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Modeling the Nestos River plume dynamics using ELCOM

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ABSTRACT

Results from the first attempt to simulate the Nestos River plume using the three-dimensional numerical model ELCOM are presented. The numerical model was validated using in-situ CTD data from three field campaigns taking place under variable discharge and meteorologic conditions. Results showed that the model predicted satisfactorily the surface expansion and the shape of Nestos river plume in all cases. The calculated versus observed salinity values showed significant correlations under high, moderate-high and low flow condition. The numerical model revealed that Nestos plume enters the Kavala Gulf only under high and intermediate river flow conditions, and only under favorable east and northeast winds. After validation, the model was used to examine plume behavior under four test cases of variable discharge and winds. These results illustrated that Nestos plume is mostly wind-driven, while river discharge is the key parameter responsible for transporting the plume away from the mouth. The plume directed mainly westwards throughout the year, under the influence of the general water circulation and the predominance of E–NE winds. Local coastal morphology such as the existence of the Thassos Passage also plays a significant role on the plume dispersion and movement.

Keywords: River plume; Coastal zone; Numerical model; ELCOM; Nestos River; Kavala Gulf

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