Multi-frequency flux density and VLBI Observations of rapidly variable AGN

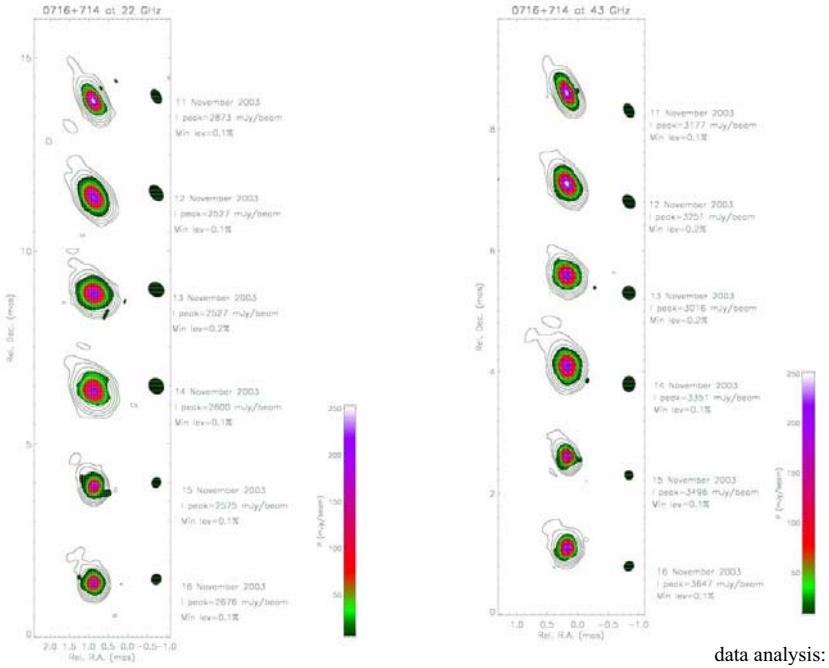
Status and preliminary results

T. Krichbaum, I. Agudo,
K. Gabanyi, S. Britzen, N. Marchili, et al.

H. Ungerechts, H. Wiesemeyer, C. Thum, et al.

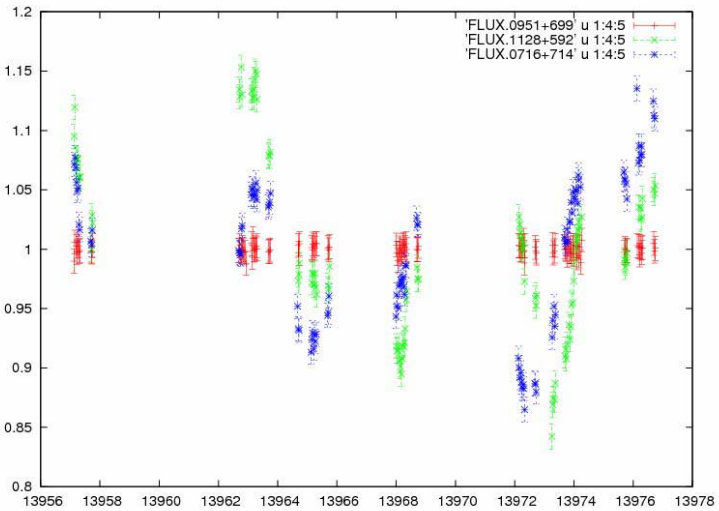
J. Liu, J.L. Han, et al.

