AMS Home Journals Home Journal Archive Subscribe For Authors Help Advanced Search Search Go

Abstract View

Isopycnal EOFs in the Azores Current Region: A Statistical Tool forDynamical Analysis and Data Assimilation

Michel Gavart and Pierre De Mey

Laboratoire d'Océanographie et de Géophysique, Toulouse, France

ABSTRACT

An empirical orthogonal function analysis of the vertical space–time variability of the thermohaline structure of the ocean in summer and fall 1993 in the Azores Current region has been performed. The analysis used data from CTD casts of the SEMAPHORE intensive experiment, referred to as a seasonally varying climatology. The relative merits of depth-coordinate and isopycnal-coordinate representations have been examined in regard to the quality of identification of physical processes and to the effectiveness of the extrapolation from a sea level anomaly in an attempt to improve the treatment of the vertical dimension in oceanic assimilation problems. The isopycnal EOFs consistently proved more efficient in capturing the vertical structure of both dominant processes in the area of investigation: the variability linked to the Mediterranean Water, and the coherent physical system made up of the Azores Front and the Azores Current. The isopycnal analysis also proved more robust when meddies (Mediterranean Water lenses) were included in the analysis. In addition, isopycnal EOFs appeared to be more observable from altimetry: Residual sea level anomaly variance after projection on the dominant mode (representing the Azores Front/Azores Current) was 8.4 cm^2 in depth-coordinate representation and 3.6 cm^2 in isopycnal-coordinate representation. As an attempt to estimate the vertical structure of errors needed by assimilation schemes, differential isopycnal EOFs were calculated from pairs of casts close in space and time. Despite that only 15 pairs were available for the chosen radii, the dominant process was a quasi-homogeneous vertical displacement of isopycnals with quasi-conservation of water masses and potential vorticity on the isopycnal grid.

Options:
- Create Reference
- Email this Article
- Add to MyArchive
- Search AMS Glossary

Search CrossRef for:
- Articles Citing This Article

Search Google Scholar for:
- Michel Gavart
- Pierre De Mey