



THE UNIVERSITY OF
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Department of Statistics
PHD THESIS PRESENTATION

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Statistical Methods for Climate Ensembles

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ABSTRACT

Climate models are mathematical models aimed at reproducing physical processes on a global scale and at predicting quantities such as temperature given some forcing inputs. Climate ensembles are collection of such runs with different initial conditions and different forcing scenarios that are used by climate scientists to predict the future state of the Earth system and to detect the anthropogenic footprint.

The purpose of this talk is to introduce a statistical framework suitable for computer generated data, and to show how the runs in the ensemble can be reproduced (emulated) with global space-time statistical models that also address the issue of reproducing nonstationary features of the error structure. Given the large size of the data, fitting these models requires fast and parallel algorithms for gridded data on the sphere \times time domain and efficient ways of computing likelihoods for more than 100 million data points. In the last part I will introduce an extension of the methodology for a multi-model ensemble and will show how such models can be successfully employed for comparing climate models with filtered observations.

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