Polarimetric VLBA monitoring during core campaign in Nov. 2003



data analysis: I. Agudo

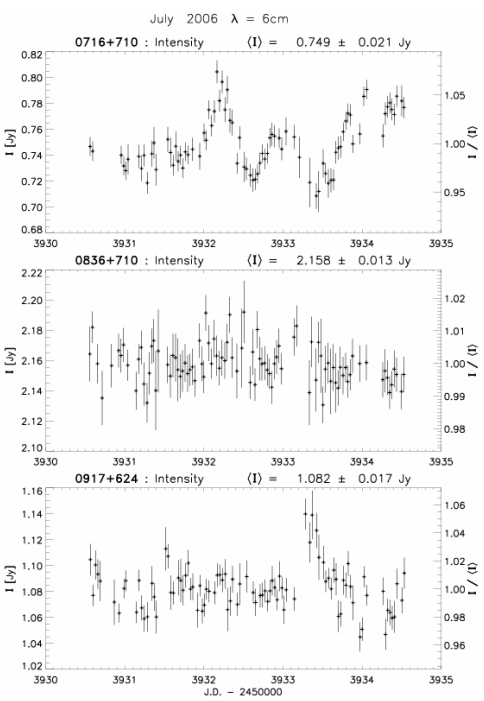
11 cm Effelsberg monitoring in August 2006



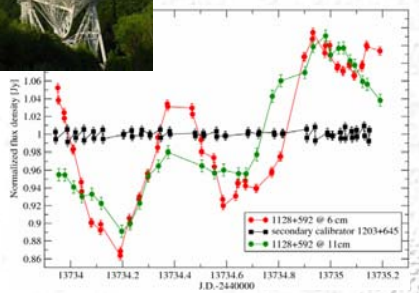
Regular monitoring of IDV sources with the 25m Urumqi telescope (China)

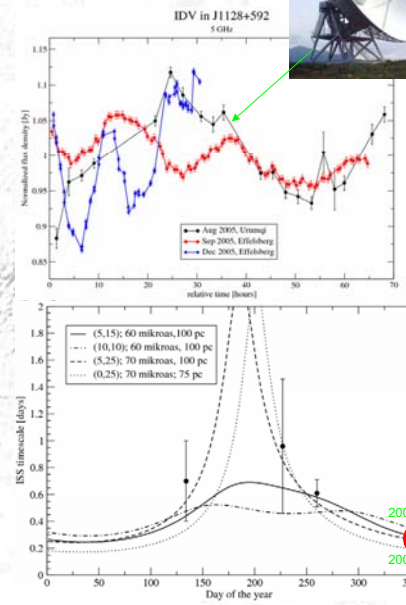
3-5 days of continuous blocktime scheduled every 4-6 weeks

reach rms accuracy of 1 %



A new rapid IDV source: J1128+59





Is there an annual modulation pattern ?

Gabanyi et al. 2007, in prep.

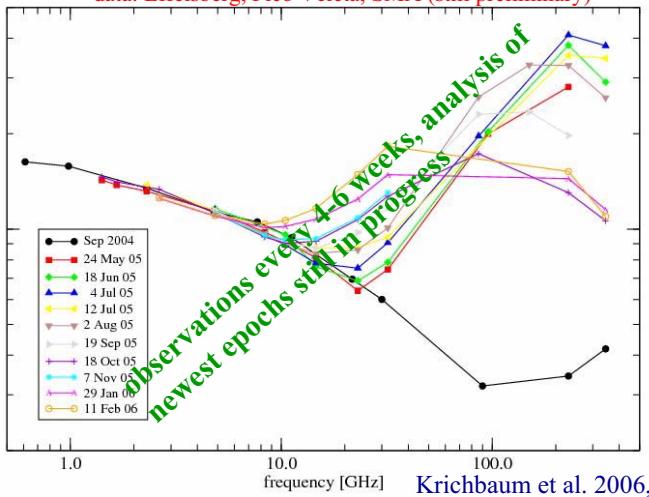
Multi-frequency monitoring of 3C454.3 with the Effelsberg and IRAM telescopes

T.P. Krichbaum, et al. (MPIfR)
H. Ungerechts, H. Wiesemeyer, C. Thum, et al. (IRAM)

