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Modeling of moisture fluxes in atmospheric fronts

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In this study a problem of diagnosis and forecasting of moisture distribution in frontal zones are discussed. A proper account of the energy and mass fluxes in the cyclone domain allows outlining areas with precipitation maxima in the atmospheric fronts and the warm cyclonic sectors. The cyclogenesis intensity and degree of baroclinic instability are the major factors determining the precipitation within the frontal zone. The offered approach of analytical modeling is based on the plane field theory and complex velocity potential functions. The velocity fields are given by the series of primitive sources of certain intensity, vortexes of certain circulation and dipoles with certain momentum and orientation relatively to the front line. The coordinates of all these parameters are also given. The input data are taken from satellite images of cloudiness and computed fields of the vortex, temperature and humidity. The results show the presence of moisture fluxes from the outer area toward the cyclone center with following release of energy due to the latent heat flux. This analytical solution is in an agreement with the negative viscosity theory explaining the transfer of energy from the smaller-scale processes to the larger-scale ones up against a cascade.