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An abrupt change in the IDV characteristics of 0954+658 during its 2008 outburst

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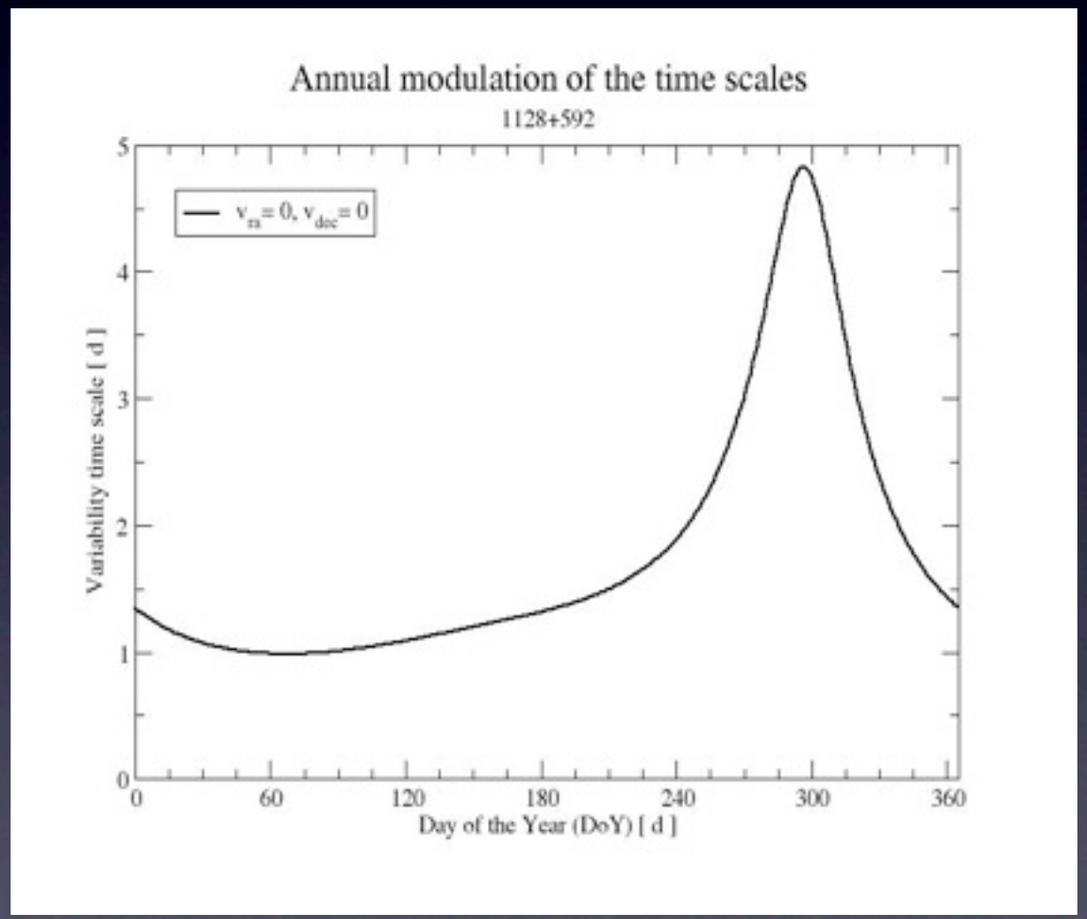
IntraDay Variability (IDV)

Fast variability in 30-50%
of flat-spectrum-radio sources:

- Time scales from hours up to a few days
- Variations from few percent up to 100% of the average flux density
- Source-intrinsic or source-extrinsic?

