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Occurrence of an attractor in a laboratory experiment on internal-tide generation at a shelf break.

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As part as the European funded project Hydralab (www.hydralab.eu) we carried out a series of laboratory experiments on internal-tide generation at the Grenoble Coriolis Turntable. The original aim of this work was to study the generation of internal tidal beams at the shelf break, as well as the influence of the coriolis effect and of the presence of a seasonal thermocline. The setup consisted of a 7m long and 4m wide canal, with at one of its ends an oscillating paddle generating an homogeneous barotropic flow, and at the other end a shelf-like topography, connected to the basin by a slope, which acts as the internal-tide generation region. Velocity fields in the whole tank could be estimated using simultaneous PIV measurement with different cameras.

The generation process was shown to be extremely efficient, but the trapezoidal shape of the canal unexpectedly concentrated the energy on internal-wave attractors, occurring for various values of the forcing period. We present the dynamical aspects of these attractors, which to our knowledge are the largest ones ever observed in laboratory experiments, as well as a study on the energetics of the barotropic-baroclinic conversion. Our results are in good agreement with predictions from a numerical internal tide generation model, and those simulations allow us to identify the regions and rates of conversion, which are otherwise hard to obtain experimentally.