



Nutrient distribution during the spring bloom following the unusual winter 2005 deep mixing event in NW Mediterranean.

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Deep winter convection in the Medoc area brings nutrients to surface waters which results in the most important spring bloom in the NW Mediterranean. The extent of this process is variable from year to year, influencing the productivity of the region. In winter 2005, specially dry and windy weather led to very extensive deep water formation in both the open sea and the continental slope (by the process of cascading), extending the mixing farther away from the traditional Medoc area and deeper into the water column. Here we report hydrographic conditions, distribution of dissolved inorganic and organic nutrients, particulate carbon, nitrogen, and phosphorus and chlorophyll concentrations measured during EFLUBIO-2 cruise, between March 25 and April 5 2005. The study included an area south of the Nor Balearic Front (NBF), where deep winter convection does not take place.

We found high variability in the Medoc area, with patches of deep mixed waters showing relative high surface salinity among areas covered with relative low salinity water. Recent Atlantic Water with relative low salinity increased salinity stratification south of the NBF. Dissolved inorganic nutrient concentrations were low in surface waters, increased with depth to maximum of $10.2 \pm 0.25 \mu\text{M}$ nitrate, $0.39 \pm 0.01 \mu\text{M}$ phosphate and $9.50 \pm 0.11 \mu\text{M}$ silicate and decreased slightly below 500 m. Dissolved organic nitrogen showed surface highest around $4 - 6 \mu\text{M}$, while dissolved organic phosphorus concentrations were below $0.1 \mu\text{M}$. Particulate carbon, nitrogen and phosphorus concentrations were higher than 15, 2 and $0.1 \mu\text{M}$, respectively, at the

beginning of the sampling period, decreasing subsequently to values below 5, 1 and 0.05 μM , respectively. The distribution of dissolved inorganic nutrients was related to mixing between the water masses in the area (Atlantic Water, Levantine Intermediate Water, and Western Mediterranean Deep Water), nutrient uptake and mineralization, with a shift from higher nutrient uptake to stronger diffusive effects from north to south, crossing the NBF. Integrated (0-200 m) nutrient stocks were higher in the north (2.3 mol N m^{-2} , 0.07 mol P m^{-2} and 1.3 mol Si m^{-2}) than in the south (1.5 mol N m^{-2} , 0.03 mol P m^{-2} and 0.3 mol Si m^{-2}). Contribution of dissolved organic nutrients was higher in the southern stations (50% against 26% for N and 33% against 13% for P). From these data, we tentatively estimated an export production for the Medoc area of about 1.6 mol C m^{-2} during the 10 days time period.