Aim: Follow the spectral evolution after major flare in Spring 2005

Spectral Evolution of 3C454.3 after Optical Outburst in May

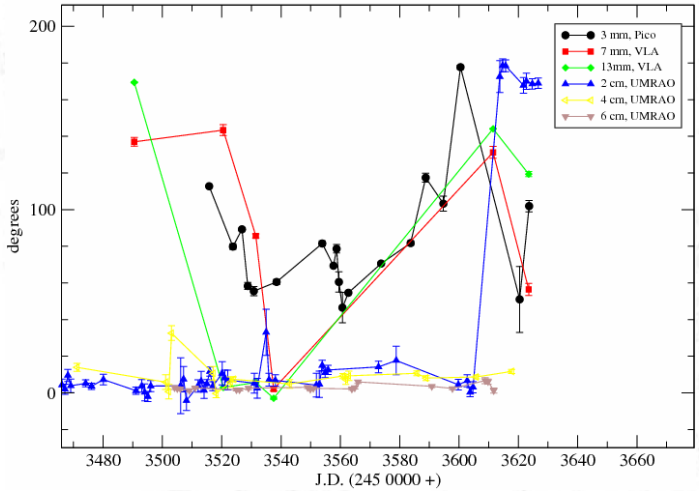
data: Effelsberg, Pico Veleta, SMA (still preliminary)



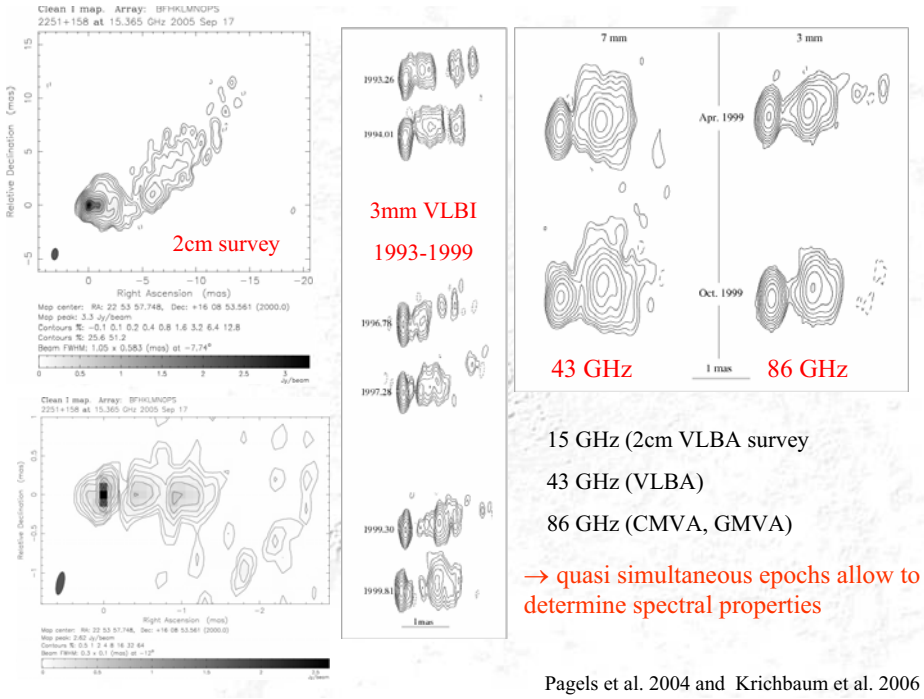
Krichbaum et al. 2006, in prep.

3C454.3: Polarisation Angle Variations

(Pico Veleta, VLA, Michigan)



Krichbaum, Wiesemeyer et al. 2006, in prep.



