



Recovering missing data in cloudy high resolution ocean color images using kriging

Y. Lehahn (1,2), F. d'Ovidio (3), L. Dubroca (4), M. Lévy(1)

(1)Institut Pierre-Simon Laplace, Centre National de Recherche Scientifique, Paris, France, (2)Dept. of Geophysics and Planetary Sciences, Tel Aviv Univ., Tel Aviv, Israel, (3)UMR 8539 LMD, Ecole Normale Supérieure, Paris, France, (4) Stazione Zoologica "A. Dohrn", Villa Comunale, 80121 Napoli, Italy

Ocean color satellite imagery provide a powerful tool for the study of phytoplankton variabilities and of the dynamical processes driving them. However, the exploration of this data is severely limited by the presence of clouds that often mask large parts of the images, thus reducing the amount of available data and prevent contiguity in time and in in space.

Focusing on the northeast Atlantic, here we address the problem of missing data in high resolution (1km) SeaWiFS images by applying the kriging technique. Although the method is commonly used for recovering missing data in many geophysical fields, to our knowledge it was never applied before to ocean color satellite images.

At a first stage we test the performance of kriging over a library of 20 500 X 500 km cloud free chlorophyll images on which we overimpose cloud masks that are randomly taken from a dataset of 6 years (1998-2003) SeaWiFS images of the study area. Altogether 1000 combinations of chlorophyll images and cloud masks were used. The method is shown to give remarkable results in recovering missing chlorophyll values and in reconstructing mesoscale chlorophyll structures. The error estimation embedded within kriging is linearly correlated with the real error, thus providing a reliable evaluation of the interpolation error for a given pixel.

The interpolated data is used for studying the impact of the mesoscale dynamics on the annual chlorophyll cycle.