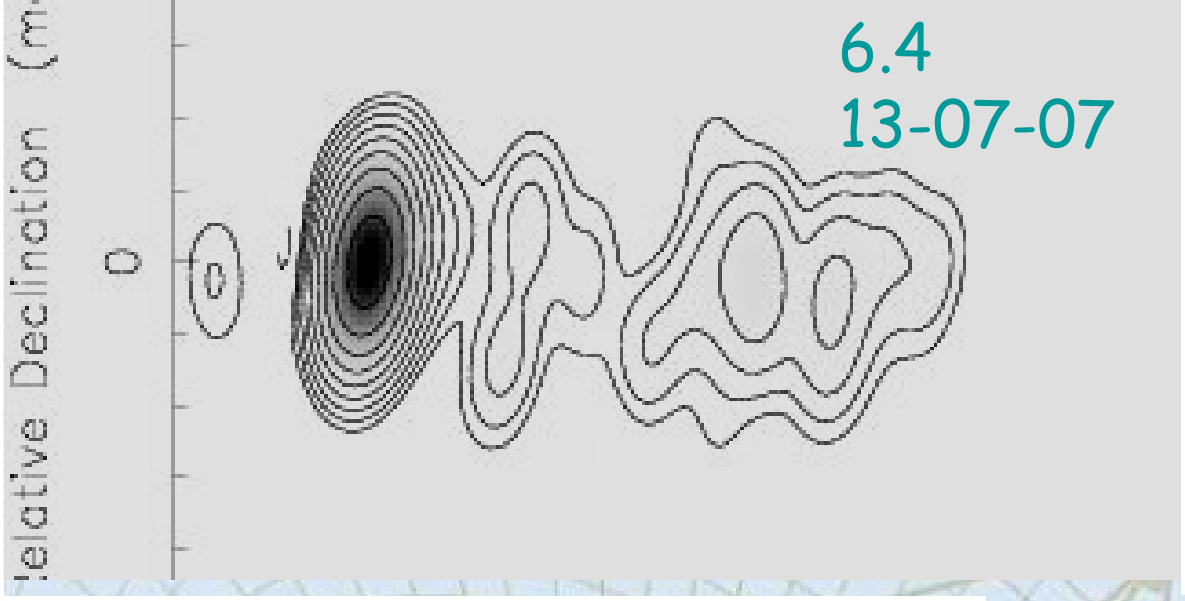


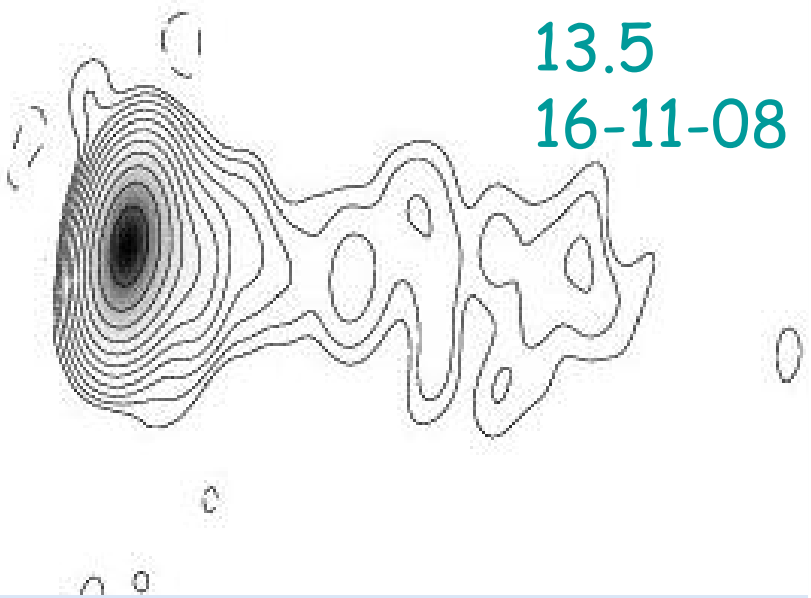
From 15 GHz data

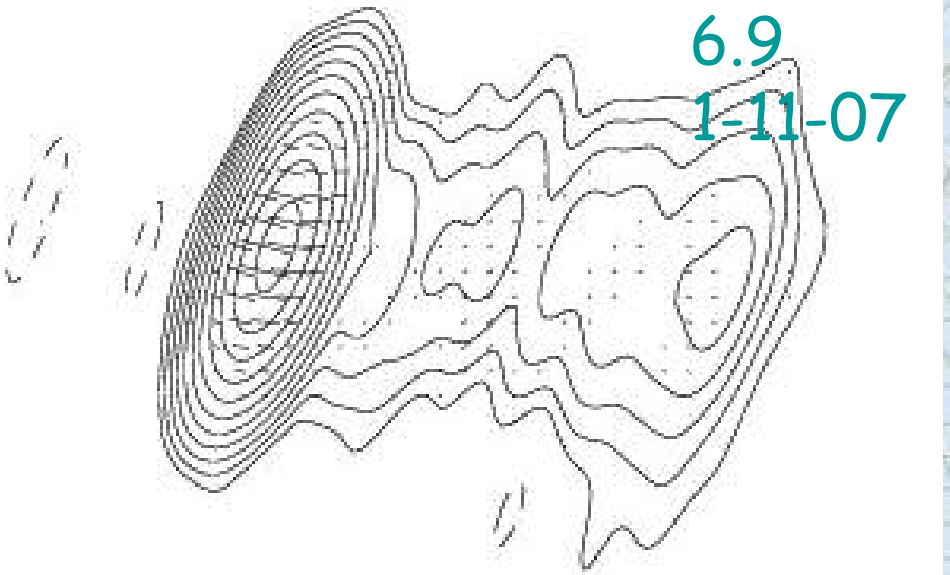
More epochs are available!

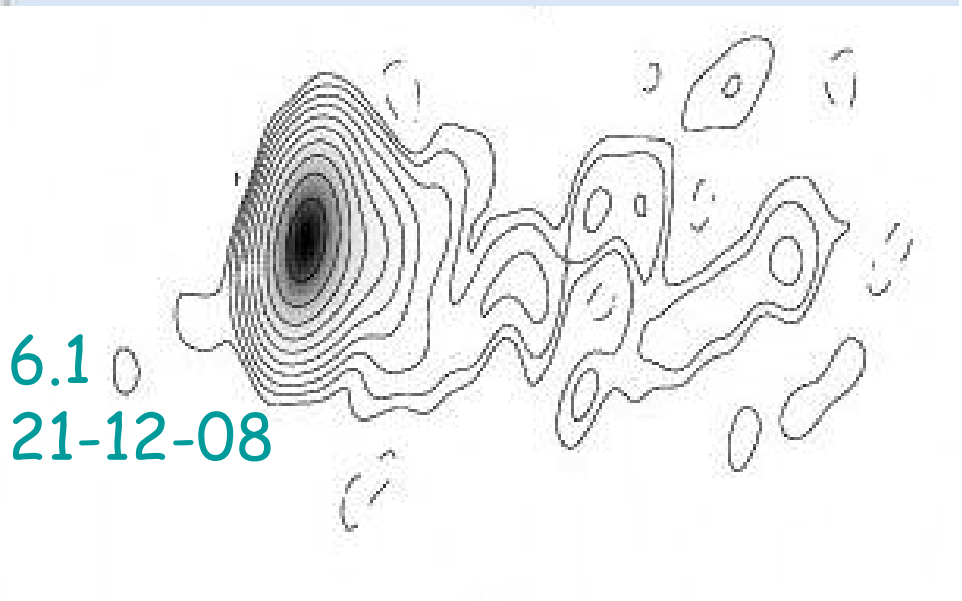



Peak: 7454.9, Contours: 1.20 x √2, RMS: 0.26 mJy/beam
Beam: 1.15 x 0.52 mas at −10.9 deg., Nat.Wgt.(no taper)
2251+158, Epoch: 2008−06−25, 15.4 GHz
MOJAVE Program
B6
core
b6
3
Relative Declination (mas)
Relative R.A. (mas)
15
10
5
0
−5
−10
−15

