Geophysical Research Abstracts
Vol. 13, EGU2011-9695, 2011
EGU General Assembly 2011


# The Mediterranean Sea large scale low frequency ocean variability from 1987 to 2007: a retrospective analysis

Nadia Pinardi (1), Mario Adani (2), Giovanni Coppini (3), Srdjan Dobricic (4), Claudia Fratianni (5), Vladislav Lyubartsev (6), Paolo Oddo (7), Marina Tonani (8), and Marco Zavatarelli (9)

(1) University of Bologna, Laboratorio SINCEM, Corso di Scienze Ambientali, Ravenna, Italy (n.pinardi@sincem.unibo.it, +39-(0)513782654), (2) National Insitute of Geophysics and Vulcanology, Operational Oceanography Group, Bologna, Italy, (3) National Insitute of Geophysics and Vulcanology, Operational Oceanography Group, Bologna, Italy, (4) EuroMediterranean Center for Climate Change, Bologna, Italy, (5) National Insitute of Geophysics and Vulcanology, Operational Oceanography Group, Bologna, Italy, (6) EuroMediterranean Center for Climate Change, Bologna, Italy, (7) National Insitute of Geophysics and Vulcanology, Operational Oceanography Group, Bologna, Italy, (8) National Insitute of Geophysics and Vulcanology, Operational Oceanography Group, Bologna, Italy, (9) University of Bologna, Laboratorio SINCEM, Corso di Scienze Ambientali, Ravenna, Italy

The Mediterranean Sea general circulation steady state and interannual variability components will be analyzed from the recent 21 years re-analysis of Adani et al. (2010). The re-analysis resolution is 1/16 x 1/16 degrees resolution and atmospheric forcing is given by ECMWF six hours analyses at 0.5 x 0.5 degrees resolution. All available data sets are assimilated, from satellite SLA to SST and in situ temperature and salinity profiles.
The most important results can ne summarized as follows: 1) the 21 year mean circulation, or steady state circulation component, is composed of sub-basin scale gyres and open ocean jets, noticeably the Algerian current segments, the Atlantic-Ionan Stream and the Mid-Mediterranean Jet. Slope currents such as the Liguro-Provencal, the North African and Asia-Minor currents have the largest energy content of the circulation. 2) The decadal variability of the circulation is dominated by the Ionian circulation reversal, documented previously only by numerical simulations and satellite altimetry: the reversal occurs in the whole water column and it is evident in the 1987-1996 mean versus 1997-2006 mean currents. The second characteristics of the two decadal mean states is the strengthening of the ciclonic circulation of the Levantine basin in the 1997-2006 period.
Eddy and mean kinetic energy analysis confirms that eddy kinetic energy is 80% of the total kinetic energy for this period, thus confirming the pervasiness of the eddy field and the importance of eddy-mean flow interactions with probably a dominance of conversion of mean to eddy kinetic energy occurring and all scales.
The multi-decadal water mass formation analysis confirms the finding that Cretan Deep Water (CDW) formation, producing the Eastern Mediterranean Transient, is an isolated event peaking in the years 1992-1993, together with a major Levantine Deep Water (LDW) formation event occurring in the same years. The largest Western Mediterranean Deep Water (WMDW) event occurs during the winter of 2005 followed by the winter 1987 event. Adriatic Deep Waters (ADW) form more regularly except for the interruption of the 1994-1999 period. The water mass properties in the Adriatic Sea are shown to shift radically in 1999 due to a salinity change while WMDW instead change progressively increasing both salinity and temperature.
The emerging picture of the general circulation adds more details to the well known picture of the surface circulation by Robinson et al. (2003) and Malanotte-Rizzoli et al. (2006) and alows to speculate about the basic wind driven mechanisms of the circulation.