Multi-layer quasi-geostrophic equations of the ocean: Mathematical analysis and numerical simulations

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We study a multi-layer quasi-geostrophic model of the ocean. We prove the existence of a maximal attractor and we estimate its Hausdorff and fractal dimensions in terms of the data. The model is discretized in time using an implicit Euler scheme. We analyse the stability of the scheme and using the theory of multi-valued attractors, we prove that the discrete attractor generated by the numerical scheme converges to the global attractor of the continuous model. Some numerical simulations are presented.

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