Implementation and evaluation of regional and coastal ocean forecasting systems in the Eastern Mediterranean

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The Cyprus Coastal Ocean Forecasting and Observing System (CYCOFOS) has been producing operational flow forecasts of the northeastern Levantine Basin since 2002. The flow forecasting module, CYCOM, has been upgraded to produce daily forecasts using the hourly SKIRON atmospheric forcing, and its resolution has been increased from 2.5 km to 1.8 km. CYCOM is nested in the ALERMO (Aegean Levantine Eddy Resolving Model) regional model, which is nested within the MFS (Mediterranean Forecasting System) basin model. The first run of CYCOM for each week is initialized from ALERMO fields. The Variational Initialization and FOrcing Platform (VIFOP) has been adopted to reduce the numerical transient processes following initialization. A five-day forecast is produced every day thereafter, using the updated SKIRON surface forcing and lateral conditions from the weekly ALERMO run and/or MFS run. The daily forecast provides more detailed and more accurate information for the upper ocean. The operational, daily, high-resolution forecasts agree exceptionally well with the ALERMO regional model at medium and large-scales, especially when VIFOP is used. In situ hydrographic data from the Cyprus basin are similar in many ways to the corresponding operational forecast fields. Smaller-scale features begin to appear in CYCOM after about two weeks of "active" running. The "active" experiments do not reinitialize model fields every week as in the operational runs; only boundary forcing is provided. A four-week active experiment contains a rich, realistic eddy-field, yet is close to the lower-resolution regional forecast in a smoothed sense. Remotely-sensed sea surface temperature shows similarities to the small-scale variations present in the CYCOM active run. Plans for further model improvement include assimilation of observed temperature (XBT) and conductivity-temperature-depth (CTD) profiles.