Nonlinear effects of Rossby waves can be observed in the World Ocean. You can see our work on the Agulhas vortices (Gnevyshev, V. G., A. A. Malysheva, T. V. Belonenko, and A. V. Koldunov (2021), On Agulhas eddies and Rossby waves travelling by forcing effects, Russ. J. Earth. Sci., 21, ES5003, doi:10.2205/2021ES000773). We show the clear tracks there and they are well identified. Identification of linear Rossby waves can be found in the works of La Casce (https://doi.org/10.1002/2017GL075430). He says that it is the long-wave limit of Rossby waves that we observe in the ocean. And the short-wave limit is practically not visible from the field data. Our paper supports this result.

Our result is qualitative and characterizes the asymptotic behavior of the waves in the absence of other factors that in reality can affect their propagation. However, the asymptotic conditions for the wave propagation are cannot be observed in the nature. There are two main reasons for it. The first reason is that Rossby waves in the ocean do not exist in a vacuum, but interact with other processes - currents, vortices and other waves. Another reason is that the very kinematics of Rossby waves is unstable and the wave tracks can vary significantly. The Green function of Rossby waves demonstrates that only long Rossby waves have a clear almost zonal direction and the waves always go west (Lighthill, 1967). On the contrary, the short Rossby waves do not have clearly defined directions (we also illustrated this in the paper). The short Rossby waves can move in any direction. Perhaps, that is why the short Rossby waves are not being observed in the ocean. It is difficult to choose the only direction of the waves, the only track that the wave will follow.

Our paper is devoted to the Hamilton-Jacobi equations i.e. the ray equations. This is the short-wave limit where the wavelength is less than 50 km. How can they be identified in the ocean? There is no way because a) the altimetry space resolution 0.25°; b) we obtained the result that there are no stable tracks for Rossby waves (in the short-wave linear approximation). Once again, the task is extremely sensitive to the initial data.

Dear reviewer, the is no sense for us to prove our point of view since two other reviewers have already written the negative reviews. One of them didn’t understand at all what the article was about. If you want to continue the discussion, you can email us if you are not afraid to interact with the Russians. We are always open for collaboration.