Abstract View

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Dynamics of Deep Thermocline Jets in The POLYMODE Region

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ABSTRACT

We present the study of a series of very energetic events, which occur in the 360 days of the Polymode Synoptic Dynamics Experiment dataset. The method consists of the assimilation of data by a quasi-geostrophic open boundary model so that dynamically adjusted fields are produced. They are used to study local dynamical vorticity and energy balances during 20 to 30 day benchmark forecast experiments.

The data and forecasts show the presence of strong jets at the thermocline levels (100–1400 meters), which intensify via a process of baroclinic conversion of available gravitational energy into kinetic energy. The formation, together with strengthening, of these jets is explained in terms of amplifying short-scale baroclinic waves growing along the sheared borders of larger eddies. Associated with the local steepening or the frontal areas, there is a cyclone development processes that results from the growth of these short baroclinic waves. Thus. the area at the southern boundary of the Gulf Stream recirculation gyre is found to be a region of in situ baroclinic energy conversions: the time scale of the process is 30 days and the short length-scale waves amplify in a region of the order of a hundred kilometers.