DIAPYCNAL MIXING: A NUMERICAL MODEL

Poster

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We propose a numerical model to study the importance of the diapycnal mixing in the evolution of a frontal system. The model estimates the intensity of the mixing induced by the geostrophic shear through the mean density tendency, wr, which measures the temporal variation of the mean density due to the divergence of the density Reynolds flux. This flux is determined from the vertical gradient of the mean density and a diffusion coefficient turbulent, which is related to the gradient Richardson number, under the assumption that Kelvin-Helmholtz instabilities are induced by the mean flow shear.

The process of frontogenesis is based on an oscillating horizontal deformation field characterised with a compression phase and an expansion phase. The results for a case study show that after twelve hours of compression there are zones in the frontal system with high positives and negatives density tendency values, of about 3 10-3 Kg m-3 s-1 .These high diapycnal convergence and divergence causing a significant redistribution of the diapycnal surfaces. In the phase of expansion the vertical density gradient and the diapycnal velocity gradient decreases producing that the gradient Richardson number increases reducing the diapycnal mixing. The structures in the distribution of isopycnals produced in the phase of compression persist.

We suggest that this process may have considerable importance in frontal systems in CANIGO area like upwelling region, Azores Front and mesoscalar structures.