Department of Mathematics and Statistics

Mississippi State University

Colloquium

Changepoints in Climatology

Robert Lund

Department of Mathematical Sciences

Clemson University

Monday, October 17 at 3:30 pm
Allen 14

Abstract. This talk overviews changepoint issues in climate studies. Changepoints are ubiquitous features in climatic time series, occurring whenever stations relocate or gauges are changed. Ignoring changepoints can produce spurious conclusions. Changepoint tests involving cumulative sums, likelihood ratio, and maximums of F statistics are introduced; the asymptotic distributions of these statistics are quantified under the changepoint-free null hypothesis. We find that cumulative sum procedures work best when the changepoint is near the center of the data record; otherwise, maximums of F statistics perform better. Next, time series aspects of the problem are addressed. Series with positive autocorrelation can have long sojourns above and below mean levels, hence mimicing a mean shift. We show how to modify the above methods to account for autocorrelation. The methods are illustrated in several applications, including temperature trends and Atlantic Basin tropical storm counts. Changes in tropical storm and hurricane counts has been controversially addressed in the media recently, with the debate even reaching US Senate floors.

Contact Jon Woody, jwoody@math.msstate.edu or (662) 325-7147, for additional information.