DEPARTMENT OF
Mathematical
Sciences presents

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11:00-12:00 SE 215
Refreshments provided

Modeling Spatial and Spatio-temporal Process on the Sphere with Convolution

Large spatial data are becoming more and more popular in environmental science and other related fields. Observations are often made over a substantial fraction of the surface of the Earth over a long period of time. It is necessary to model spatial and spatio-temporal random processes on the sphere which is challenging both conceptually and computationally. Convolution modeling method can be utilized to generate a random field with valid covariance structure on spheres. By allowing the parameters in the kernel functions to vary with locations, it is possible to generate a flexible class of covariance functions and capture the nonstationary properties. Specifically, a latent dynamic process is defined on a grid covering the globe. The data vector is first projected onto the low-dimensional space spanned by those grids at each available time point. The resulting time series are fitted with seasonal ARIMA models. Forecasting is made by convolving the latent dynamic processes at all grid points using von Mises–Fisher kernel function. The procedure is illustrated by the total ozone data collected by Total Ozone Mapping Spectrometer during a 12-year period of time.