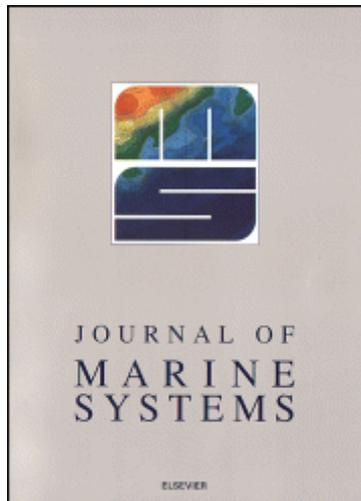


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Exchange Processes at the Ocean Margins.

Frankignoulle M.



The ocean margins are well known as regions of enhanced biological production, partly fuelled by nutrients in river discharges and boosted in many regions by upwelled nutrients from the deep ocean. A related interest is the life cycle of some plankton and fish species whose larvae are transported by along-slope flow. Hydrocarbon exploration and production operations are moving to deeper waters and need improved prediction of physical conditions. There is a general need to improve the predictive ability of models for continental shelf and slope seas, using realistic oceanic inputs.

Deep oceanic and shallower shelf seas interact in ways not yet fully understood. Particular shelf-edge processes influence ocean-shelf exchanges of oceanic nutrients and organic carbon cycle from productive shelf seas.

All these factors have encouraged recent studies of ocean margin processes. A particular emphasis is on exchanges that are potentially important to the oceanic cycle; a closed budget has yet to be determined, but the importance of nutrient inputs at the margin is increasingly evident.

Studies during the last decade have been carried out at various contrasting locations around the European margins (e.g., ECOMARGE, MORENA, ARCANE, OMEX, SEFOS, SES, ENAM II) and at US eastern and western margins (e.g., SEEP I, II, CODE7 the Coastal Zone Transition Program). These studies have greatly advanced the observational data set.

We need to model in combination: detailed stratified flows over the steep continental slope; biological processes in the water column and upper layers of the sea bed; other constituents and particulate distributions; transports along and across the continental slope. How can models be combined for robust estimates of fluxes, and extrapolated in time and space to form global cycling estimates?

It is likely that the observations hitherto do not suffice to test these models over the full range of processes and contrasting ocean margins. What measurements need to be made to improve model predictions? This question embraces place, time and novel approaches, for experiments to improve understanding and model formulation and for continuing predictive systems.

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