



CORE-JET BLENDING EFFECTS IN AGN UNDER THE KVN VIEW

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Resolution and Blending

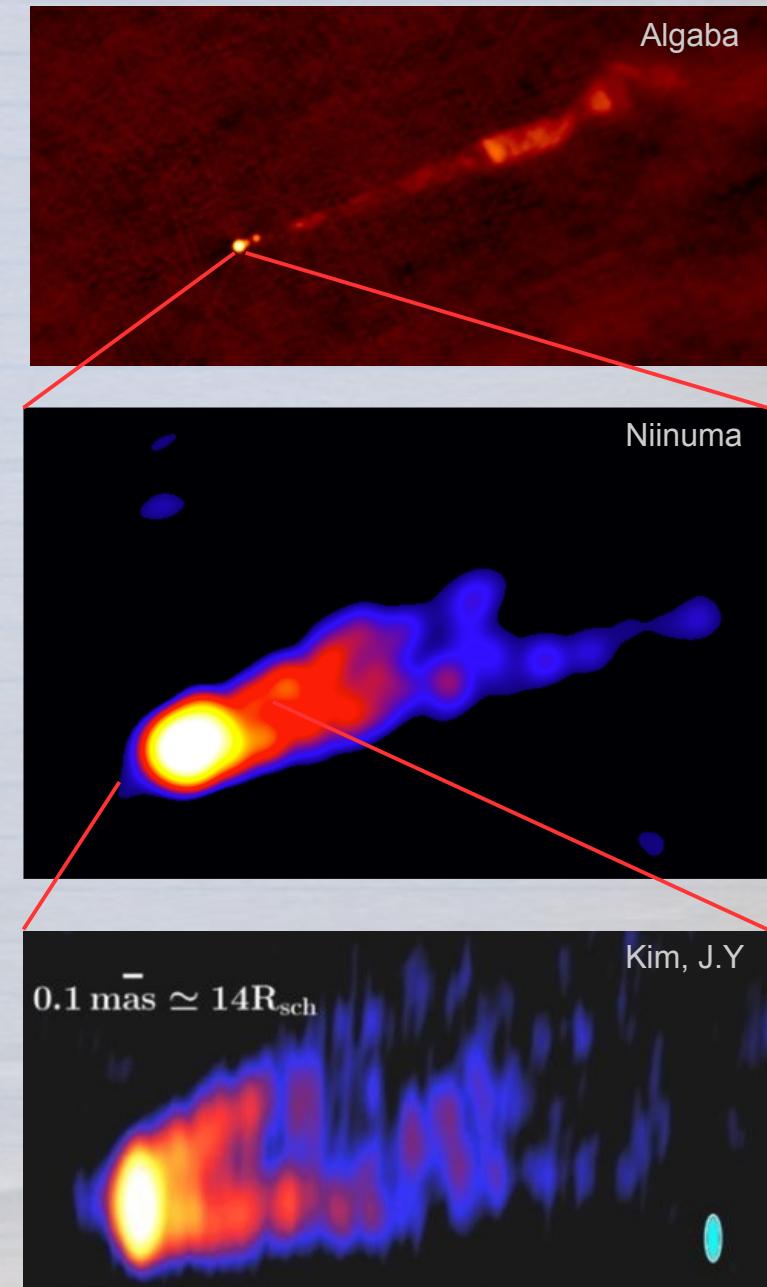
Studies of AGN

- Structure: Typically core+jet

When's the 'core' actually the core?

- Core ($\tau=1$ surface)
- VLBI core (beam...)

