



Modeling Geodetic Processes with Levy α -Stable Distribution and FARIMA

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Over the last years the scientific community has been using the auto regressive moving average (ARMA) model in the modeling of the noise in global positioning system (GPS) time series (daily solution). This work starts with the investigation of the limit of the ARMA model which is widely used in signal processing when the measurement noise is white. Since a typical GPS time series consists of geophysical signals (e.g., seasonal signal) and stochastic processes (e.g., coloured and white noise), the ARMA model may be inappropriate. Therefore, the application of the fractional auto-regressive integrated moving average (FARIMA) model is investigated. The simulation results using simulated time series as well as real GPS time series from a few selected stations around Australia show that the FARIMA model fits the time series better than other models when the coloured noise is larger than the white noise. The second fold of this work focuses on fitting the GPS time series with the family of Levy α -stable distributions. Using this distribution, a hypothesis test is developed to eliminate effectively coarse outliers from GPS time series, achieving better performance than using the rule of thumb of n standard deviations (with n chosen empirically).