

User project objectives for HyIV-CNRS-Nycander

Internal waves are an important source of vertical mixing in the ocean. In the deep ocean such waves are mainly excited by tidal currents flowing over rough topography. For this reason, there have been numerous studies of tidally generated internal waves during the last decade. The main goal of the research is to calculate the energy conversion from the barotropic tides to internal waves, and the location and amount of vertical mixing that the waves give rise to.

The basic objective of this project is to establish the scaling of tidal energy conversion with topographic height in the supercritical regime. It is also designed to study resonance phenomena that have been found in theoretical studies with periodic supercritical topography. The supercritical regime is very challenging for numerical simulations, since much of the energy is concentrated into narrow beams. If one wants to go beyond the highly idealized topographies accessible by analytic or semi-analytic methods, laboratory experiments are necessary. Some laboratory experiments with tidal generation of internal waves have been performed, but they have generally used a single two-dimensional ridge.

This project will allow to evaluate energy conversion to internal waves in an experiment with supercritical extended topography. Two different periodic two-dimensional topographies will be used. This will make it possible to compare with analytic and semi-analytic solutions developed by the project leader (Prof. J. Nycander). To facilitate the interpretation, wave absorbers will be used in order to damp internal waves at the surface as well as on the lateral walls. These wave absorbers design will benefit from the CNRM-GAME team expertise.