In general, what we consider to be the core, is actually a blending of core+innermost jet, limited by resolution effects



Resolution and Blending

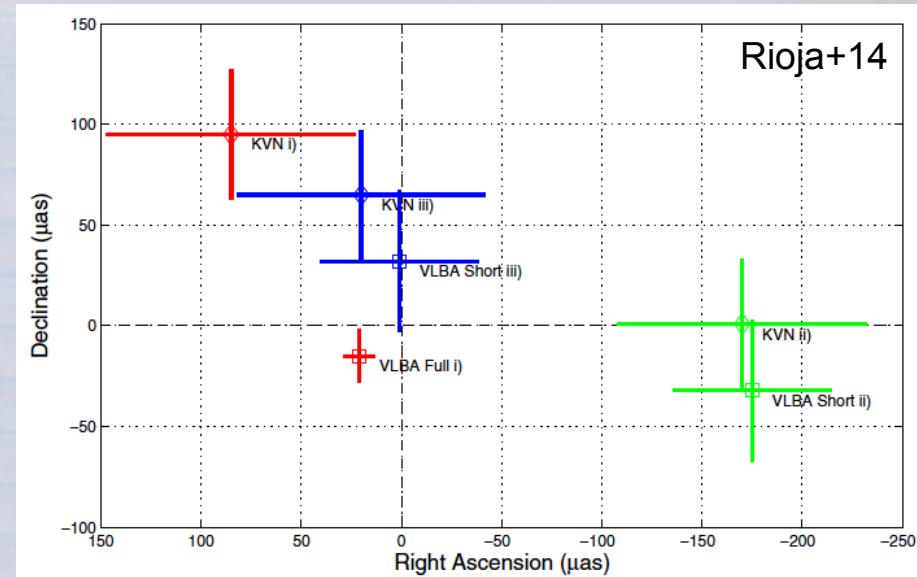
Annoying blendings and how to fight them

- Integration of properties that are from core and jet
- Can affect the observables
 - Core size / core shift
 - Polarization
 - Spectral index
 - ...etc
- Possible Approaches
 - Comparison with other maps with different resolutions
 - Convolution with larger beam
 - Monte Carlo simulations
 - ...etc

Observations and Analysis

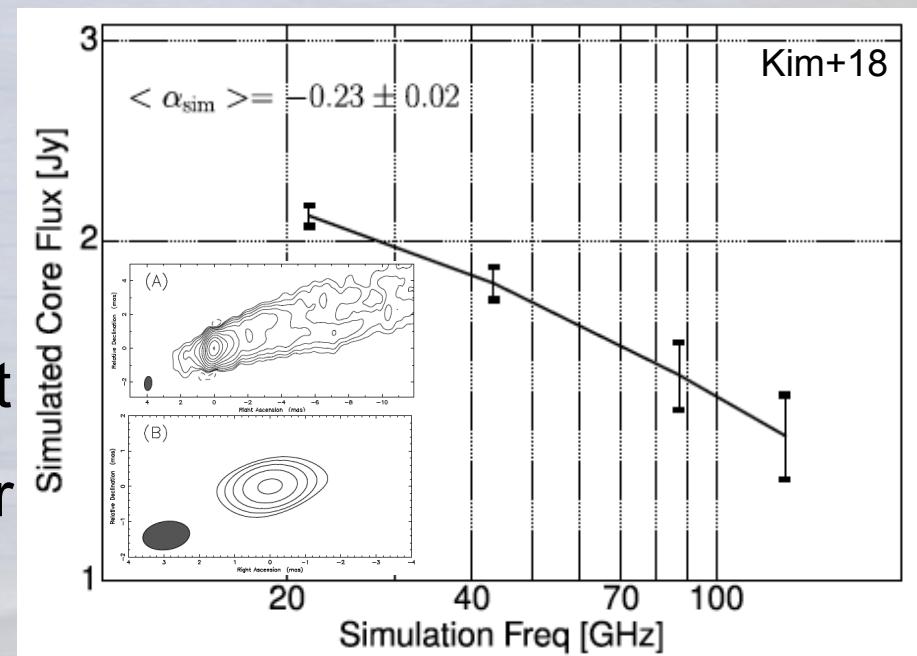
The case of the KVN

- KVN is a very powerful array
- Resolution is however still poor compared with e.g., VLBA (but see E-KVN talk by T. Jung)



Previous Works

- Astrometry (Rioja+14)
- M87 spectral index (Kim+18)
- Results seem source-dependent
 - May need a larger sample for statistics!



