

Fluxes Across Continental Margins : Comparison of the SEEP and ECOMARGE Experiments

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The first comprehensive, multi-disciplinary, multi-institutional experiments to address the problem of fluxes across the marine boundaries of continental margins have been the SEEP program in the USA and the ECOMARGE program in France, both having begun in the early 1980s and continuing to the present. Major aspects of the first stages of both experiments have been published in dedicated volumes of *Continental Shelf Research* in both of which introductory papers give overviews and, to some degree, syntheses of the projects (Walsh et al., 1988; Monaco et al., 1990). SEEP (Shelf-Edge Exchange Processes) has been funded primarily by the US Dept. of Energy, and ECOMARGE (ECOsystèmes de MARGE's continentales) by INSU of the French CNRS.

The scientific objectives of the two programs are very similar, as are some of the hypotheses on which the two experiments are based, as well as numerous aspects of the physical characteristics of the study areas yielding, therefore, some similarities in experimental design. Several other aspects of the study areas, however, are dissimilar, yielding differences in experimental strategy, and therefore in the results of the two experiments.

Both experiments have been sited on arcuate portions of continental margin on which the width of the continental shelf decreases in the downstream direction of the general advective drift of both shelf and slope waters (Figs. 1 & 2); exchange of water and suspended particulate matter (SPM) by "diffusive" processes across the shelf/slope break is relatively less than by advective transport toward and across the break at the downstream end of the system; "diffusive" exchange is related to meteorologic forcing with both seasonal and shorter-term components, and is strongly "event" driven.

Other aspects of the study areas and experiments differ strongly from each other. In the Middle Atlantic Bight of the SEEP experiment: there is a significant tidal dynamic component; riverine influx of SPM is low to possibly negative; primary productivity is relatively high; there is little storage of fine particles on the shelf; and the adjacent continental slope is incised by occasional submarine canyons. In the Gulf of Lions ECOMARGE experiment: there is no tidal mixing; riverine input of SPM is significant although seasonally variable; primary productivity is comparatively low; there are significant deposits of fine-grained sediments on the shelf; and more than 50% of the adjacent continental slope is incised by submarine canyons.

The effects of these and other similarities and differences on hypotheses, on experimental design and results, and conclusions will be analyzed as quantitatively as possible.

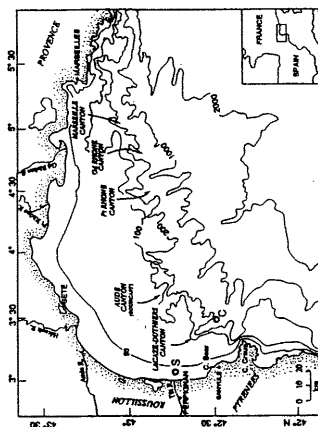
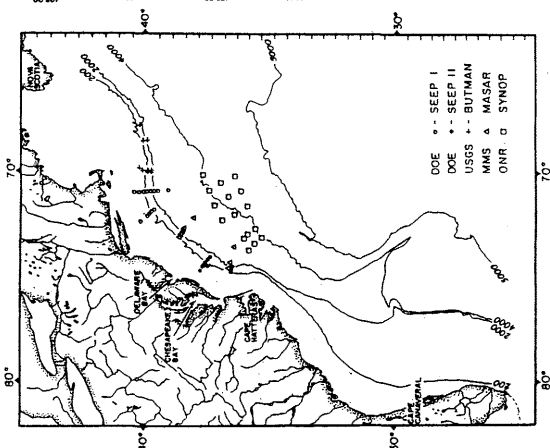


Fig. 1. (Left) The Middle Atlantic Bight (Cape Hatteras north to Cape Cod) of the USA east coast, showing the locations of the SEEP-I and -II experiments in the context of other US experiments during the 1980s.

Fig. 2 (Above) The Gulf of Lions (Cape Creus northeast to around Maresilles) of the French Mediterranean coast in which the first ECOMARGE experiment took place.



REFERENCES

- Monaco, A., P. Biscaye, J. Soyer, R. Pocklington and S. Heussner, 1990, Particle fluxes and edosystem response on a continental margin: the 1985-1988 Mediterranean ECOMARGE experiment. *Cont. Shelf Res.* (in press).
- Walsh, J.J., P.E. Biscaye and G.T. Csanady, 1988, The 1983-1984 Shelf Edge Exchange Processes (SEEP)-I experiment: hypotheses and highlights. *Cont. Shelf Res.*, 8, 435-456.