ANALYSIS OF TWO MESOSCALE EDDIES IN THE SOUTHERN IONIAN AND CRETAN BASINS IN 2006

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Abstract

During the EGYPT-1 campaign in April 2006, two mesoscale eddies, a Libyan eddy and the Ierapetra 2005, have been sampled in detail mainly with CTD casts. The goal of this study is to compare these hydrographic measurements with results of two simulations done with high resolution models developed in the framework of the Mercator project. Focus is on the generation, the vertical water mass distribution, and the drift of these eddies.

Keywords : Levantine Basin, Ionian Sea, Mesoscale Phenomena, Circulation Experiments, -missing-, .

Introduction

During the EGYPT-1 campaign in April 2006, two mesoscale eddies have been sampled by CTD casts ($\sim$ 10 km apart): (1) a Libyan eddy (LE) included in a transect from the Libyan to the Cretan shelves and (2) the Ierapetra remaining from the summer 2005 (I-2005). Two simulations are compared with in situ measurements. One simulation was done with the operational Mercator model running with assimilation [www.mercator-ocean.fr] and another simulation was done with a similar model running without data assimilation [1]. A preliminary comparison of the general circulation in April 2006 is made. And then the characteristics of the observed and modelled eddies are investigated.

Observations versus models

As observed in situ in April 2006, the surface layer of the sampled LE is mainly composed of recent Atlantic Water (AW) that has been transported along-slope there from the West. Recent AW signature with a different origin than those of the sampled LE, was not observed on the section from the Libyan to Cretan shelves, highlighting thus the absence of the Mid Mediterranean Jet (MMJ). The sampled LE had a large signature at depth (>1000 m), a diameter of about 100 km and it was centred near 33.5°N-23.5°E. Simulations show LE with a vertical distribution of water masses in agreement with in situ data. But in April 2006, modelled LE was not at the position of the observed LE. The observed LE was later tracked during its westward drift at least from April to October 2006. Such a long westward drift for LEs had not been observed yet. But according to a recent modelling work [2], LEs could be generated in the south-eastern part of the Ionian basin near 19°E-21°E and could propagate westwards along the 1000-2000 m isobaths with a speed of $\sim$ 1-2km/day and a lifetime ranging from few months to more than 2 years.

According to measurements, the I-2005 had a diameter of 150 km and a vertical extent larger than 1000 m. It was centred near 33.5°N-26°E that is well south of its summer position. It finally merged with the I-2006 being created in early summer. This behaviour was already observed [3] but was not so well reproduced by the simulations [2].

Conclusion

This study of the circulation and the hydrology of the southern Ionian and Cretan basins in 2006 helps validating models. These first results assist the circulation schemes provided by models and observations that show a circulation along the slope, and the absence of MMJ.

Acknowledgments

The EGYPT program is supported by French funding from INSU, PATOM, GMMC, CORIOLIS, and Région Provence Alpes Côte d'Azur. Modelling work was supported by the Mercator project and atmospheric forcing was made available by the ECMWF. Computations were made at the French IDRIS from the CNRS.

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