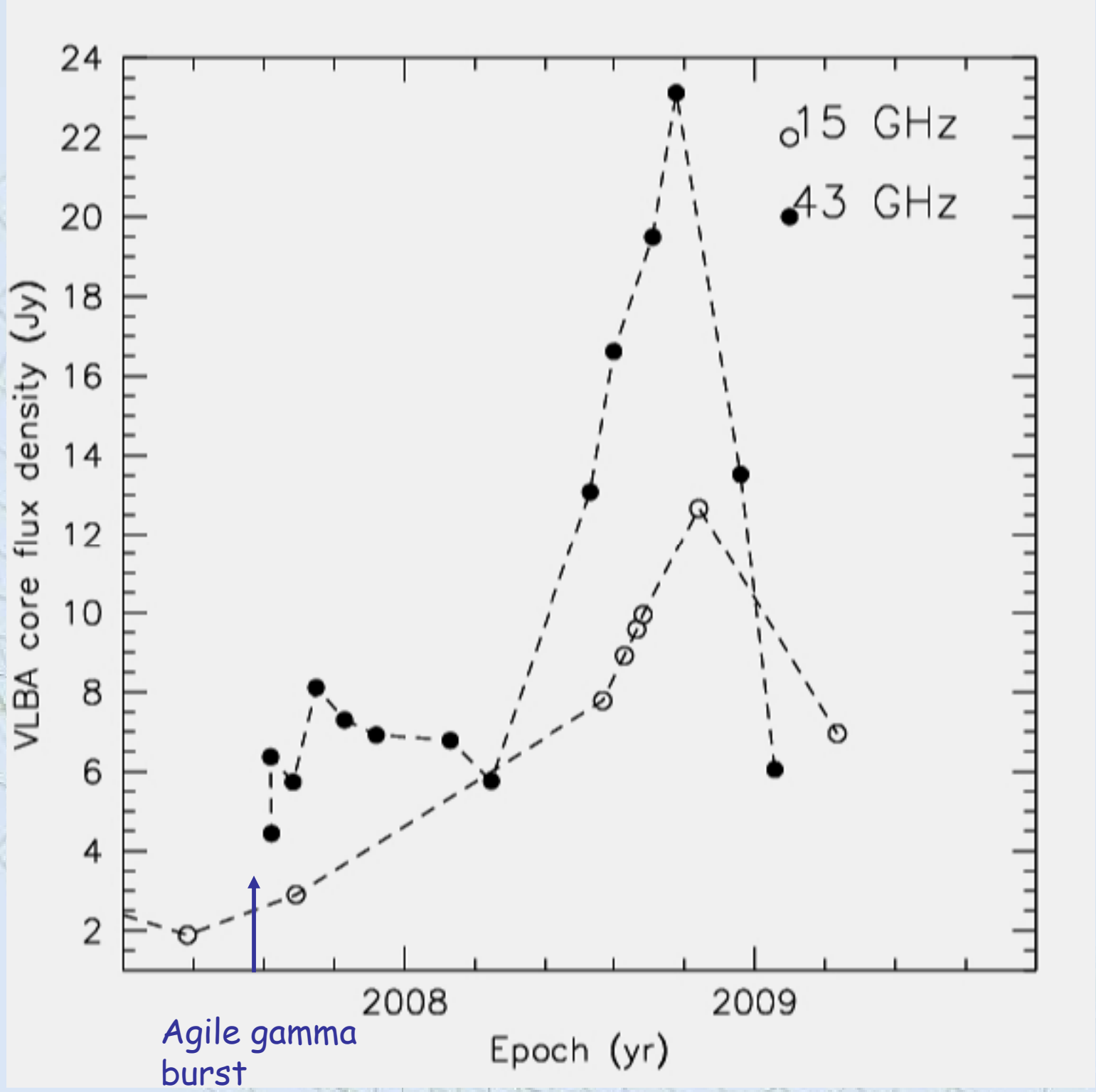








No evidence of activity in the jet at 43 GHz in the 2007-2008 time range



Nuclear flux density variability from VLBA data

Origin radio burst on 2008?

1) increasing Doppler factor.
July 2007 $\Gamma = 8.4$ and $\Theta = 2.6^{o}$ (Vercellone et al. 2009)
November 2008: the nuclear flux increase up to 12.7 Jy (at 15 GHz) could be due to a bulk velocity increase from 0.993 ($\Gamma = 8.4$) to 0.9990 ($\Gamma = 20$) if Θ constant.