Observations and Analysis

Our approach

- **Comparison of KVN data with VLBA**
(Core flux, core size, brightness temperature)
- Multi-epoch (for repeatability) simultaneous data is difficult
- Not all frequencies can be followed up
- Need a multi-source sample for statistics
- **Comparison of iMOGABA with BU 43 GHz light curves**

iMOGABA

- 22/43/86/129 GHz monthly monitoring with KVN

VLBA-BU-BLAZAR Program

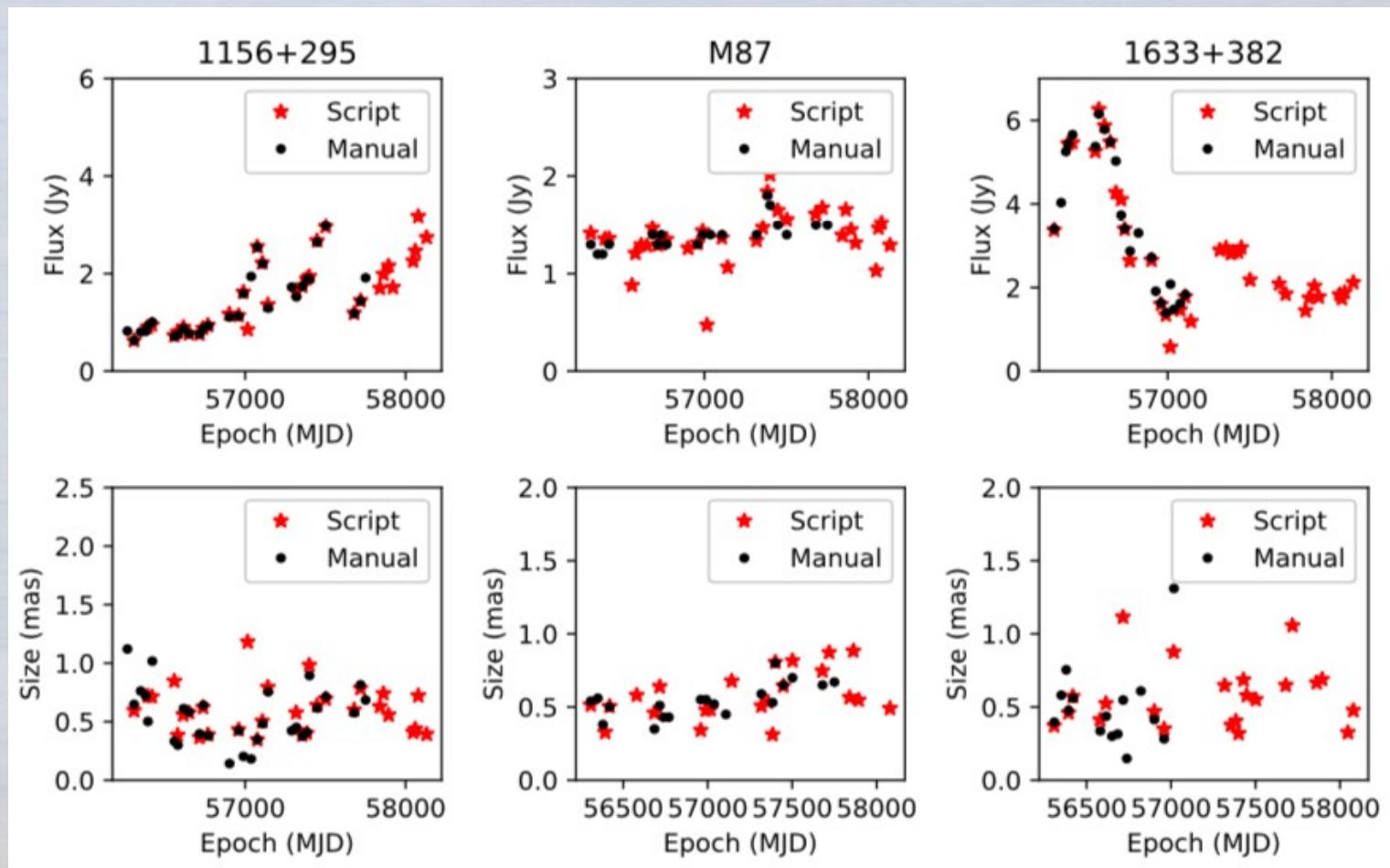
- 43 GHz monthly monitoring with VLBA

Observations and Analysis

One script to check them all...

