Lecture 6.3 (12:05-12:30)

A semi-parametric model for ice accumulation rate and temperature based on Antarctic ice core data

Debasis Sengupta (ISI)

In this talk, we present a semiparametric model for describing the effect of temperature on Antarctic ice accumulation on a paleoclimatic time scale. The model is motivated by sharp ups and downs in the rate of ice accumulation apparent from ice core records, which are synchronous with movements of temperature. We prove strong consistency of the estimators under reasonable conditions. We conduct extensive simulations to assess the performance of the estimators and bootstrap based standard errors and confidence limits for the requisite range of sample sizes. Analysis of ice core data from two Antarctic locations over several hundred thousand years show a reasonable fit. The apparent accumulation rate exhibits a thinning pattern that should facilitate the understanding of ice condensation, transformation and flow over the ages. There is a very strong linear relationship between temperature and the apparent accumulation rate adjusted for thinning.

Joint work with Radhendushka Srivastava