

Abstract

Post-processing of satellite remote sensing data is often done to reduce noise and remove artifacts due to atmospheric (and other) disturbances. Here we focus specifically on satellite derived vegetation indices which are used for large scale monitoring of vegetation cover, plant health, and plant phenology. These indices often exhibit strong seasonal patterns, where rapid changes during spring and fall contrast to relatively stable behavior during the summer and winter season. The goal of the post-processing is to extract smooth seasonal curves that describe how the vegetation varies during the year. This is however complicated by missing data and observations with large biases. Here a method for post-processing of satellite based time-series is presented. The method combines seasonally non-stationary smoothing spline with observational errors that are modelled using a normal-variance mixture. The seasonal non-stationarity allows us to capture the different behavior during the year, and the error structure accounts for the biased and heavy tailed errors induced by atmospheric disturbances. The model is formulated using Gaussian Markov processes and fitted using MCMC.