VARIABILITY OF THE ITALIAN COASTAL CURRENT IN THE CENTRAL ADRIATIC SEA

Elena Mauri *, Pierre-Marie Poulain and Miroslav Gačić
OGS, Borgo Grotta Gigante, 42/c Sgonico (Trieste), Italy - emauri@ogs.trieste.it

Abstract
The Italian coastal current is studied form July 2002 to January 2005 using MODIS surface chlorophyll concentration images. The current, marked by the sediment-rich water of Po River origin, has a strong signal in the visible wavelengths. Baroclinic instabilities protruding out of the coastal current are present all year round along the Italian central coast, and have a temporal scale of 1-2 days. Some of the instabilities expand offshore and evolve into filaments extending to the Croatian coast. Their temporal scale is longer (about 4 days). The location of the expanded instabilities is controlled by the local bathymetry.
Keywords : Adriatic Sea, Circulation, Mesoscale Phenomena.

Introduction
Coastal waters under Po River influence, rich in nutrients, dissolved organic matter and chlorophyll, flow to the southeast along the Italian Peninsula contributing to the Western Adriatic Current (WAC). This water mass is easily traced in the visible during the entire year. The development and evolution of particular baroclinic instabilities of the WAC are studied during the period from July 2002 to January 2005 using satellite chlorophyll and surface drifter data as part of the DOLCEVITA project [1].

Materials and Methods
MODIS satellite data were downloaded from the NASA web site, processed and extracted with the WIM software to provide maps of surface chlorophyll concentration. Low-pass filtered (to exclude tidal and inertial currents) trajectories of the DOLCEVITA satellite-tracked drifters were obtained and superimposed on selected MODIS images. The typical temporal scale of the instabilities was estimated using the autocorrelation statistical method applied to all the images.

Results
Daily images were analyzed to study the formation and the development of the baroclinic instabilities along the WAC. Particular focus was put on specific locations where the instabilities evolve either into elongated filaments extending offshore in the central part of the basin and eventually reaching the Croatian coast (Fig. 1) or as a wide bulge (Fig. 2).

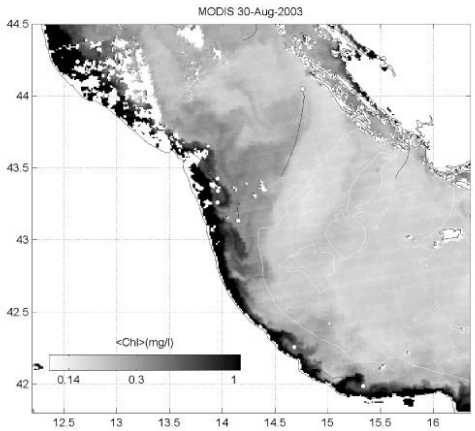

Fig. 1. MODIS chlorophyll concentration in the Central Adriatic Sea on 30 August 2003. The 100 and 200 m bathymetric contours are shown. Drifter tracks over 27-30 August 2003 are superimposed (with a white circle showing the last day).

The region south of Ancona shows the maximum extension of the instability structures and the development of long filaments localised on the northwestern flank of a bathymetric depression (the Middle Adriatic Pit - MAP). Farther to the southeast, the MAP, and the typical cyclonic circulation around it [2], hamper the offshore extension of the WAC instabilities. The region southeast of Ancona and offshore of the WAC shows high chlorophyll mean content and variance. The drifters reveal local cyclonic circulation and enhanced variability of the surface currents.

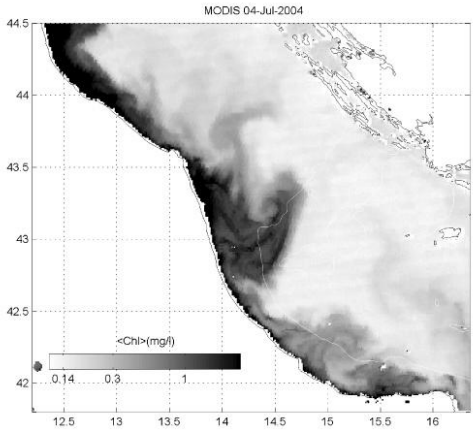

Fig. 2. Same as Fig. 1 but for 4 July 2004.

The autocorrelation method was applied to all the chlorophyll images to compute the typical time scale of the chlorophyll variability. All along the central coast the scale is around 1-2 days, with the exception of the area southeast of Ancona, were the scale is longer (around 4 days) corresponding to the persistence of the instabilities in this area. In general, our results do not show any significant seasonal variations in the occurrence and characteristics of the instabilities.

References

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