$$d < c\tau \longrightarrow T_{\rm b} \sim 10^{17} - 10^{19}{\rm K}$$

Source-extrinsic IDV: Annual modulation of the time scales



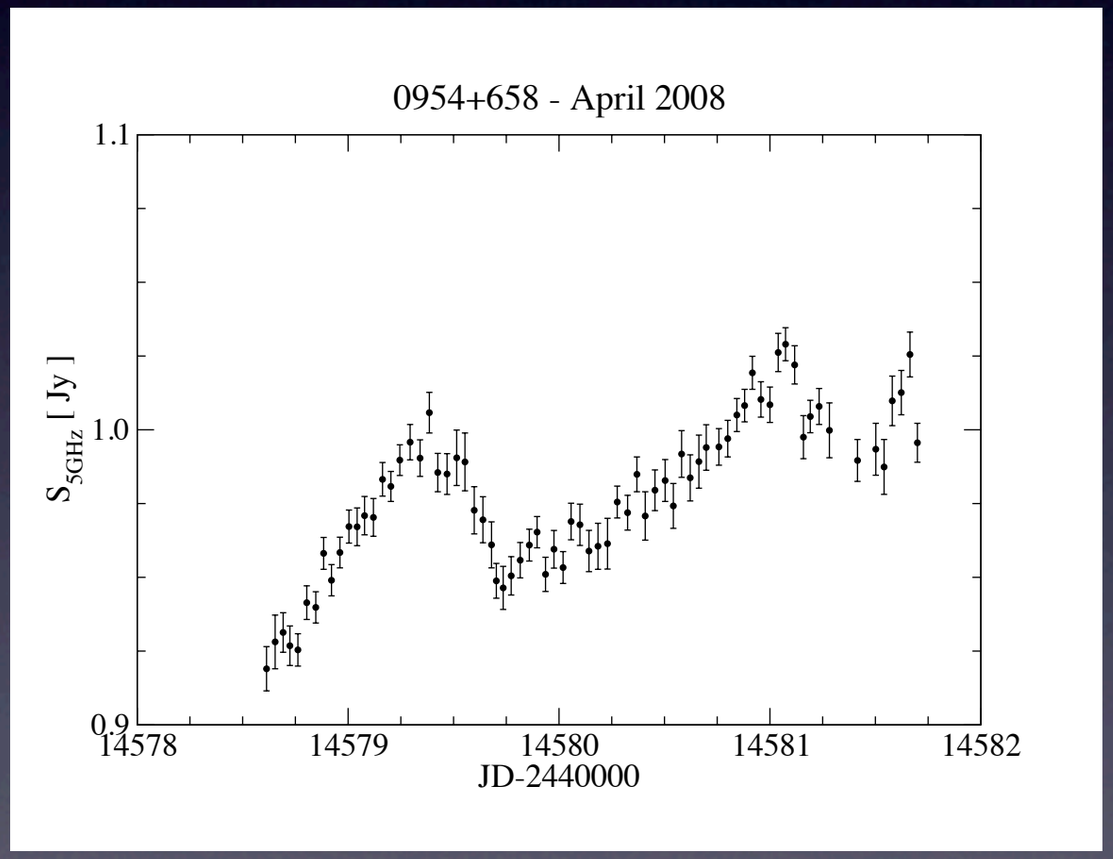
The Urumqi IDV project

The main aim

To study the *changes* in the variability time scales of IDV sources

The observations

41 observing sessions with the Urumqi Telescope, between August 2005 and December 2009, at 5 GHz



