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Bayesian analysis of heavy-tailed and long-range dependent Processes

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We have used MCMC algorithms to perform a Bayesian analysis of Auto-Regressive Fractionally-Integrated Moving-Average ARFIMA(p,d,q) processes, which are capable of modelling long range dependence (e.g. Beran et al, 2013). Our principal aim is to obtain inference about the long memory parameter, d, with secondary interest in the scale and location parameters. We have developed a reversible-jump method enabling us to integrate over different model forms for the short memory component. We initially assume Gaussianity, and have tested the method on both synthetic and physical time series. We have extended the ARFIMA model by weakening the Gaussianity assumption, assuming an alpha-stable, heavy tailed, distribution for the innovations, and performing joint inference on d and alpha. We will present a study of the dependence of the posterior variance of the memory parameter d on the length of the time series considered. This will be compared with equivalent error diagnostics for other popular measures of d.