

Spatio-Temporal Modeling of Precipitation Using Gaussian Markov Random Fields

Johan Lindström

Mathematical Statistics
Centre for Mathematical Sciences
Lund University

Abstract:

A spatio-temporal model is constructed for interpolation of yearly precipitation data from 1982 to 1996 over the African Sahel. The precipitation data used in the analysis comes from the Global Historical Climatology Network.

The spatio-temporal model is based on a Gaussian Markov random field (GMRF) with AR(1)-dependence in time and a spatial component modeled using a GMRF that approximates a stationary field with Matern covariance. The model is defined on an irregular grid on a segment of the sphere, handling the curvature of the Earth and avoiding the issue of matching irregularly spaced observations to regularly spaced grid points.

The model is estimated using a Markov chain Monte Carlo approach. The formulation as a Markov field allows for efficient computations, even though the data consists of more than 4000 measurement points interpolated to a spatio-temporal field with 30000 grid points.

NCAR Mesa Laboratory, Chapman Room
1850 Table Mesa Drive, Boulder
Wednesday, September 17, 2008
1:30pm
(Refreshments at 1:15pm)