INVISIBLE JETS: STRONG RADIO VARIABILITY vs NO OPTICAL PERIODICITY

L. Crepaldi[1], S. Kiehlmann[2], M. Berton[3], E. Järvelä[4], S. Ciroi[1]

[1] University of Padova, Italy; [2] Institute of Astrophysics, Foundation for Research and Technology-Hellas, Greece; [3] European Southern Observatory, Chile; [4] Homer L. Dodge Department of Physics and Astronomy, The University of Oklahoma, USA

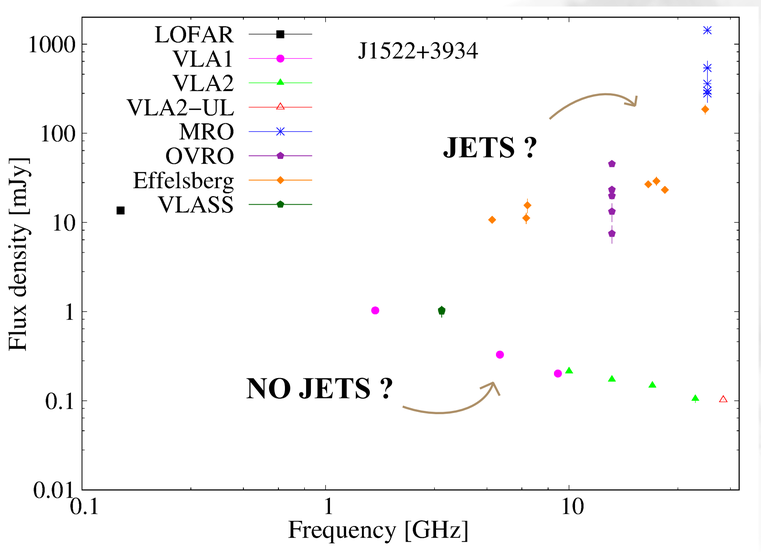
INTRODUCTION

Narrow-line Seyfert 1 galaxies (NLS1s):

Type 1 active galactic nuclei (AGN) with narrow permitted lines → Low black hole masses ($<10^8 M_\odot$) & high Eddington ratios + Disk-like host galaxies & jetted sources

= Early-stages jetted AGN

Metsähovi Radio Observatory (MRO) performed a monitoring at 37 GHz of a targeted sample of radio-quiet/-silent NLS1s, detecting ~10% (8) of them at Jy-level flux densities. Follow-up observations using different facilities confirmed flares detections.



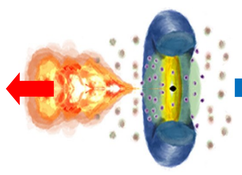
MRO DETECTIONS SUGGESTED THE PRESENCE OF **RELATIVISTIC JETS**

JVLA OBSERVATIONS TO PROVE IT

NO RELATIVISTIC JETS EVIDENCE!

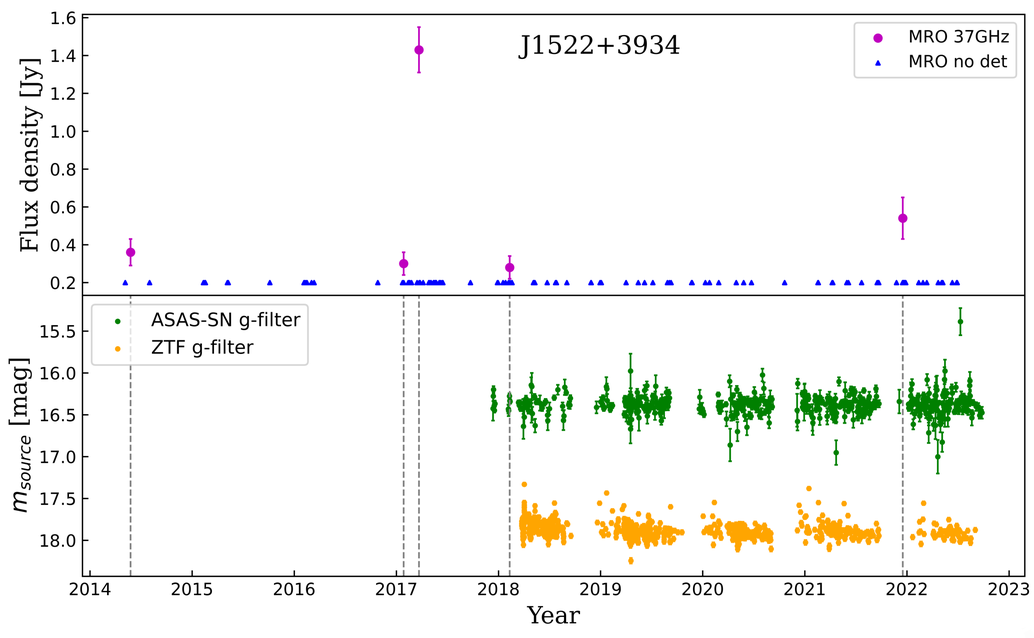
Several hypotheses in case of **jetted** and **non-jetted** sources:

Free-free absorption
Synchrotron-self absorption
Jet-ISM interaction



Magnetic reconnection

GOALS & METHODS



Optical light curves (LCs) analysis

Checking if flares were detected in optical bands

Investigate similarities between the sources (e.g. periodicities)

