

Fitting spatio-temporal random field models to satellite data from ocean surfaces

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The surface of the ocean, and therefore quantities as the significant wave height, can be thought of as a random surface in space which develops over time. In this work we explore certain types of random fields (in space and time) as models for the significant wave height and, in particular, we consider methods of fitting these models based on data obtained from the TOPEX/Poseidon satellite.

It is assumed that, for the region of ocean considered and for each time, the data can be considered stationary. On taking logs of the data, a Gaussian model appears to be appropriate. The data for a single passage can exhibit variation at different scales and hence the covariance function needs to reflect this property. Consequently, a mixture of Gaussian functions is assumed for the covariance function. To introduce temporal structure, the parameter values are modelled as a function of time.

Finally some simulation results are presented to illustrate some of the problems with fitting these models to this type of data. These results provide some insights into appropriate sampling methods for this setting.