DYNAMICS OF THE CILICIAN BASIN CIRCULATION

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Abstract
Data driven simulations in the Cilician Basin based upon observations during May-August 2005 and a coupled 3-d physical model have been carried out. The circulation features of the Cilician Basin and connected bays were investigated. Circulation features of the region are complex with elements of sub-basin scale gyres, meso-scale eddies and jets. Quantitative and qualitative comparisons of the model fields with ADCP measured currents are given.
Keywords : Circulation, Circulation Models, Levantine Basin.

The Cilician Basin coastal system occupies the northeastern part of the eastern Mediterranean Levantine Basin between Cyprus and Turkey. The system includes the wide continental shelf of the Mersin and Iskenderun Bays.

Three oceanographic surveys with mesoscale grid resolution were conducted in the Cilician Basin during May-August 2005 to investigate the circulation features of the basin. The data set collected during the cruise consists of temperature and salinity profiles at stations and ADCP measured currents throughout the cruises.

Data driven simulations in the Cilician Basin based upon above observations and coupled 3-d physical and biochemical models have been carried out to understand the dynamics of the circulation in the region. The model was initialized with the data obtained during May 18-26, 2005 and run till August. The data obtained during summer cruises were assimilated into the model.

The physical dynamical model employed here is the 4-d primitive equation (PE) model of Harvard Ocean Prediction System, which is based on the GFDL integration algorithm. The model grid covers the entire Cilician Basin at a resolution of 3 km with 25 terrain-following levels in the vertical.

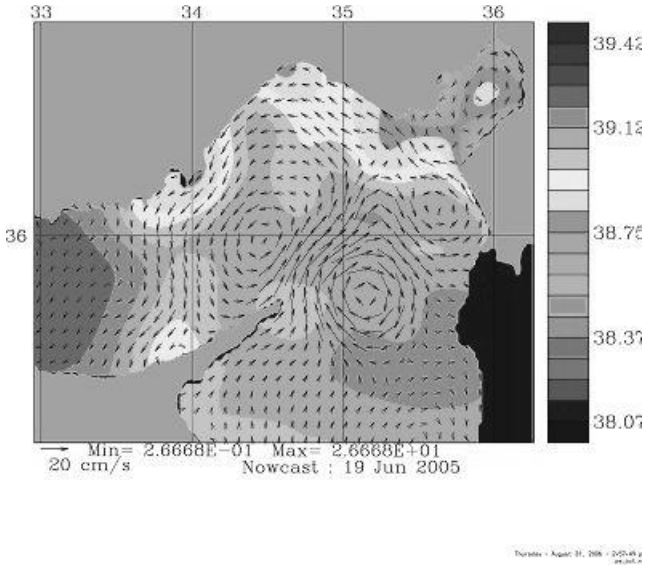

Fig. 1. Model initialization

A cyclonic circulation in the Eastern Mediterranean has long been proposed as the dominant mean current system. Accordingly, the steady surface current follows the coast of Israel, Lebanon and Syria and turns west to follow along the southern Turkish coast.

While mean currents appear to have a relatively simple pattern, the actual time-dependent currents in any part of the eastern Mediterranean are far more complex, and this complex pattern is impressed on the coastal regions. The current systems with elements of sub-basin scale gyres, meso-scale eddies, jets and oscillatory features have a determining role in the transport of materials in the sea. The shallow and wide shelf region adjacent to the Gulf of Iskenderun implies local characteristics of currents, and mixing and exchange mechanisms of the Gulf waters, which impact its biochemical structure and variability.

ADCP measurements carried out during the cruises indicate the existence of a jet with 60 cm/s velocities with the core located at the 200 m depth contour in the Mersin Bay. This jet separates coastal and open sea waters and its spatial variability affects the replenishment of the coastal waters of the Mersin Bay. The model simulated circulation features are consistent with ADCP measured currents both quantitatively and qualitatively.

The interactions between northeastern Mediterranean shelf area and the open waters drive the circulation within the Iskenderun Bay. The strong local wind in Iskenderun region is also effective on the short term variability of the Iskenderun Bay circulation.

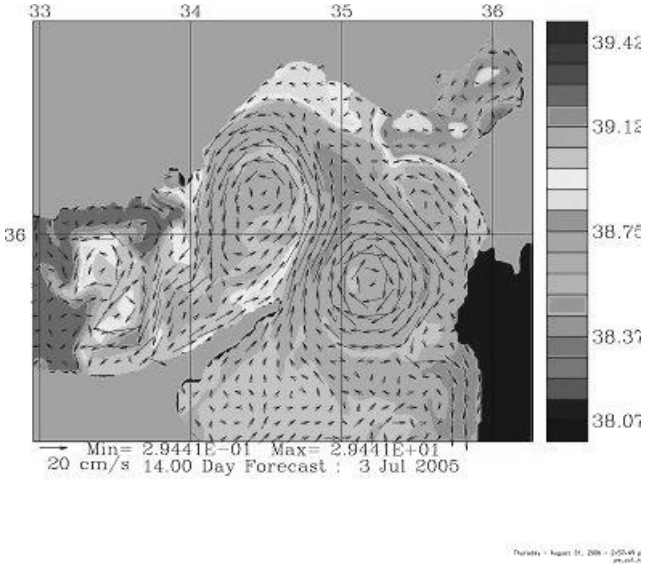

Fig. 2. Model 14 days forecast

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