

Comment on os-2022-5

Anonymous Referee #3

Referee comment on "Analytical solution of the ray equations of Hamilton for Rossby waves on stationary shear flows" by Vladimir Gnevyshev and Tatyana Belonenko, Ocean Sci. Discuss., <https://doi.org/10.5194/os-2022-5-RC3>, 2022

The manuscript is concerned with theoretical investigation of Rossby wave dynamics on currents. Its radical novelty is in considering Rossby wave dynamics on non-zonal currents, which, as the authors have demonstrated, changes the wave kinematics qualitatively. The authors were able to solve analytically the Hamiltonian ray equations. The solutions are quite elegant. The significance of the findings is in the very different overall picture of Rossby wave dynamics, which allows to predict new phenomena and, in particular, re-interpret the old simulations of Rossby wave dynamics carried out by Peter Killworth and his group.

The results are mathematically sound. The presentation is clear, easy to follow, but needs an extra polishing. The English needs some help from a native speaker.

The main weakness of the work is that the authors made no serious attempt to link their results with observations.

I see two options:

(i) To revise the paper by adding a discussion on how the results can be applied for interpreting observations. What of the newly found phenomena could be observed, at least in principle, and how? Discuss the gap between the theory and reality of altimeter observations of Rossby waves. Is it possible to obtain useful information on baroclinic Rossby waves from ADCP arrays? When the SKIM system of measuring surface currents from satellites becomes functioning would it be possible to use it for Rossby wave observations? The dominant tendency nowadays is to employ a variety of multiple sensors distributed somehow in the ocean, what are perspective of this approach for monitoring Rossby wave dynamics?

(ii) The manuscript can be re-submitted to a more mathematically oriented journal (e.g. JFM, Phys Fluids, Proc. Roy Soc, Wave Motion, etc).

In any case, the English needs some extra polishing, a copy editor help is needed.