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Role Of Relative Wind Stress In Generating Eddy Instabilities

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Relative wind stress (calculated by including the surface current terms) is known to remove energy from mesoscale eddies, but how they respond to this damping mechanism over their lifetime is poorly understood. A method for predicting eddy energy is made by time stepping forward the energy equation of a linear two-layer model using an analytical relative wind stress damping term. Results of this prediction are then compared with numerical experiments of an idealised two-layer anticyclonic eddy in a high-resolution general circulation model. The energy in both experiments displays a quantitative agreement in relative wind stress damping, though this is not the case when the eddy in the numerical experiment becomes baroclinically unstable. In addition to this well-known relative wind stress damping mechanism, we found that relative wind stress can trigger eddy instabilities sooner, leading to quicker decay. The earlier onset of these instabilities by relative wind stress is observed in a Lorenz energy cycle.