FINAL REPORT TO THE OFFICE OF NAVAL RESEARCH

For work under Contract N00014-92-J-1024
01 Oct 1991 - 14 May 1994

MODELING COASTAL SEDIMENT TRANSPORT PROCESSES

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Background The two-year contract's intent was to study when so-called role vortices might exist in the ocean's bottom boundary layer. Such organized motions exist in the atmospheric boundary layer and are responsible for some bed forms (*e.g.*, some spectacular sand dune formations such as the Sabara desert). No similar organized motions have been reported in the ocean's bottom boundary layer. If they do exist they may be the cause of some bed forms on the ocean bottom, some of which, like the "ridge and swales" found on the inner continental shelf, are of practical interest to the U.S. Navy.

The study was a numerical one. Specifically, an existing computer model of the ocean's bottom boundary layer (BBL) was used to see if such role vortices could exist in the BBL. The model was previously used to study the interaction of a BBL with a deep ocean jet (Ezer and Weatherly, 1990, *J. Phys. Oceanogr.* 20, 801-816).

Initially progress was slow since the graduate student whose thesis research was involved with this study was greatly distracted by preparation for his Ph.D. comprehensive examinations.

Progress Report After many simulations we conclude that the model we used does not reproduce or predict role vorticity structures in the BBL. Our studies were patterned after similar computer simulations which predict the existence of role vortices in the atmospheric boundary layer.

Rather than try to publish these null results, we decided to check whether our results might be due to the model. The model we used is a hydrostatic one. All the numerical studies of role vortices in the atmospheric boundary layer found to date use models which are non-hydrostatic.

About the time we decided to modify our model to make it non-hydrostatic the ONR grant expired. Although we are continuing to work to bring this project to completion, no additional support has been requested from ONR.

At present we think we have been successful in making our numerical model non-hydrostatic. With the hydrostatic feature included, the model now predicts features which look like role vortices, but more test runs are in order.

I expect the student (Francisco Sandoval) who has been working with me on this study will submit a Ph.D. thesis describing his results by the end of this year . One or two manuscripts acknowledging ONR support should be distilled from his thesis shortly thereafter.

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