

STATISTICS COLLOQUIUM

TUESDAY, FEBRUARY 19, 2008

TALK: 4:00 PM — SCIENCE CENTER RM. 705

RECEPTION: 5:15 PM — SCIENCE CENTER, 7TH FLOOR

“Two Topics in Spatial Statistics: Estimating Cloud Height from Multi-angle Satellite Imagery and Deformed Random Fields”

Ethan Anderes
Department of Statistics
University of California at Berkeley

ABSTRACT

In this talk I will present two recent research projects, both dealing with random fields and spatial statistics. Although one project is applied and one is theoretical, both consider the scenario where one observes a dense realization of a two dimensional random field without replicates.

The first part of the talk will present recent collaboration with Bin Yu (UC Berkeley) and the MISR team at the Jet Propulsion Laboratory for developing a new stereo matching algorithm for cloud height estimation using multi-angle cameras provided by the MISR instrument on the Terra satellite. Clouds play a major role in determining the Earth's energy budget. As a result, monitoring and characterizing the distribution of clouds becomes important in global studies of climate. By viewing the multi-angle cloud images as discrete sub-samples of a continuous random field, one can view cloud-top height estimation as a statistical parameter estimation problem. This paradigm sheds fresh light on the feature matching problem and provides a framework for developing computational techniques and incorporating technical details of the MISR instrument for improving height estimates.

The second part of the talk will present a new fixed domain asymptotic result, in collaboration with Sourav Chatterjee (UC Berkeley), for estimating the deformation of an isotropic Gaussian random field. The estimates are constructed using directional quadratic variations to estimate components of a singular value decomposition of the Jacobian of the deformation. The remaining estimable components are recovered by a projection onto the Bergman space of holomorphic maps. If time permits we will discuss some details of the proof and future applications.