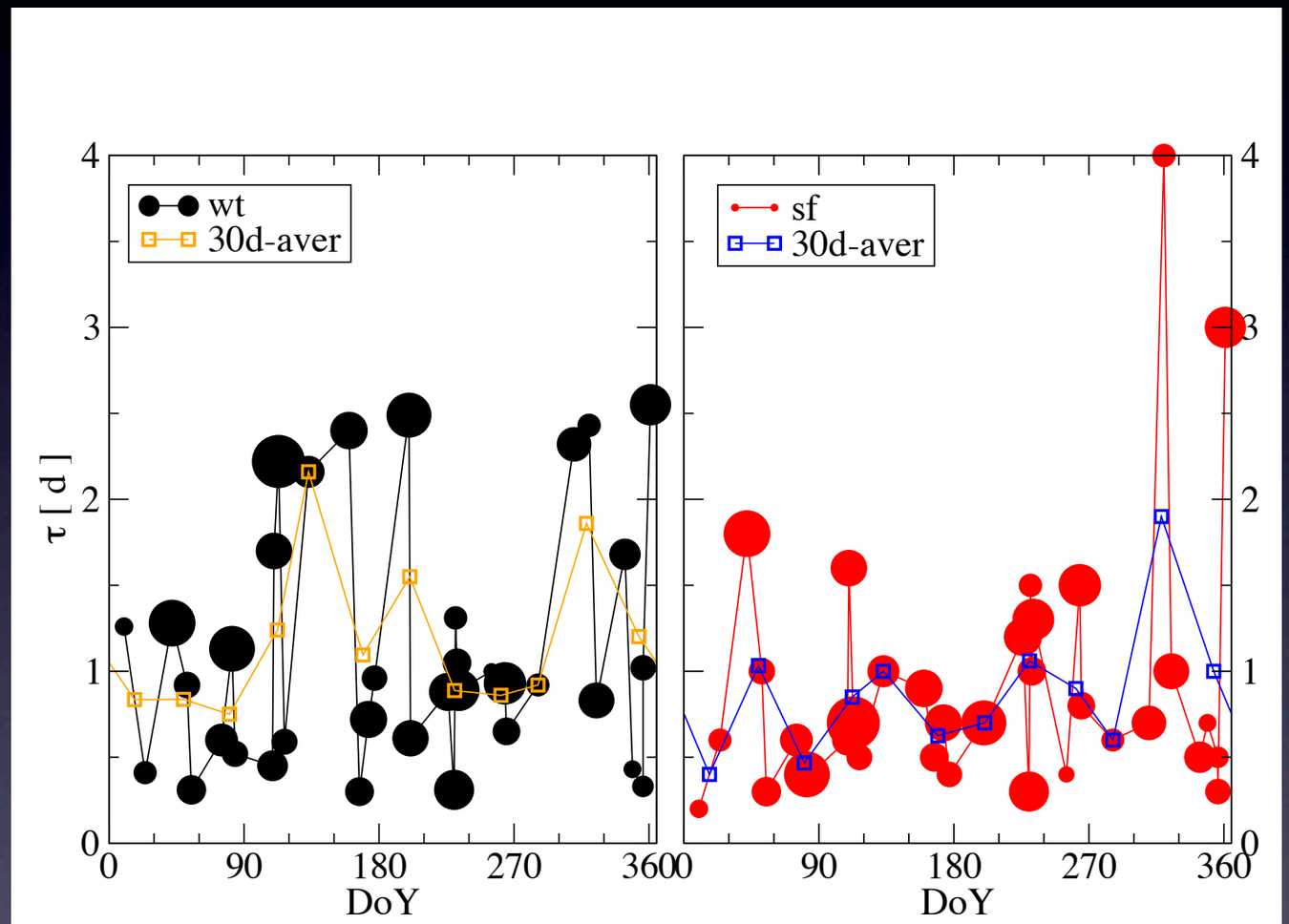
The main targets

0716+714, 0917+624, 0954+658, 1128+592, 0235+164

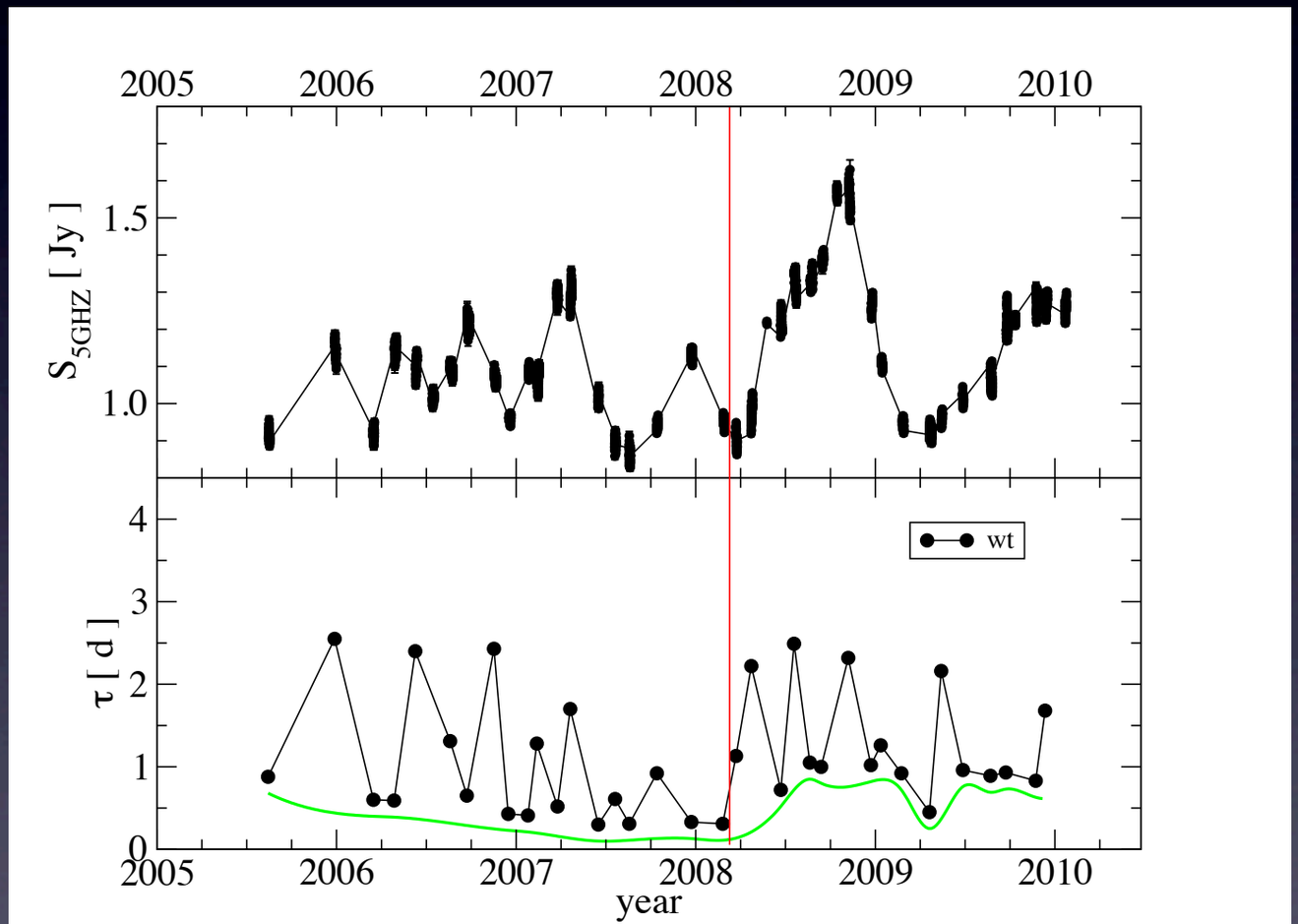
The analysis methods