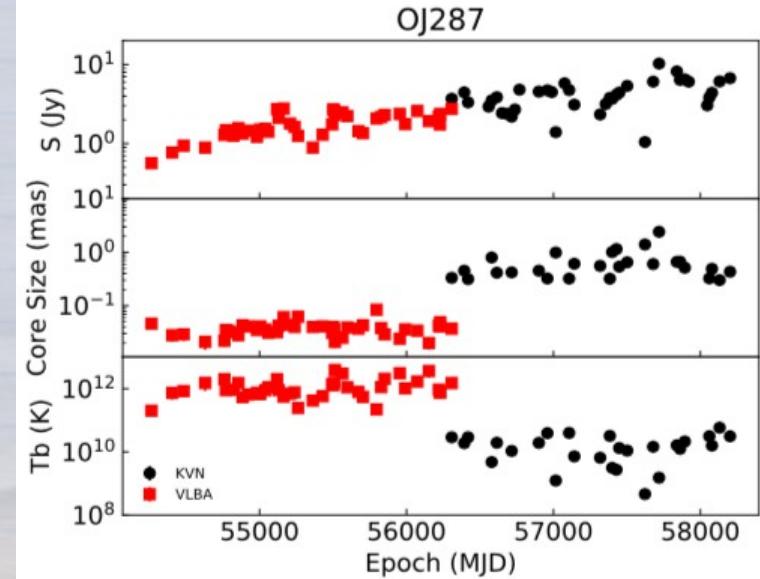
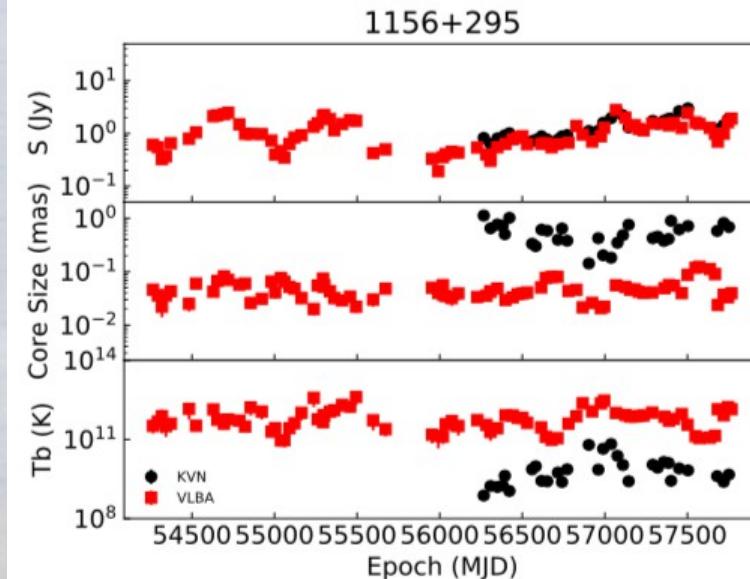
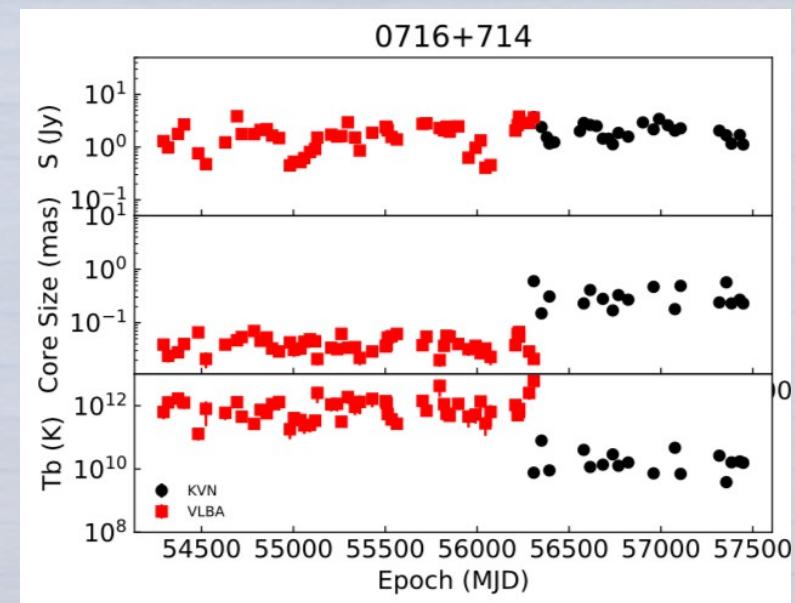
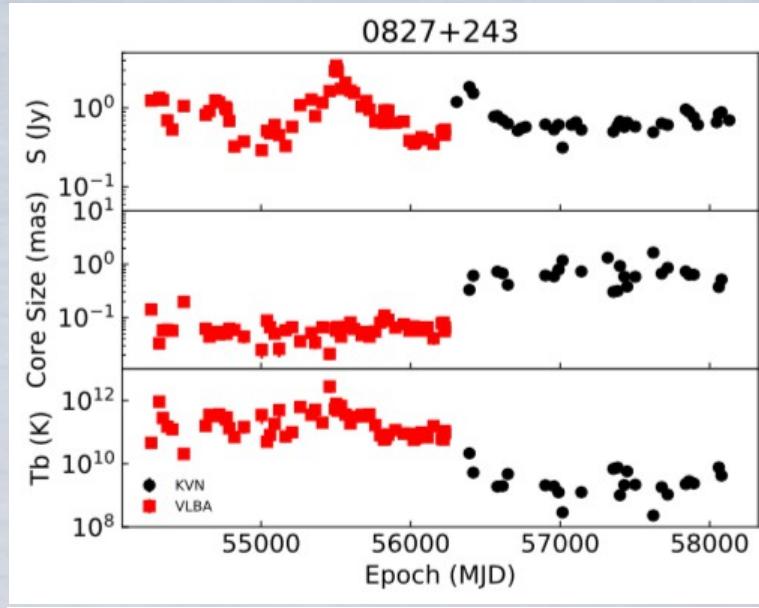
...and in the analysis bind them

