subjectively identified during independent RR96 forecast evaluations and named by Robinson et al. (1998b). The sustained presence of the ABV, MCC and IBV during RR96 is likely due to the squeezing and stretching of the AIS over the Adventure Bank and Maltese plateau, to the prevailing mean westerly winds maintaining an upwelling balance on the southern coast of Sicily and to the inertia of the isopycnal domes. The intermittent SMV lacks these topographic and mean wind controls, and could be unsettled by meandering southward shelf currents (Böhm et al., 1987). From this identification, it is of interest to study the dynamical relationships and interactions between these five features and the double MAW and MLIW flow system of the Sicily Channel. A complete understanding of these relations and their variabilities at multiple time and space scales should be valuable for Mediterranean science.

A small step in this direction was provided by the present study of ten days of estimated physical fields and dominant error covariance decompositions, revealing several of the 3D-multivariate PE processes associated with the variations of the above five features. In the Ionian slope region, filaments and bifurcations of the AIS into several streams as well as meanders of the temperature and salinity slope fronts were suggested by the field evolution and confirmed by the dominant predictability eigenvectors. This dominant variability involved mesoscale to subbasin-scale baroclinic and barotropic topographic wave patterns. The tracer and internal flow anomalies were close to thermal-wind balance and mainly limited to 0–500 m. The corresponding barotropic transport anomalies were shown to have their largest amplitudes in this region and to be influenced by baroclinicity, relief, diffusion and nonlinear effects. In the ABV and MCC region, the dominant variability was of a mesoscale, internal and baroclinic nature, not far from geostrophic equilibrium. The internal flow anomalies usually dominated the external ones and were supported by temperature and salinity anomalies often adding effects in density. If couplings between the Ionian slope, IBV and ABV/MCC regions occurred, they appeared to involve subbasin-scale external processes and mesoscale, baroclinic internal processes, possibly occurring simultaneously in both regions. South of the AIS, a substantial mesoscale activity with several MAW eddies was estimated and forecast with accuracy by the present scheme. Considering water masses, the salinity variability and error patterns associated with the deep MLIW and with the Tunisian shelf and Ionian waters were found to be linked with the variations of the properties (pycnocline depth, vertical and horizontal scales, overall strength) of the surface-intensified features presently revealed. In general, the scales of the dominant predictability error covariances in the Strait were usually observed larger at mid-depths than in the surface and bottom layers. These scales and associated error patterns were often not separated, implying the possibility of coupled multiscale interactions. In fact, the dominant eigendecomposition of covariance matrices did not follow a simple scale ordering. Looking at covariance function fields, the dynamical evolution over realistic topography induced nonhomogeneous and locally anisotropic 3D maps, with complex multivariate correlations, in accord with the evolving properties of the physical fields.

In general, the above facts show how the present approach can continuously decompose, organize and track the dominant nonlinear ocean variability. It was found here, and confirmed in other ocean regions, that the three-dimensional variations of variability of a feature are often associated with *groups* of predictability eigenvectors