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# Improving Temporal Correlations in Empirical Orthogonal Function Expansions for Data Interpolating Empirical Orthogonal Function Algorithm

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**Abstract :** Satellite-derived sea surface temperature (SST) is a key parameter for many operational and scientific applications. However, the disadvantage of SST data is a high percentage of missing data which is mainly caused by cloud coverage. Data Interpolating Empirical Orthogonal Function (DINEOF) algorithm is an EOF-based technique for reconstructing the missing data and has been widely used in oceanographic field. The reconstruction of SST images within a long time series using DINEOF can cause large discontinuities and one solution for this problem is to filter the temporal covariance matrix to reduce the spurious variability. Based on the previous researches, an algorithm is presented in this paper to improve the temporal correlations in EOF expansion. Similar with the previous researches, a filter, such as Laplacian filter, is implemented on the temporal covariance matrix, but the temporal relationship between two consecutive images which is used in the filter is considered in the presented algorithm, for example, two images in the same season are more likely correlated than those in the different seasons, hence the latter one is less weighted in the filter. The presented approach is tested for the monthly nighttime 4-km Advanced Very High Resolution Radiometer (AVHRR) Pathfinder SST for the long-term period spanning from 1989 to 2006. The results obtained from the presented algorithm are compared to those from the original DINEOF algorithm without filtering and from the DINEOF algorithm with filtering but without taking temporal relationship into account.

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