- A script developed by Hodgson to modelfit iMOGABA sources



Observations and Analysis

Some Sample Sources



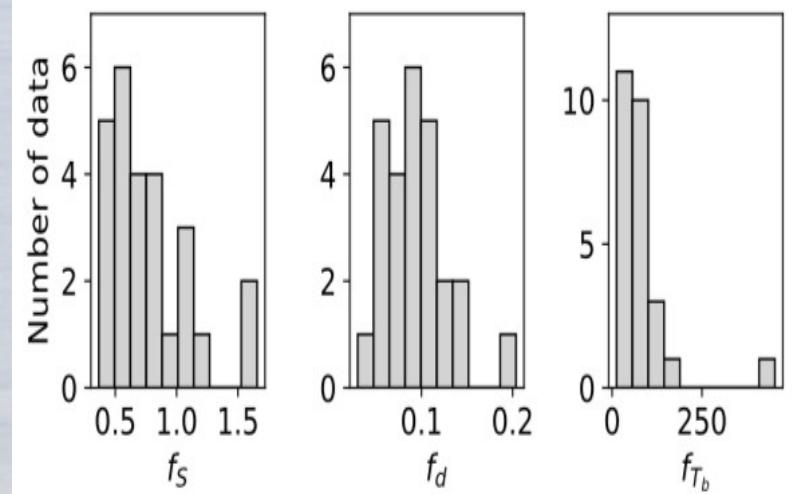
Results and Discussion

Inspecting the fractional variables VLBA/KVN

- Core Flux density
 - Many sources, flux loss $f_s \sim 0.5$
 - Some compact sources $f_s \sim 1$
 - Variability in $f_s > 1$
- Core Size
 - VLBA ~8611km (MK-SC)
 - KVN 476km (KT-KY)
 - Expected factor $f_d \sim 0.1$, but scatter is too large
 - Other phenomena affecting

