1123-62-392 **Matthew Bowers*** (`mcbowers@purdue.edu`), West Lafayette, IN 47906, and **Wen-wen Tung** (`wwtung@purdue.edu`), West Lafayette, IN 47906. *Quantifying Uncertainty in Time Averages of Climate Signals with both Short- and Long-Range Dependence.*

Time averaging of observed or simulated data is a fundamental practice in climatology. Being an estimate of the underlying climate mean state, its uncertainty due to sampling variability is naturally characterized by the variance of its sampling distribution, which can be used to construct confidence intervals. Researchers have long recognized that the persistent serial correlations in climate signals necessitate modification of the classical Central Limit Theorem in order to compute accurate variances of time averages. Yet, these efforts have primarily focused on autoregressive or other short-range correlation structures. Here, we present a framework for estimating the variance of time averages of climate signals with short-, long-, or both short- and long-range dependence based on asymptotic results applicable to fractional ARIMA models and Monte Carlo simulations. We find that processes with even weak long-memory cause substantial underestimation of uncertainty in confidence intervals that assume pure short-range dependence. Yet given a sufficient sample size, confidence intervals accounting for long-memory perform well on processes with both short- and long-range dependence. (Received August 30, 2016)