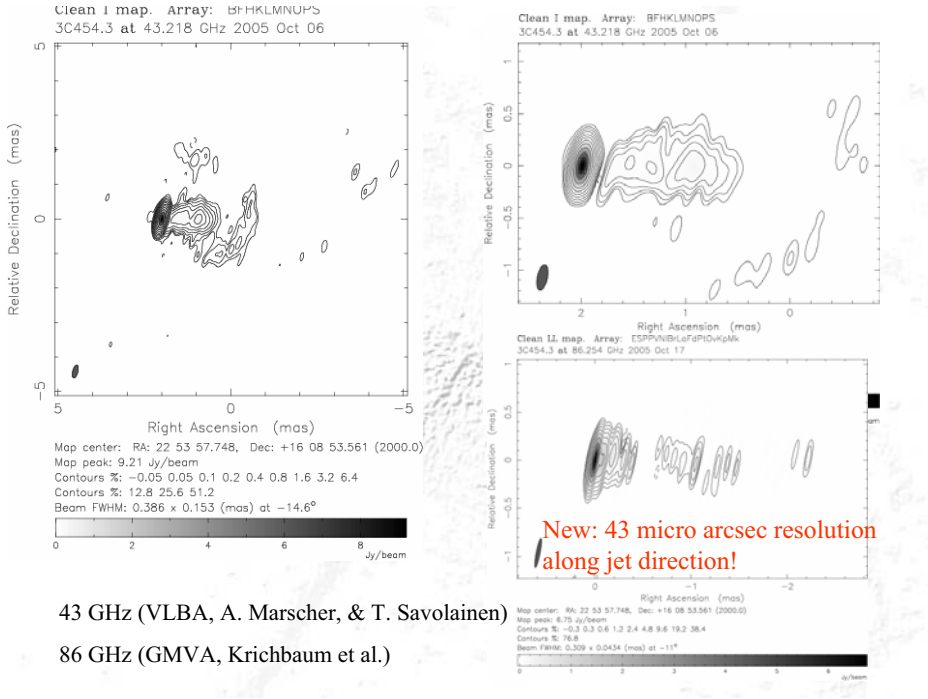
15 GHz (2cm VLBA survey

43 GHz (VLBA)

86 GHz (CMVA, GMVA)

→ quasi simultaneous epochs allow to determine spectral properties

Pagels et al. 2004 and Krichbaum et al. 2006



43 GHz (VLBA, A. Marscher, & T. Savolainen)

86 GHz (GMVA, Krichbaum et al.)

3mm polarimetric monitoring of OJ287 with IRAM 30m

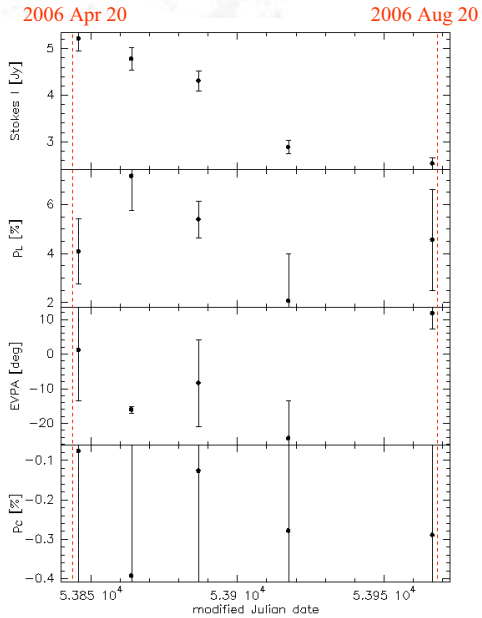
- To help providing new data to fix or rule out the models and to help establishing the possible casual connection between the second optical flare and the radio flares
- We have proposed a monitoring of OJ287 with the new IRAM 30m polarimeter (XPOL)
- with 86 GHz measurements every 15 days during more than 1.5 yr
- As we observe 4-Stokes parameters => circ. pol. densely time sampled for an AGN for the first time at 3mm
- Our observations will also support the interpretation of mm-VLBI monitorings
- Highest rated proposal for the last deadline
- 4 months of observations already performed
- Almost 50% data initially rejected due to bad weather (mainly) and technical problems (part of these data will be recovered in the future)

Agudo et al. 2006

3mm polarimetric monitoring of OJ287 with IRAM 30m

Preliminary results:

- Crude data reduction. Inst. pol. cal. and error bars (still very conservative) will be improved in the future.
- Evidence of significantly large variability in Stokes I only.
- pL about 2% -7%
- EVPA about -20º to 10º
- pC tends to be negative but consistent with null circular polarization within the present error bars.

