Seminar Series: Spatial Statistics

Date: Friday, March 31, 2017
Time: 2:30 – 3:20 p.m.
Location: MATH 215

Speaker: Dr. Matz Andreas Haugen
Affiliation/Organization: Department of Statistics, University of Chicago

ASSESSING CHANGES IN VARIABILITY OF EXTREME TEMPERATURES USING ENSEMBLE MODEL SIMULATIONS

Abstract: Characterizing statistical properties of extreme temperature events in a transient climate has been challenging in the past due to lack of data. By taking advantage of repeated global circulation model (GCM) simulations with near-identical initial conditions, characterizing extreme temperature events can be done with more confidence. We analyze 50 simulations of the CESM model from 1850-2100 under the RCP8.5 scenario to study how extreme temperature events change as a function of time in the North American region. Because of the relative abundance of simulations and their approximate independence, we obtain accurate confidence intervals around the changes in temperature variability without making assumptions on the spatial structure of the data. Discrete separation between seasons are avoided by assuming a smooth transition of the temperature distribution from day to day. We find that winter variability generally decreases both in the bulk and in the high tail of the temperature distribution in the higher latitudes, above 45 degrees latitude. Low tail variability also decreases in the winter but in more southern regions, below 45 degrees latitude. These variability changes correspond to a skewing of the temperature distribution in opposite directions on each sides of the 45 degrees latitude line. Summer variability decreases substantially less than winter variability, both in the bulk and in the tail of the distribution, and does not show the same skewness pattern as the winter temperature distribution.