

Abstract Submitted  
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**Lagrangian transport through an ocean front in the North-Western Mediterranean Sea**<sup>1</sup> ANA MARIA MANCHO, Department of Mathematics, IMAFF, CSIC, EMILIO HERNANDEZ-GARCIA, IMEDEA (CSIC - Universitat de les Illes Balears), STEPHEN WIGGINS, DES SMALL, School of Mathematics, University of Bristol, VICENTE FERNANDEZ, Istituto Nazionale di Geofisica e Vulcanologia INGV — We analyze with the tools of lobe dynamics the velocity field from a numerical simulation of the surface circulation in the North-western Mediterranean Sea. We identify relevant hyperbolic trajectories and their manifolds, and show that the transport mechanism known as the “turnstile,” previously identified in abstract dynamical systems and simplified model flows, is also at work in this complex and rather realistic ocean flow. In addition nonlinear dynamics techniques are shown to be powerful enough to identify the key geometric structures in this part of the Mediterranean. In particular the North Balearic Front, the westernmost part of the transition zone between saltier and fresher waters in the Western Mediterranean is interpreted in terms of the presence of a semipermanent “Lagrangian barrier” across which little transport occurs. Our construction also reveals the routes along which this transport happens.

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