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The effects of quasar variability on astrometry

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Radio sources observed in global IVS sessions are mostly flat-spectrum radio-loud quasars. While some quasars appear almost point like, many have extended jet components in addition to compact cores. The structure of these jets often varies on timescales of months to years as the black hole at the centre of the quasar accretes new material and ejects components of radio-emitting plasma. These components expand adiabatically as they move away from the compact core, and eventually disappear. In this way, the structure and flux density of quasars are related.

We present an analysis of nine variable quasars frequently observed in global geodetic VLBI programs. We find a clear anti-correlation between source flux density and structure index, in the sense that the brightest sources are also the most compact. This anti-correlation is stronger on the rising side of the flare, consistent with astrophysical expectations. Consistent with previous findings, we show that bright, compact quasars also have more repeatable astrometric positions. We suggest that flux density time series may be a useful additional piece of information used in selecting quasars for geodetic VLBI observations.

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