

Dynamic multi-resolution spatial models

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Abstract

Data from remote-sensing platforms are typically spatial, temporal, and massive. Existing prediction methods like kriging are computationally infeasible. The multi-resolution spatial model (MRSM) captures nonstationary spatial dependence and produces fast optimal estimates using a change-of-resolution Kalman filter. However, past data can provide valuable information about the current status of the process being investigated. In this article, we incorporate the temporal dependence in the process by developing a dynamic MRSM. An application of the dynamic MRSM to a month of daily Total Column Ozone (TCO) data is presented, and on a given day the results of posterior inference are compared to those for the spatial-only MRSM. It is apparent that there are advantages to using the dynamic MRSM in regions where there are missing data, such as when a whole swath of satellite data is missing.