Geophysical Research Abstracts, Vol. 9, 07992, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-07992

A 1-year mesoscale simulation of the biogeochemistry in the north-eastern atlantic ocean

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A series of cruises over a 700km x 500 km wide area has been proceeded between autumn 2000 and autumn 2001 in the North-Eastern Atlantic Ocean in order to achieve a mesoscale study of this region known to be a sink of atmospheric carbon. These cruises took place in the context of the POMME (Programme Océanographique Multidisciplinaire MesoEchelle) program, designed for the understanding of the mechanisms responsible for the subduction of modal waters and for the study of their biogeochemical properties, in relation with the mesoscale variability. This here-exposed work aims to simulate the succession of events occurring during this year of survey so as to compute global budgets of tracer fluxes and of water subduction, and to study the influence of the meso- and submeso- scale variability on these last quantities. The final goal of this study is the computation of the amount of carbon subducted in the surveyed area, and to show the influence on various physical scales on it.

In order to achieve this computation, we use a primitive-equation model, coupled with a biogeochemical model, which makes possible the simulation of the evolution of the ecosystem. Two different configurations were used : a purely-prognostic model is used in the first one and a altimetry-assimilating model for the second one. In the secon configuration, geostrophic velocities stemmed from a quasi-geostrophic altimetry-assimilating model are assimilated. The ecosystem is modelised by the nitrogen-based LOBSTER model (NNPZDDOM). We have reproduced, with a good agreement with satellite data, the evolution of the chlorophyll, except in two areas where the simulated mixed layer depth is too small. This weak concentration is particularly relevant with the purely diagnostic configuration. We thus have used an enhanced 1.5 TKE vertical

diffusion scheme, in which the impact of waves and Langmuir circulation is introduced. The first results of the simulations tend to show an enhanced productivity and a larger chlorophyll content, more in agreement with observations.