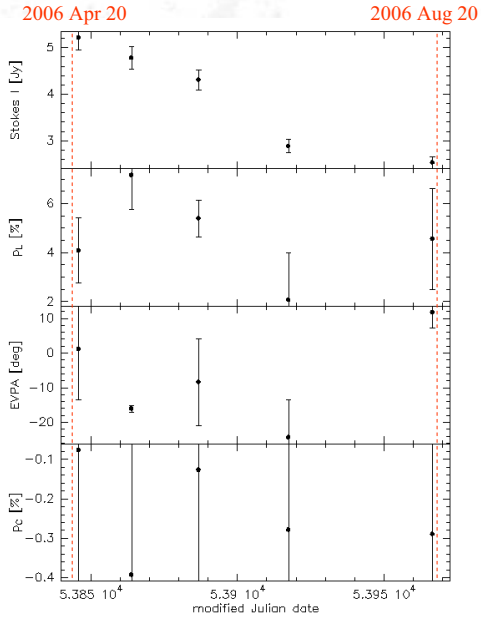


Agudo et al. 2006

3mm polarimetric monitoring of OJ287 with IRAM 30m

Future:

- Continuation of the observations for another 1yr-1.5 yr
- Proposal for the next deadline in preparation
- Optimization of the calibration strategy
- Recovery of data from non-optimum weather-condition observations

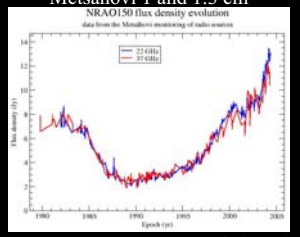


Agudo et al. 2006

NRAO 150: A misaligned quasar with a rotating jet

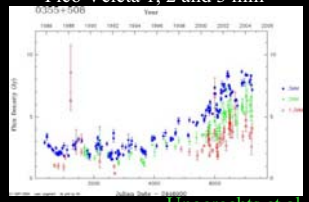
- Intense radio-mm source
- First catalogued by Pauliny-Toth et al. (1966) at 1.4 GHz
- Monitored at radio-mm λ since beginning of the eighties
- ~12 Jy at 1.3cm and ~7 Jy at 3mm

Metsahövi 1 and 1.3 cm



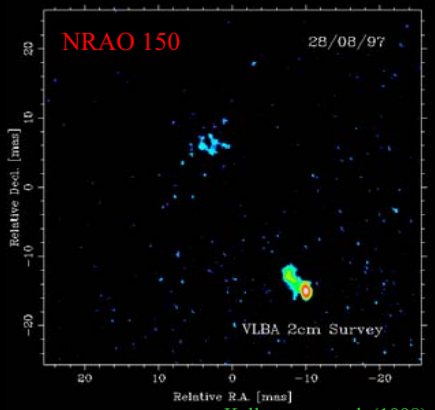
Terasranta et al. (2004)

Pico Veleta 1, 2 and 3 mm



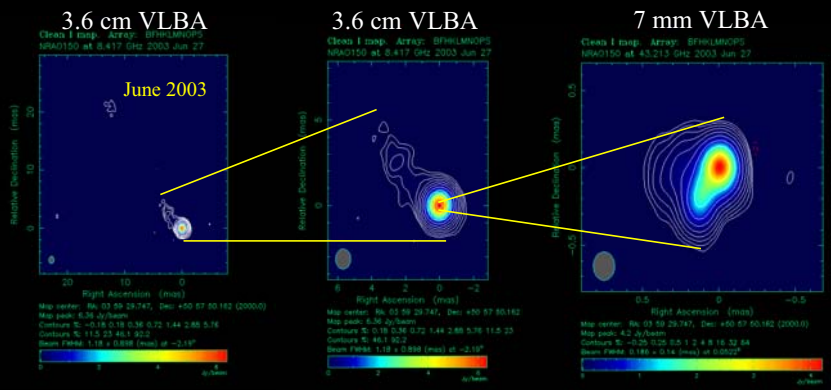
Ungerechts et al.

