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Assimilating the remote sensing ocean color data into a biogeochemical model of the Baltic Sea

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The objective of this study is to investigate if the assimilation of ocean color data into a complex marine ecosystem model can improve the hindcast of key biogeochemical variables in coastal seas. A localized Singular Evolutive Interpolated Kalman filter was used to make assimilation of the daily fully reprocessed product of Multi-Satellite chlorophyll observations into a three-dimensional ecosystem model of the Baltic Sea. Twin experiments are performed to evaluate the performance of the assimilation with respect to both satellite and in situ observations. Compared to the reference run, the assimilation was found to immediately and considerably reduce the bias, root mean square error, and increase the correlation with the spatial distributions of the assimilated chlorophyll data while this improvement is limited to the upper layer of the water column. This feature is explained by the weak correlation taken into account by the assimilation between the surface and deep phytoplankton. The assimilation scheme used is multivariate, updating all biogeochemical model state variables. The other variables were not degraded by the assimilation. More significantly, the skill metrics for non assimilated variables indicate that the hindcast of the mean data values at L4 was improved; however, improvements in the short-term forecast were not discernable. Our results provide general recommendations for the successful application of ocean color assimilation to hindcast key biogeochemical variables in coastal seas.