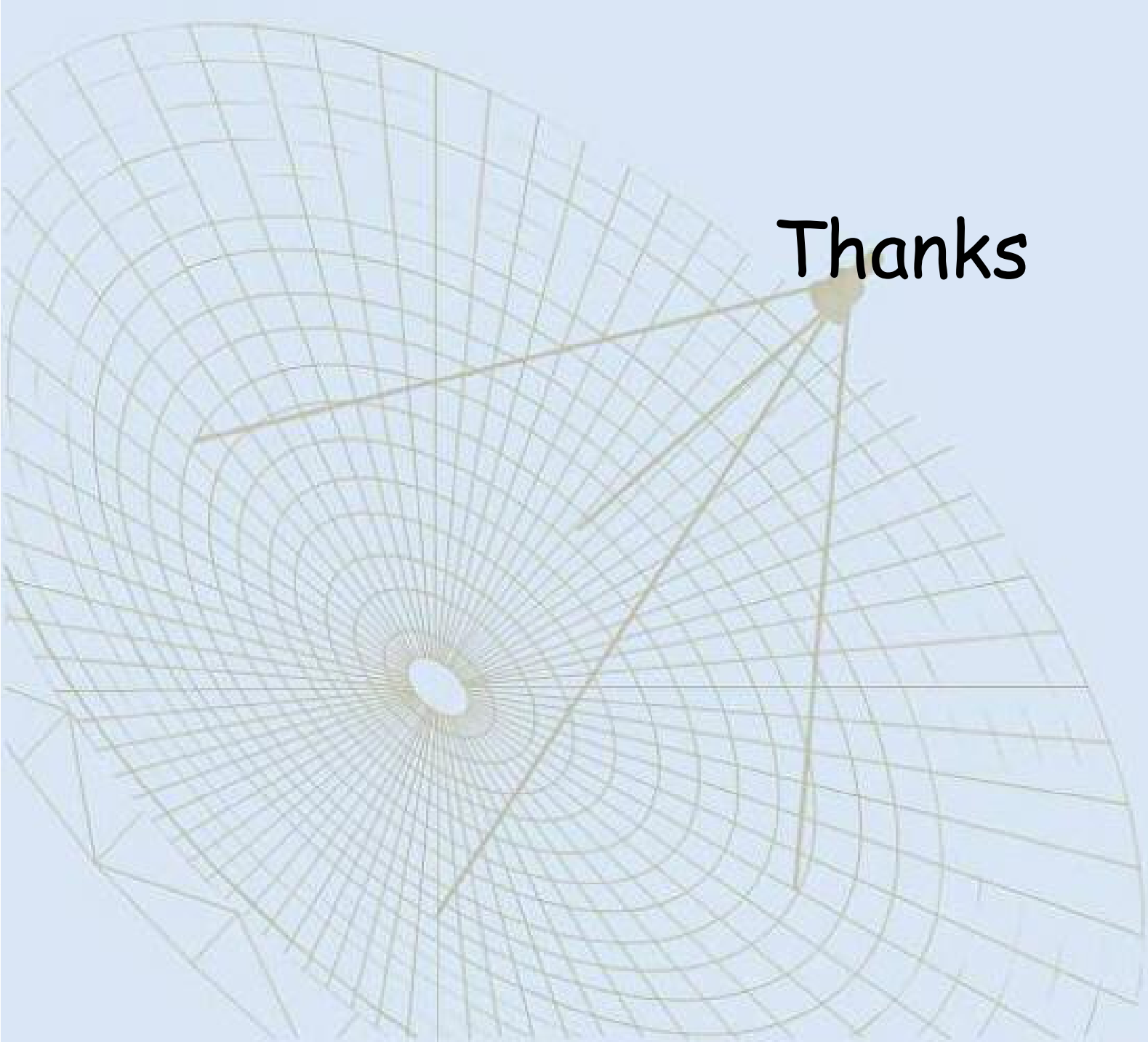
In this scenario if the gamma ray flux is from the inner region where the radio flux is self-absorbed and 2 - 4 years could be the time delay in between the high frequency activity and the possibility to detect in VLBI images a new component coming from the core. But the radio jet is complex with evidence of velocity structures therefore the new component could be not easily visible.

2) the nuclear flux density increase is not due to new jet components or accelerating jet components but only to an increase in the nuclear emission with no correlation with jet sub-structures.

BUT
the jet shows a peculiar structure.
It is resolved with a shear and an inner spine.
In the past we saw knots with a high flux density variability
Knots are moving at superluminal motion, evidence of decreasing and increasing apparent velocity.

We remember that on 2000.5 knot B6 was brighter than the core
On 2003 knot b6 was brighter than the core. at about the same epoch also B6 showed a small increase in flux density.

This suggest that the inner jet region could be important in the general properties of this peculiar source.



Thanks