- cm-VLBI scales shows a jet extended up to ~30 mas to the North-East



Kellermann et al. (1998)

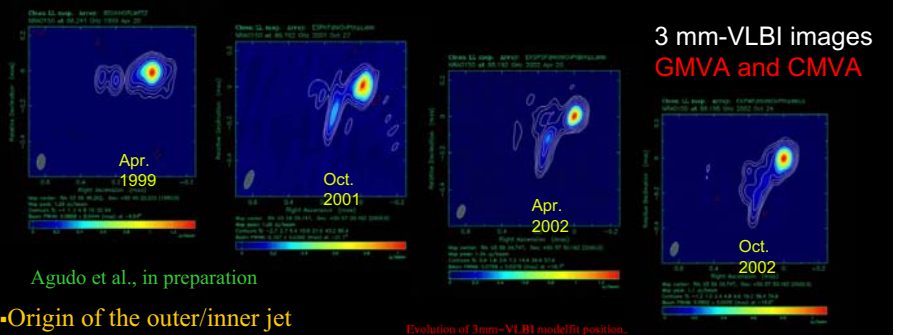
VLBI results: ~120º of inner to outer jet misalignment



- New 3.6 cm and 7 mm-VLBA observations reveal a strong misalignment (of ~120º) within the first 0.5 mas
- Question: What produces this strong misalignment?
- Answer: Jet bend, alignment of the jet with line of sight and projection effects
- Another question: What produces the jet bend? Answer: 3mm VLBI monitoring

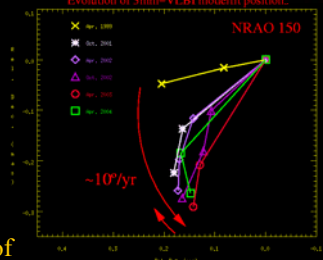
Agudo et al., in preparation

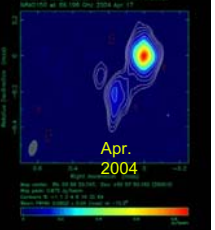
VLBI results: Fast jet structural position angle rotation



Agudo et al., in preparation

- Origin of the outer/inner jet misalignment
- Rotation of the innermost 0.5 mas of the jet with an angular speed of ~10º/yr
- Change in the rotation direction of the jet before April 2004, which allows for the estimation of possible periodicity

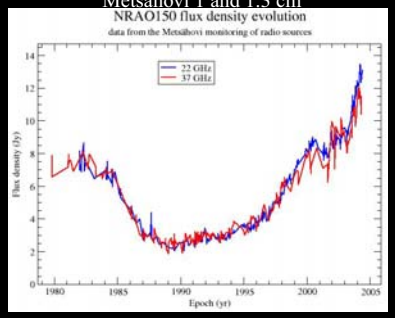




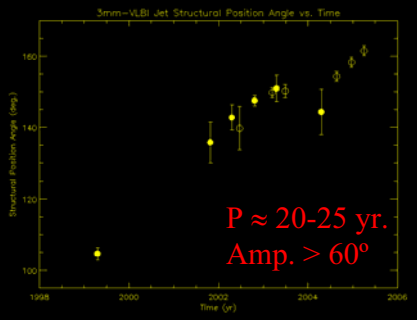
Agudo et al. 2006

VLBI results: Is NRAO 150 rotating periodically?

Metsahövi 1 and 1.3 cm



Terasranta et al. (2004)



- If the jet rotation is correlated with the single-dish light curves of the source:
  - Possible periodic behaviour
  - P ≈ 20-25 yr
- It needs to be confirmed and constrained

Agudo et al. 2006