

STATISTICS COLLOQUIUM

FRIDAY, APRIL 27, 2007
TALK: 11:00 AM — CGIS N354
(1737 Cambridge Street)
Simulcast – HSPH Kresge G3

“Statistical Processes on a Global Scale”

Michael Stein
Department of Statistics
Director, Center for Integrating Statistical and the Environmental Science
University of Chicago

ABSTRACT

This talk explores some of the issues that arise in statistical modeling of atmospheric phenomena on a global scale, using total column ozone as measured by the satellite- based Total Ozone Mapping Spectrometer (TOMS) as a case study.

A basic issue in all statistical models for natural phenomena is finding statistical regularities that enable one to take meaningful averages. Since the statistical characteristics of total column ozone strongly depend on latitude, we consider the use of axial symmetry (invariance of statistical properties to rotations about the Earth's axis) as a possible exploitable regularity. Methods for summarizing, modeling, estimating and visualizing spatial dependence for axially symmetric processes are addressed. A computationally convenient approach to modeling axially symmetric processes using truncated series expansions of spherical harmonics is shown to capture much of the larger- scale latitudinal variation in spatial dependence. However, the approach performs disastrously in terms of describing the local behavior of the process. By combining the spherical harmonic expansion with a covariance function with finite range it is possible to obtain a better model without sacrificing all of the computational benefits of the series expansion approach.