

Locally Stationary Processes and their Application to Climate Modeling

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In the analysis of climate it is common to build non-stationary spatio-temporal processes, often based on assuming a random walk behavior over time for the error process. Random walk models may be a poor description for the temporal dynamics, leading to inaccurate uncertainty quantification. Likewise, assuming stationarity in time may also not be a reasonable assumption, especially under climate change. Based on ongoing research, we present a class of time-varying processes that are stationary in space, but locally stationary in time. We demonstrate how to carefully parameterize the time-varying model parameters in terms of a transformation of basis functions. We present some properties of parameter estimates when the process is observed at a finite collection of spatial locations, and apply our methodology to a Bayesian spatio-temporal climate analysis.