Structure function analysis & Wavelet analysis

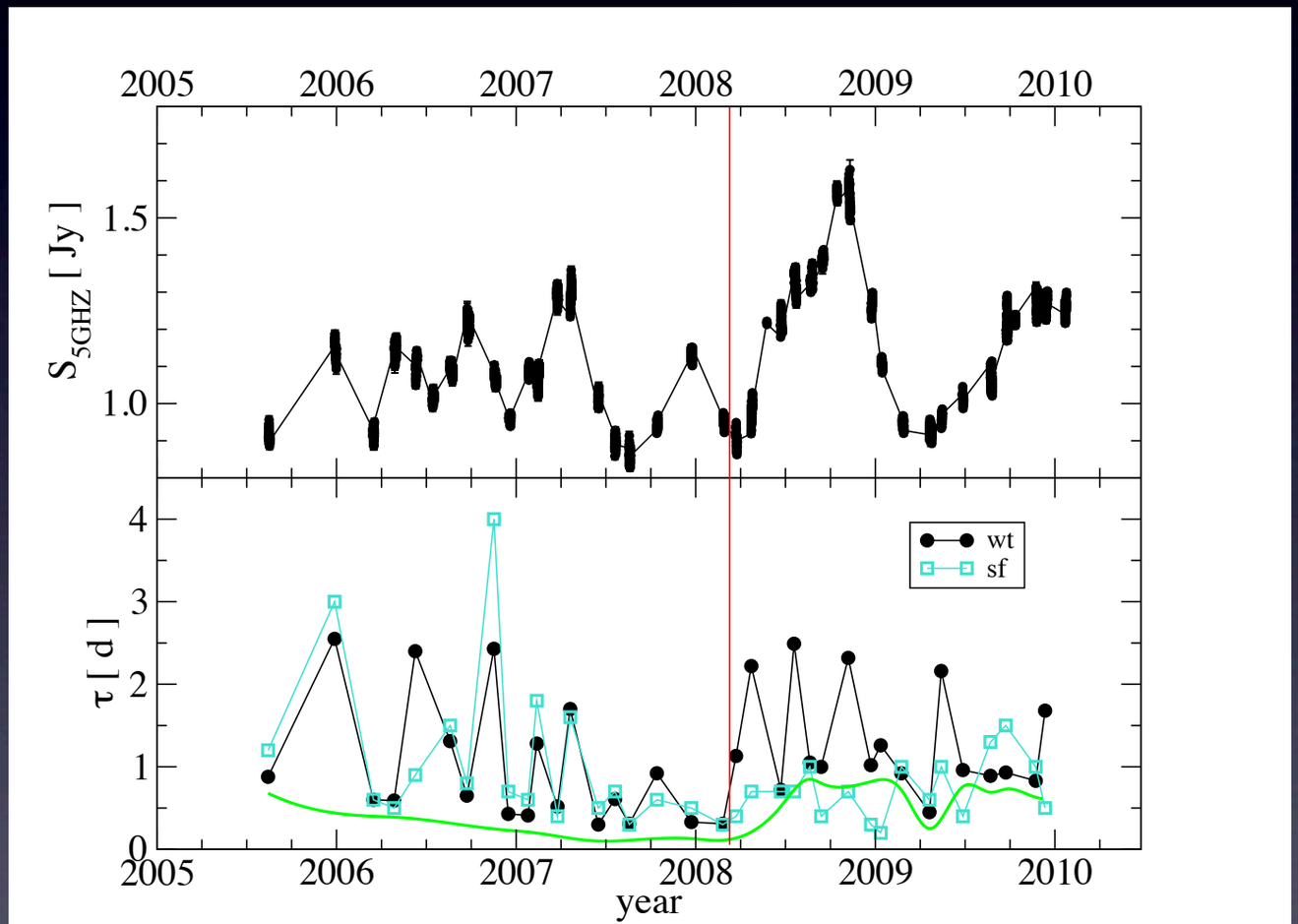
Annual modulation plot for 0954+658



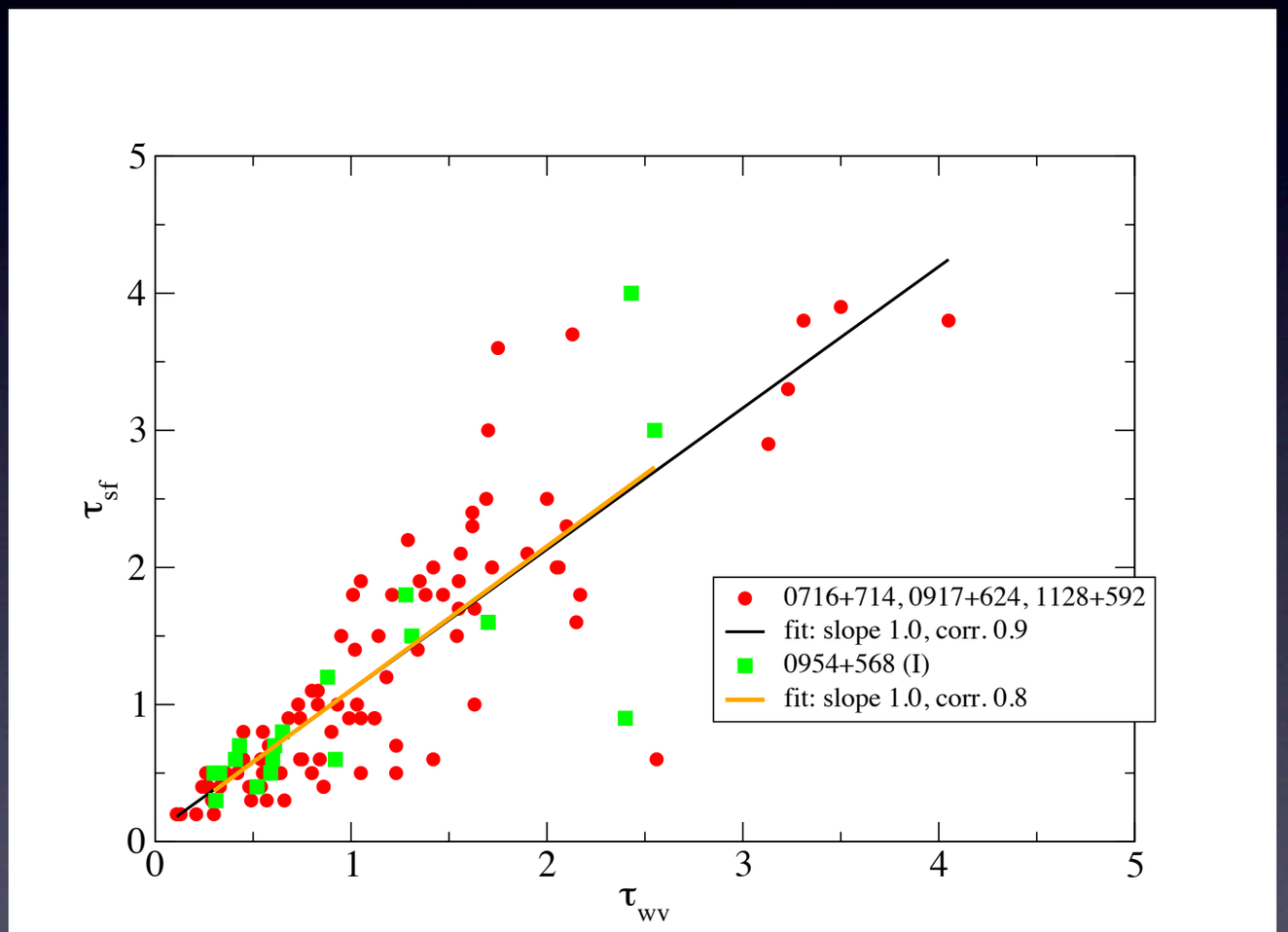
Variability time scales vs time



