Estimation and Extraction of Harmonic Features from Pollution and Mortality Time Series

20 years of daily pollution and mortality data from a number of Canadian urban centres was analyzed as part of a Health Canada project to study the time-varying health effects of air pollution. For analysis, the time series must be decomposed into deterministic and stochastic parts. The challenge lies in the estimation of the deterministic portion, especially with presence of nonstationarity. Empirical Mode Decomposition was applied to data for slowly-varying structure (trend) estimation. Additional time- and frequency-domain techniques were applied to the residual (detrended) time series for line component estimation and extraction. The deterministic and harmonic structure found is discussed.