Geophysical Research Abstracts,
Vol. 11, EGU2009-2166, 2009
EGU General Assembly 2009

Conditions for local generation of solitary waves in a pycnocline: a numerical study

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Internal Solitary Waves (ISWs) in the ocean mainly arise from the interaction between a barotropic tidal flow and the continental slope or mid-ocean ridges. In the Bay of Biscay and near the Mascarene ridge however, ISWs have been detected far from such topographic features, at distance large enough for the latter process to be unlikely responsible for their generation. It has rather been suggested that, at these locations, the ISWs could result from the interaction of an internal gravity wave *beam* forced by the tide — a so-called internal tidal beam — with the thermocline (New Pingree 1990, 1992, Pingree New, 1991). Theoretical works have been achieved by Gerkema (2001) and Mauge Gerkema (2007) (using a modal approach) and by Akylas et al. (2007), which demonstrate the feasibility of such a conjecture. To our knowledge however, the generation of ISWs by an internal tidal *beam* has never been observed directly nor simulated numerically. This is the purpose of our work.

We will present and characterize results of the generation of ISWs at a pycnocline hit by an internal tidal beam, using two-dimensional direct numerical simulations; an idealized non-rotating situation will be considered. The generation conditions of the ISWs will be analyzed and a simple model for the selection of the ISW-mode will be derived. Finally, extrapolation to the oceanic case will be discussed.