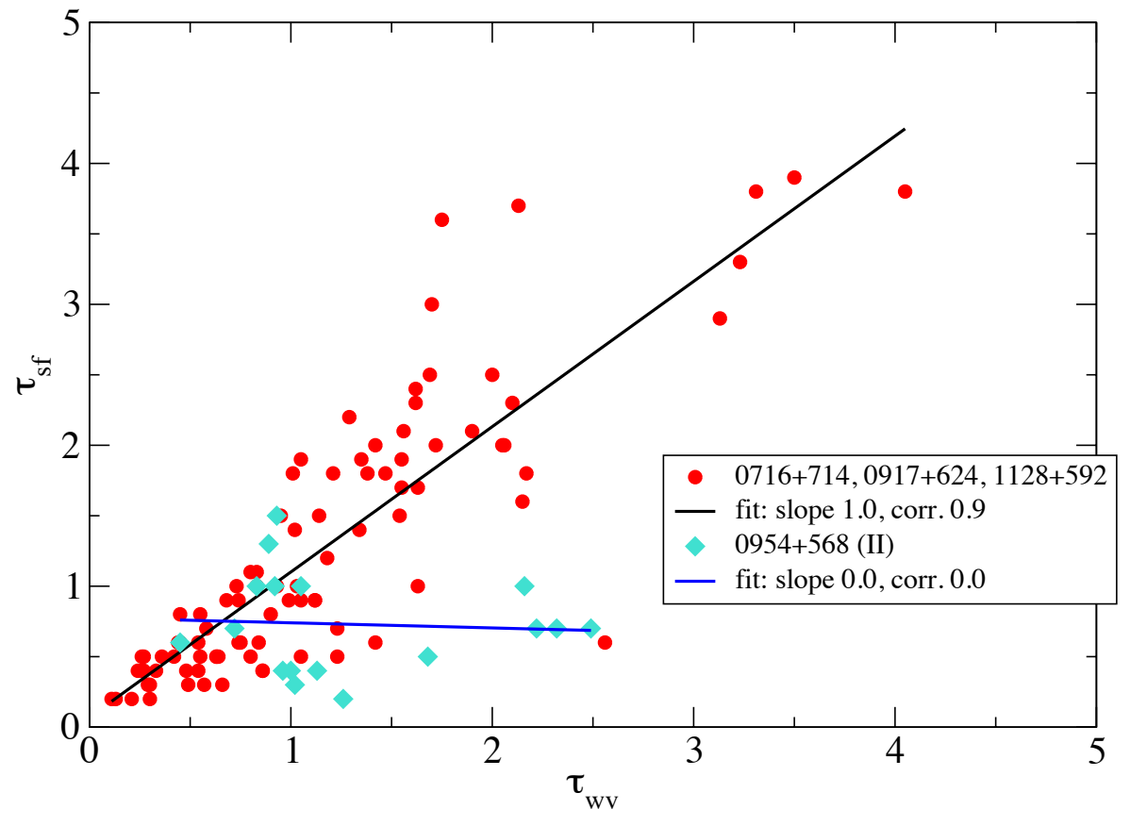
Variability time scales vs time



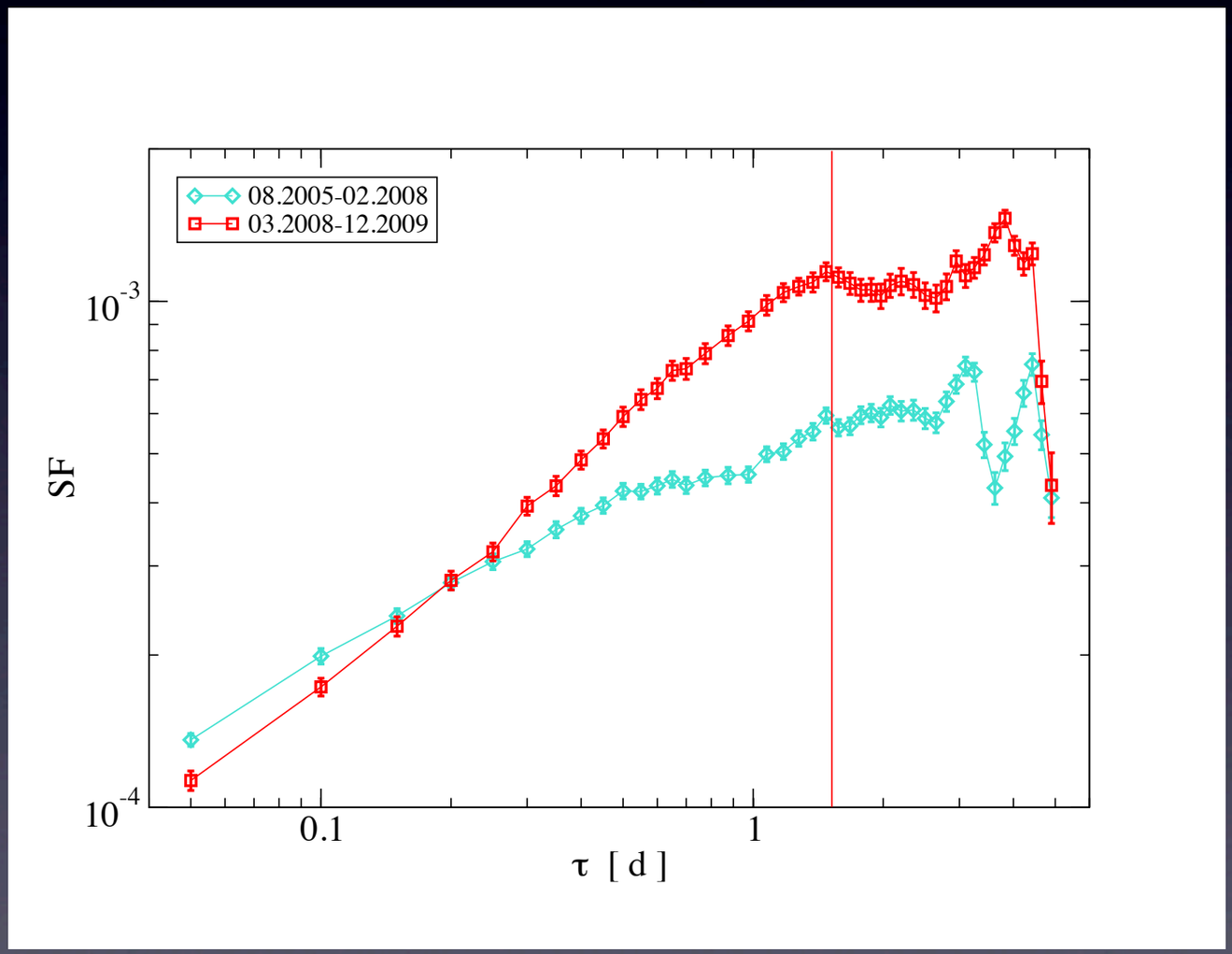
Structure Function vs Wavelet



