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Author: Prof. Eyal Heifetz
Tel Aviv University, Israel, eyalh@post.tau.ac.il

Dr. Yoav Lehahn
Weizmann Institute of Science, Israel, yombav@gmail.com
Mr. Ron Goldman
Israel, ron@ocean.org.il
Mr. Shai Efrati
Israel, shaief@gmail.com

SATELLITE AND MODEL BASED TOOL FOR SHORT TERM PREDICTION OF TRACER
TRANSPORT IN EASTERN MEDITERRANEAN SURFACE WATERS

Abstract

Transport of substances by marine currents has a strong impact on the marine and coastal environment. An important consequence of this transport is the displacement of pollutants over wide areas. COSEM (Containment Spread in the Eastern Mediterranean) is an interdisciplinary project, aimed at characterization, monitoring and short term prediction of transport mechanisms in the surface waters of the eastern Mediterranean. The project, which was financed by the Israeli Ministry of Science and Technology, is based on integration of high resolution numerical modeling with a multi-satellite dataset that is comprised of two components: 1. AVISO (<http://www.aviso.altimetry.fr/en/home.html>) altimetry data that are used to extract the geostrophic surface currents; and 2. MODIS (<http://modis.gsfc.nasa.gov/>) ocean color data that are used to quantify spatiotemporal variability patterns in surface chlorophyll. Horizontal transport properties, as well as their impact on different physical and biogeochemical tracers, are quantified using recently developed Lagrangian analysis methods. Specifically, we look to link spatial patterns of Lagrangian Coherent Structures (LCS) in the satellite-derived velocity field and distribution patterns of satellite derived surface chlorophyll. Lagrangian Coherent Structures, that are extracted from calculation of finite size Lyapunov exponents (FSLE), induce in advected tracer fields filament patterns with typical length in the range of 10–100 km and lifetime in the range of days/ weeks. Since LCS represent transport barriers and tracer boundaries, they separate between water bodies with possibly different physical - biogeochemical properties. This comparison is advantageous to pollution spread predictions since it compares the location of fronts in passive tracer spread. Here we will present some of the advancements achieved in the course of the COSEM projects, including diagnostics of the major eastern Mediterranean circulation patterns; characterization of patches stretching from the coast to the open sea; and quantification of transport processes along the Israeli coast. We will also introduce the near real time system for monitoring transport pathways in the eastern Mediterranean, which integrates information from the multi platform COSEM dataset.