Sample Fractional Quantities

	f_s	f_d	f_{T_b}
Minimum	0.4	0.03	12.5
25% Quartile	0.5	0.07	36.9
50% Quartile	0.6	0.09	61.8
75% Quartile	0.9	0.11	86.6
Maximum	1.6	0.20	453.1



Results and Discussion

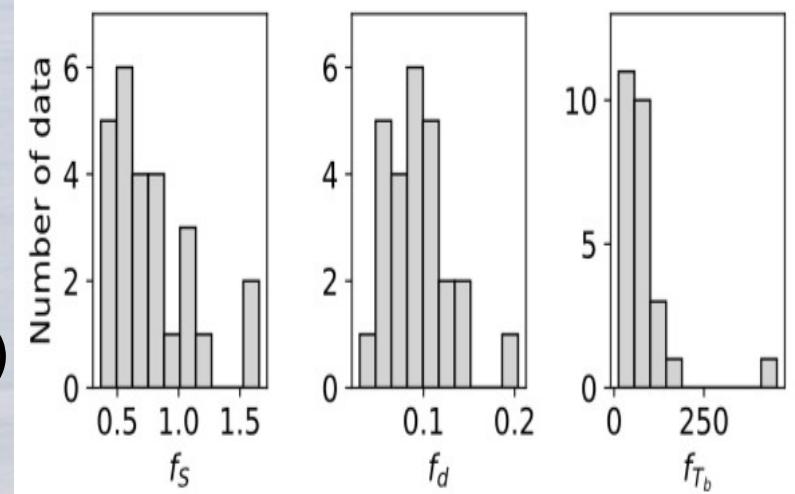
Inspecting the fractional variables VLBA/KVN

■ Brightness Temperature

- $T_b = 1.22 \times 10^{12} S(1 + z)/43^2/d^2$,
- Size term is squared and its fractional ratio is much larger than that of the fluxes
- **Tb severely limited by resolution**
- (Expected higher Tb with higher resolutions, less blending effect.
See e.g., Pilipenko+18, $Tb > 10^{13}$)

