



EOF analysis of MODIS chlorophyll images in the northern Adriatic

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In the framework of the DOLCEVITA project, data from MODIS on the Aqua polar-orbiting satellites were acquired and processed to create daily images of near-surface chlorophyll concentration in the northern Adriatic with 1 km spatial resolution. These images provide information on the spatial characteristics and temporal evolution of near-surface pigments under the influence, among other factors, of wind forcing, air-sea fluxes and river runoffs, and controlled by the complex internal ecosystem dynamics. MODIS being a radiometer using bands in the visible part of the spectrum, most images are partially covered by clouds resulting in gaps with no data.

More than 350 MODIS images with less than 95% cloud coverage over the northern Adriatic area and spanning the period 27 June 2002 – 23 June 2004 are used to describe statistically the chlorophyll variability. After some data reduction (median values in 3x3 pixels), images of temporal mean, standard deviation, and minimal and maximal values were produced. These results show enhanced pigment levels and larger variability along the Italian coast from the Gulf of Trieste to the Conero Promontory. In particular, large values of chlorophyll concentrations are found in the vicinity of the Po River delta and in the coastal area south of it (the Western Coastal Layer - WCL).

The method of Beckers and Rixen (Journal of Atmospheric and Oceanic Technology, 2003) to simultaneously “fill in” the missing data gaps corresponding to cloudy pixels and compute the principal modes of variability (Empirical Orthogonal Functions - EOF) was applied to the reduced resolution (3 km) images. Examples of “filled” daily images are shown and the efficiency of the “interpolation” method is discussed. Most of the variability is found to be included in the first few principal modes. The spatial

patterns and temporal evolution of these modes are interpreted and compared with the variability qualitatively observed in the individual images, such as the Po River plume variations and instability features in the WCL.