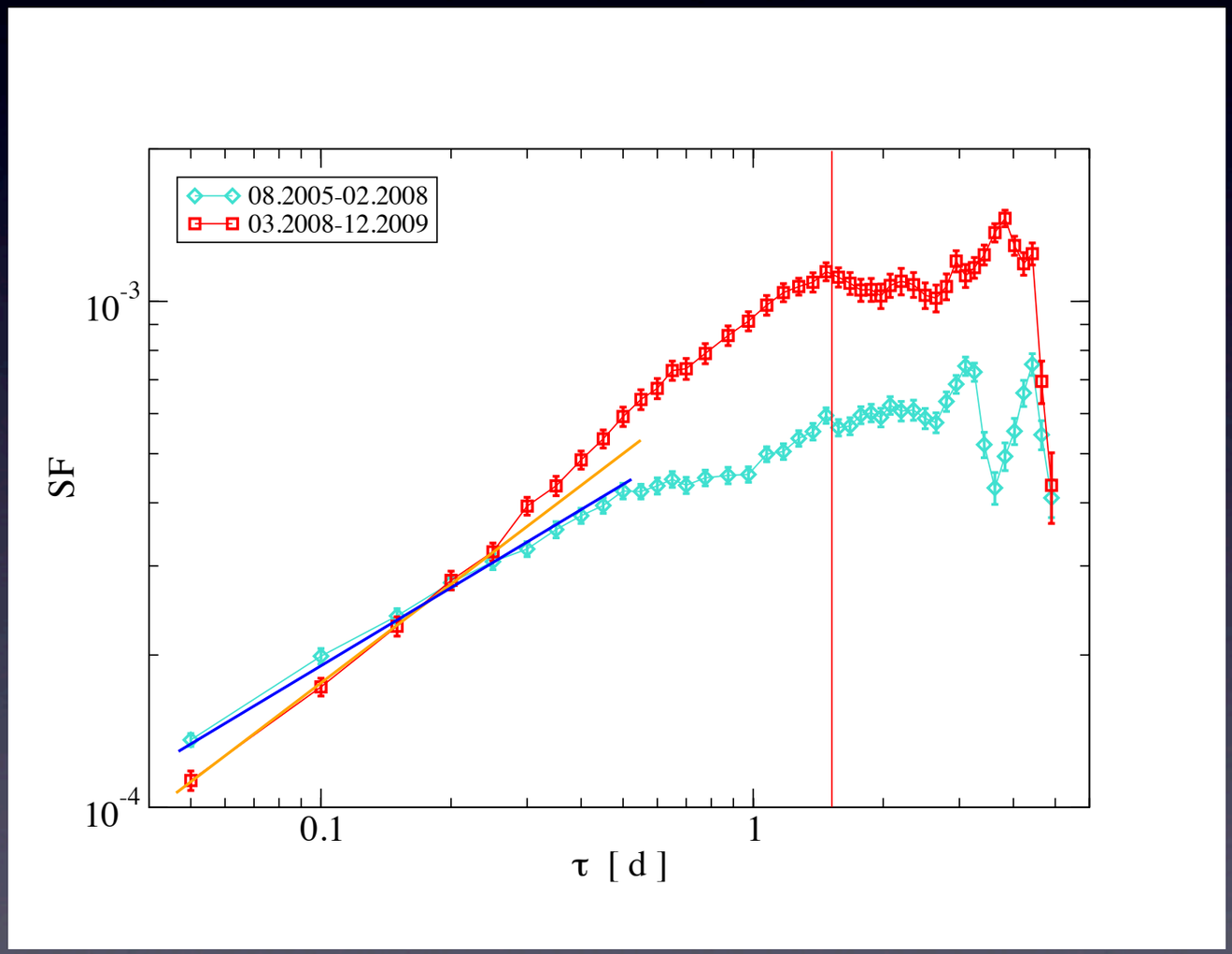
Structure Function vs Wavelet



Structure Function before and after March 2008



Structure Function before and after March 2008



Multiple time scales?

- Disagreement between SF and wavelet
- Change in the SF slope after March 2008

Source-extrinsic + Source-intrinsic variability?

Scintillation of multiple compact components?

Summary

- (weak) evidence for annual modulation
- remarkable change in the variability characteristics after March 2008
- appearance of multiple time scales in the light curves