Review of the article

Internal waves in marginally stable abyssal stratified flows

by *Nikolay Makarenko et al.*

In this paper, a strongly nonlinear long wave model is proposed to describe internal waves in a configuration that is known as 2.5 layers. The model prescribed extends the work by Voronovich (2003) by considering a background shear current. I particularly appreciate that the model is presented in its most general form, without recourse to the Boussinesq approximation, and the fact that the authors were able to present the dynamical system governing solitary-wave solutions in an explicit way as a first-order ODE for the interface displacement (the Hamiltonian of the system). Some solutions are then compared with in-situ measurements at the Romanche Fracture Zone in the equatorial Atlantic. I think its a valuable addition to the literature and I recommend publication pending the (minor) comments below.

- It is not clear to me how the the authors relate the background shear at infinity with the wave induced shear, known to trigger Kelvin-Helmholtz instabilities. Clearly this can be done if the wave under consideration is a front wave, but in the general case some good discussion would be welcome. Also, I do not see the relevance of considering the linear stability under long-wave perturbations, since in most two-layer models for any given shear, even if very small, there exists a wave number above which the problem is unstable. This issue has been the object of recent efforts how to regularize such models (see e.g. Choi et al. 2009; Lannes & Ming 2015; Duchene et al. 2016).
- I would have liked finding a more detailed study of the homoclinic orbits for the Hamiltonian system. In particular, higher-mode ISW could have been presented and conditions for the existence of trapped cores investigated. Could the latter be related with the singularities of $\mathrm{d}\eta/\mathrm{d}x$?
- For self-containedness, I would have preferred to find in §6 the density stratification and values for the background shear flow. It is not clear how the points A and B were determined to match the oceanic conditions. Also, aren't these points outside the blue region characterizing the mode-1 waves? Is the point O located along the line $F_1 = F_2$? Is the solution on Fig. 4 a periodic wave?