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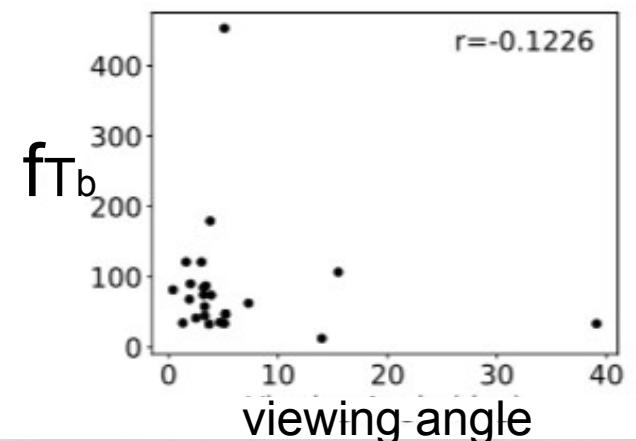
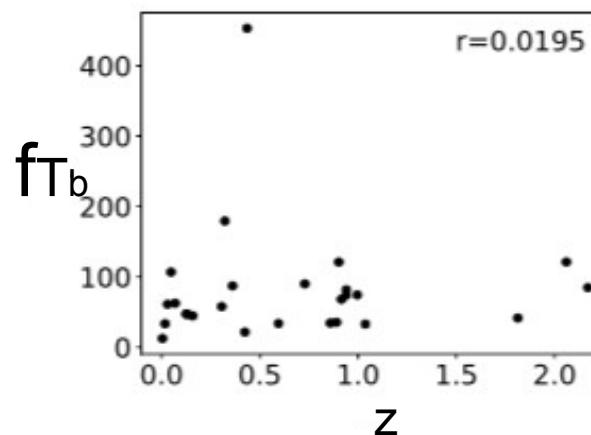
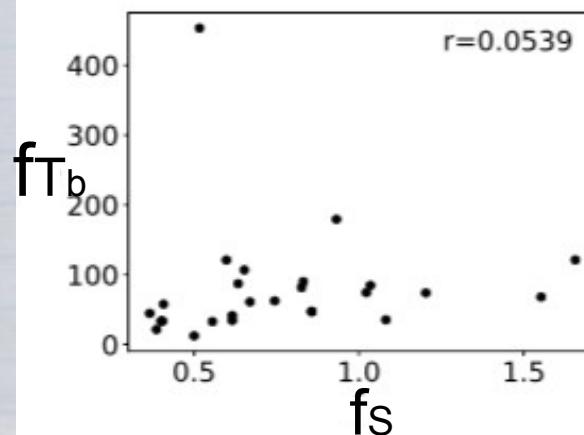
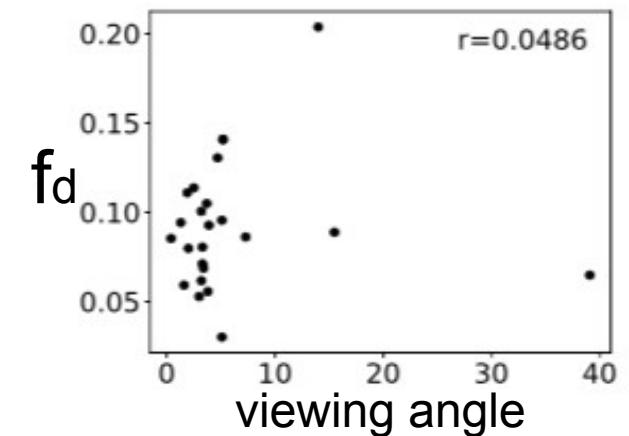
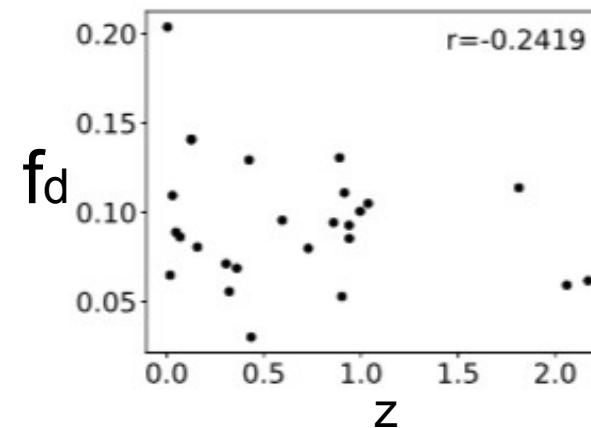
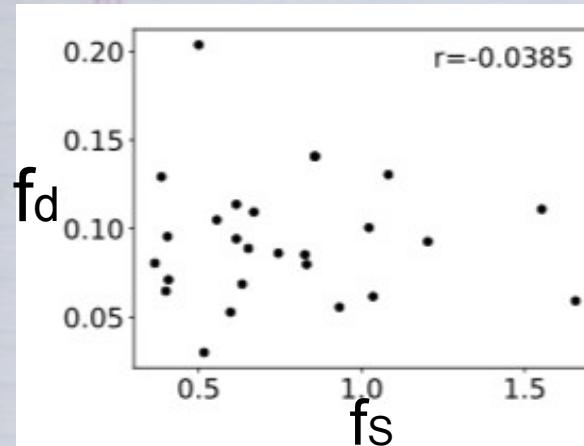
Results and Discussion

Are the properties of the source playing a role?

