mesoscale to subbasin-scale anomalies, most of which account for tracer filaments along the Ionian slope, with adjusted transport and internal velocity. These elongated T and S anomalies are close to being in phase, compensating each other in density. They could correspond to barotropically induced bifurcations of the surface AIS. Interestingly, the T and S anomalies of Panel (1) also have their largest amplitudes along the strongest portions of the temperature and salinity fronts of the Ionian slope, respectively (Fig. 5). The AIS temperature front dominates along the eastern coast of Sicily, north of 36°N to 38°N, down to about 150 m depth. In the surface, the Ionian salinity front dominates south of 36.75°N to 34.5°N, almost in parallel to 16.5°E, down to about 100 m (from around 100 m to about 220 m, the zonal horizontal gradient of this salinity front reverses in accord with the MLIW rising on the shelf). Hence, the first vector corresponds to possible bifurcations of the AIS and to fluctuations in the positions of the ‘‘Ionian slope fronts’’. Note that it is the study of such forecast eigenvectors that clearly revealed the different latitudinal locations of these temperature and salinity slope fronts. The second, third and fourth vectors (Panels 2–4) contain baroclinic/barotropic topographic Rossby wave patterns along the Ionian slope that are roughly similar to those of the initial ES conditions (Fig. 9). The T and S surface anomalies are larger than initially and are mainly restricted to their respective fronts. The external component is relatively strong: the surface internal flow anomalies are about twice as large as the external ones (definition in Section 2.2). These forecast vectors (2–4) are dynamically adjusted to the PE field conditions of Sept. 18, with nonhomogeneous, anisotropic patterns and scales. Higher eigenvectors show error patterns in the Ionian slope, ABV, MCC, IBV and SMV regions. Some are intrinsic to a region, others show coupled patterns, with local wavelengths ranging from 20 to 500 km. Scales are generally larger at mid-depths than in the surface and bottom layers. For most eigenvectors, the scales are not as separated as in the initial ES conditions (Figs. 9–11) and the energy ordering does not strictly follow scales. There are multiple scales in three-dimensions on most vectors, with complex, nonhomogeneous patterns, different from regions to regions.

Fig. 15 shows the RMS predictability error forecast corresponding to the forecast of Fig. 12a. Panel (a) shows the ψ and surface T, S and $\hat{u}$ errors; Panel (b) shows the level-10 T, S $\hat{u}$ and $\hat{v}$ errors. Initially, the tracer errors were horizontally uniform in the domain of interest and the velocity errors corresponded to PE adjusted responses (Section 3.1). During Sept. 15–18, this has evolved. In the surface (Panel a), the most dynamically uncertain features are the Ionian slope fronts (ψ, T, S, $\hat{u}$) and the meanders of the AIS along the ABV and MCC (T, S and $\hat{u}$). The T and S error fields confirm the different locations of the temperature and salinity slope fronts. The ψ error field supports the Ionian slope as the region of largest variations of external variability. On level-10 (Panel b), the temperature is most uncertain within the IBV and associated filaments ($\sim$ 20–30 m depths), while the salinity is most uncertain along the Ionian slope ($\sim$ 70–150 m depths) and along a MLIW path to the Western Mediterranean ($\sim$ 40–60 m depths). An implication of these results is that, for several locations and features, the dominant variations of variability during Sept. 15–18 correspond to specific state variables, indicating the need for particular data.

The nonlinear dynamical evolution of the error covariance function is portrayed by Figs. 16 and 17. Fig. 16 recalls the initial shapes (Section 3.1). Precisely, the variability