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Coupling a population dynamics model of the banded carpet shell (*Paphia rhomboïdes*) to a 3D hydrodynamical model of the English Channel.

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Diversity and abundance of the benthic fauna in the Channel Sea have favoured the development of fisheries, particularly those of shellfish (scallop, warty venus, common cockle, dog cockle, banded carpet shell, surf clam, …) and also attracted the interest of scientists. Some large scientific programs were carried out in the seventies to study benthos distribution in this area. Among the main listed bivalves, the banded carpet shell (*Paphia rhomboïdes*) is particularly widespread in the English Channel, where it is one of the most abundant species in terms of biomass. In view of its halieutic interest, this species is especially interesting for studying and understanding the distribution of invertebrates in the Channel and performing eventually stock control scenarios. In this purpose, an ecological model of the banded carpet shell population in the Channel was developed (Savina, 2004). A population dynamics model taking into account the whole life cycle of the species (planktonic and benthic) was linked to a hydraulic and primary production box model of the Channel (Hoch, 1998). The Channel was divided into 70 compartments between which transport was deduced from a 2 dimensional pre-calculated residual currents field (Salomon and Breton, 1993).

Main results obtained thanks to this model are very satisfactory at the Channel scale. Nevertheless, the coarse spatial resolution (large compartments) and the spatial and temporal smoothing (concentrations, residual circulation) did not allow to simulate realistically distribution of banded carpet shell in some local areas.

Thus, the present work proposes to couple the previously described population dynamics model of banded carpet shell to a three dimensional hydrodynamical model (MARS3D) of the English Channel with 4 km resolution grid size. The higher spatial and temporal resolutions improve the simulation of banded carpet shell at a local scale under physical and/or trophic constraints (maximum velocity of currents, bottom shear stress, nature of sediment substratum, …).

Références :

Hoch T, 1998. Modélisation du réseau trophique pélagique et de la production primaire en Manche. Oceanol. Acta 21 : 871-885

Salomon JC, Breton M, 1993. An atlas of long term currents in the Channel. Oceanol. Acta, 16 : 439-448

Savina M, 2004. Modélisation écologique des populations de palourdes roses (*Paphia rhomboïdes*) et d'amandes de mer (*Glycymeris glycymeris*) en Manche. Thèse de doctorat de l'Université d'Aix-Marseille II, 191 p.