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Vertical velocities in the ocean are several orders of magnitude smaller than horizontal velocity field, for this reason, direct observations of w in the ocean have not been possible and even in many models, w is so noisy that there is no point in analysing it. The only way to estimate vertical velocities is through a theoretical approach using observation-based fields. The simple Linear Vorticity Balance (LVB) is a very useful starting point for a theoretical treatment of large-scale circulation. The LVB has been used to find out to what extent it can describe the large-scale dynamics of the Atlantic vertical velocity in simulations of the NEMO OGCM. It is proposed to study the sensitivity of the LVB terms in isopycnal projections at different scales by applying spatial filters to interpret the results in the light of the circulation patterns in the different sub- basins of the tropical Atlantic Ocean region. This theoretical approach is based on the simplicity of the Sverdrup Balance but in the baroclinic case. The LVB dominates the circulation in the
interior of the tropical and subtropical gyres below the mixing layer, with very promising results in the deep ocean. The balance is lost near the coast and in the equatorial region, where the non-linearity of the dynamics that is not represented in the LVB becomes apparent. One of the problems in estimating the vertical velocity field from the LVB will be to define the boundary condition from which the balance is integrated. Different boundary conditions will be proposed that allow the w to be integrated without the need to assume a level of no motion. This study has made it possible to explain how upwelling and downwellings are related to meridional flow and in particular to the betav term of the LVB.
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