

# High Resolution Bayesian Space-Time Modelling for Ozone Concentration Levels

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Ground-level ozone is a pollutant that is a significant health risk, especially for children with asthma. It also damages crops, trees and other vegetation. It is a main ingredient of urban smog. To evaluate exposure to ozone levels, the United States Environmental Protection Agency (USEPA) has developed a primary and a secondary air quality standard. To assess compliance to these standards, ozone concentration data are collected continuously from several networks of sparsely and irregularly spaced monitoring sites throughout the US. Data obtained from these sparse networks must be processed using spatial and spatio-temporal methods to check compliance to the ozone standards at an unmonitored site in the vast continental land mass of the US.

This talk will first discuss the two air quality standards for ozone levels and then will develop several competing high resolution Bayesian space-time models that can be used to assess compliance with respect to the standards. An R add-on package, `spTimer`, for Bayesian modeling and analysis of environmental space-time data will be introduced to illustrate model fitting and inference for two large data sets each with more than a million observations. Several prediction maps from these models for the eastern US, some of which are published and used by the USEPA, will also be discussed.