A NUMERICAL ASSESSMENT OF THE IMPACT OF THE ATMOSPHERIC INPUT ON THE N AND P CYCLES IN THE MEDITERRANEAN SEA

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The atmospheric input of macronutrients has been often claimed to be the missing element to close budgets and/or explain anomalies in primary production. Here an attempt to evaluate the relative importance of biologically available nitrogen and phosphorus compared with rivers load and marginal basins exchanges has been carried out in the frame of EU funded ADIOS project. The numerical results were obtained with a three-dimensional eco-hydrodynamical model implemented for the Mediterranean. A MOM-based physical module resolves the general circulation integrating primitive equations for the dynamics, while the biotic part describes the planktonic biomass evolution through the nitrogen and phosphorus cycles.

The protocol of the experiment includes a sensitivity analysis of different runs using as reference run with realistic Gibraltar nutrients fluxes. Realistic basin-dependent atmospheric input of DIN and DIP, high-valued deposition with different space-time depositional patterns were primarily analyzed in terms of primary and secondary production.

The subbasin yearly averages show that the West and East Mediterranean exhibit similar responses, maintaining unaltered the large cells PP in both basins while the small cells PP slightly increase (25 to 31 gC/y in the EMed, 78 to 88 gC/y in the WMed). The secondary production seems to be insensitive to atmospheric input, and this is related that small cell PP drives more efficiently the recycling of the nutrients through the parametrization of bacterial activity implemented in the model. The food web functioning is not altered with such atmospheric input. The model results driven by high atmospheric inputs show that EMed PP, typically dominated by small cells (as can be seen in the unperturbed run).

The last two scenarios are equivalent in terms of total nutrient load on a yearly base,
but differ in the depositional time strategy. Further numerical experiments have been conducted to evaluate the role of rivers and the nutrients fluxes with Adriatic and Aegean seas. Rivers inputs follow the seasonal cycle of nutrients load for Gulf of Lions coastline and Nile Delta. The additional source of nutrients is spread in the surrounding area of Rhone mouth, and all around the Nile Delta, while no freshwater flux is added. to take into account the exchanges with the shelves, the profiles of phosphate and nitrate are relaxed to the climatological profiles throughout the Middle Adriatic (above 43°N included) and in the Aegean (above 36N included). The nutrients profiles are climatological averages calculated from MEDAR/MEDATLAS dataset. The first results of these simulations are presented and an assessment of the relative importance of factors affecting the N and P mediterranean budgets is attempted.