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# On the vertical mass flux in the open areas of the Mediterranean Sea: what is the role of vertical velocities?

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The vertical current velocity field is investigated over the Mediterranean Sea using a high resolution Ocean General Circulation Model-OGCM. The vertical velocity field is compared with the Ekman vertical velocities generated from the wind stress curl and a general consistency is found between the two fields even if the OGCM velocities are much more intense and at smaller spatial scales than the Ekman vertical currents. The vertical velocities have maximum values of a few meters per day and show a typical characterization by sub-basin scale areas in the framework of a strong seasonal variability.

A time series of sediment trap data is available in an open ocean station of the Ionian Sea for the period September 1999 – May 2000. A relationship between the sedimentary flux and the upwelling and downwelling structures is found, revealing the indirect effect of the vertical velocity on the deep particle fluxes. The total mass, total coccoliths and coccospheres fluxes were analyzed and the deduced settling rates are 3 orders of magnitude larger than the OGCM values: in particular the particle fluxes are well correlated with upwelling velocities using a time lag of ten-twenty days. Thus we hypothesized that fecal pellets, produced by upper-ocean zooplankton and having much larger sinking velocities, could be the sinking agent for the consistent mass flux found at depth (2800 m). The upwelling vertical velocities would instead play an indirect but relevant role in enhancing surface nutrient levels and productivity a few weeks before

an enhanced vertical flux of organic detritus is found in the sediment traps.