Surveys for transients were used:

- All Sky Automated Survey for SuperNovae (ASAS-SN) in **V** and **g**-band
- Zwicky Transient Facility (ZTF) in **g**, **r** and **i**-band

Periodicity analysis:

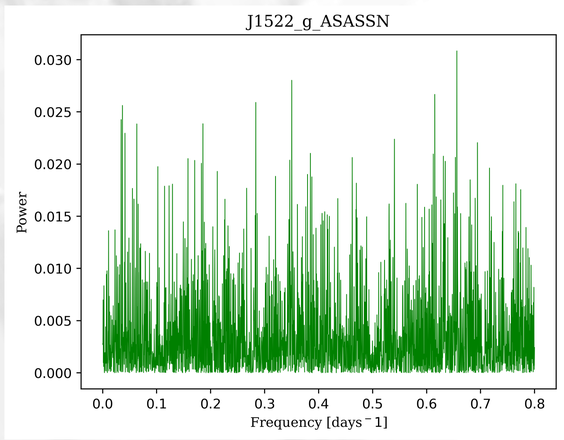
- Generalized Lomb-Scargle (GLS)
- Weighted Wavelet Z-transform (WWZ)

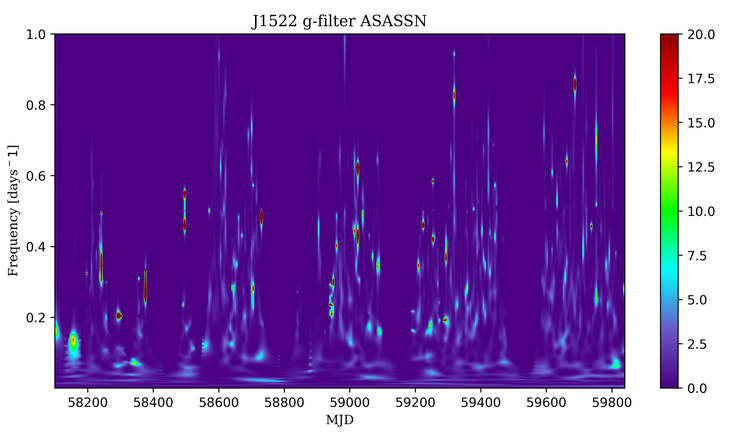
RESULTS

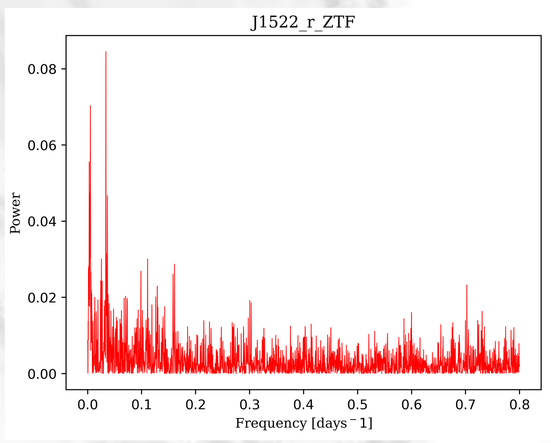
Optical behaviour completely different from the radio one, in all the sources

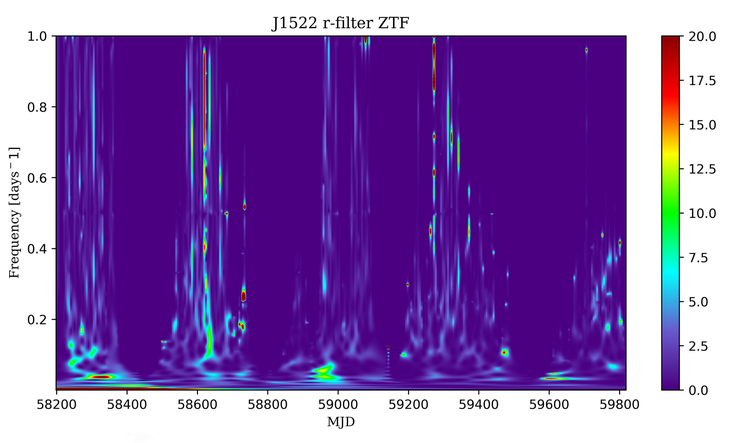
Radio flares not detected in optical bands

No periodicities identified along all the LCs









CONCLUSIONS

Considering LCs and periodograms analysis the radio and optical behaviour are clearly disconnected from each other. Therefore, the mechanism which generates the uneven strong radio flares does not impact the optical wavelength at all. A variation of the absorption factor in the high-frequency radio wavelength, due to moving broad-line region clouds, is a possible explanation.

FUTURE WORKS

- X-ray variability analysis (short- and long-scale) & spectroscopy
- High-frequency radio observations
- Optical follow-up observations in polarized light

..to be continued!
See E. Järvelä's poster

References:
Lähteenmäki+2018, A&A, 614, L1
Berton+2020b, A&A, 636, A64
Järvelä+2021, FRASS, 8, 147
Romano+2023, arXiv
Järvelä+2023 in prep.
Crepaldi+2023 in prep.

ORCID