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Laboratory Modeling on Internal Wave Generation in Straits

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LONG-TERM GOALS

The long-term goal of this project is to use laboratory experiments to elucidate the complex, three-dimensional internal wave generation processes in geometries such as the Luzon Strait.

OBJECTIVES

The objective of the research is to perform experiments that the IWISE team perceives to be the most useful to the overall goal of developing a reliable, predictive capability for internal tide generation.

APPROACH

Laboratory experiments are run using the wave tank facilities of the PI. These facilities are being advanced through IWISE funding to develop an ability to make measurements of three-dimensional internal tide generation.

WORK COMPLETED

It is still very early stages in this research program. At present, one aspect of the project has been completed, which is the purchase and delivery of equipment (traverses, camera optics) for making measurements of three-dimensional internal tide generation. As a first test, we have designed and are undertaking an experiment that is relevant to the Bataan Islands. In this experiment we will investigate the internal tide produced by a two-dimensional Gaussian ridge with a saddle removed from its peak, thereby making it three dimensional. A fundamental question we seek to answer is whether the radiated internal tide from the saddle-region is noticeably stronger or weaker than the unaltered ridge; if the former, the implication is that regions such as the Bataan Islands might be hot spots for internal tide generation at Luzon.

IMPACT/APPLICATIONS

These will be the first ever laboratory experimental studies of internal tide generation by three-dimensional topography, opening the door to an exciting new era of experimental studies of internal waves. The experiments will play a role in planning and interpreting field data obtained by the IWISE program.

RELATED PROJECTS

This work builds on the results and experience obtained in the NLIWI program, for which we studied two-dimensional internal tide generation for complex bathymetry (including double-ridges) and developed new theoretical models.

At this stage, we note that there is the interesting possibility of running an experiment of the Luzon Ridge at the Coriolis facility in Grenoble in January 2010. We are currently in negotiation with the operators of the facility and are discussing the practical issues of how best to run such an experiment.

REFERENCES

PUBLICATIONS