- Compactness
- Redshift
- Viewing angle

Results and Discussion

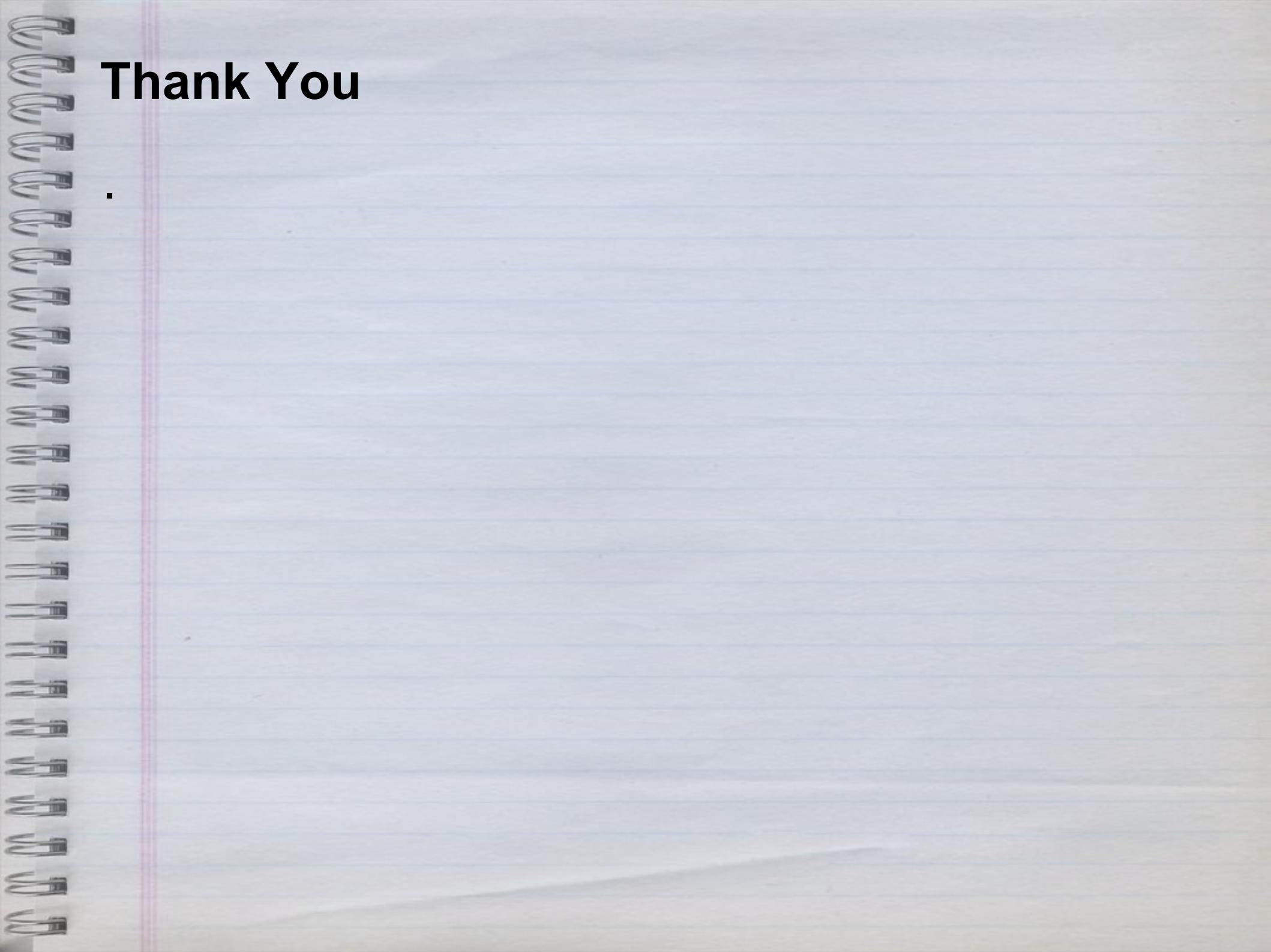
Are the properties of the source playing a role?



- No correlation found

Conclusions

- Core-jet blending effects need to be considered to characterize the source
- Comparison between KVN and VLBI suggest that blending includes phenomenology beyond pure array resolution
- Blending seems to be not related with properties of the source such as core dominance, redshift of viewing angle
- Can a common blending value be attributed to the array, independently of the source?
- Further source-by-source analysis and direct comparison



Thank You