

Abstract Submitted  
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**Topological detection of Lagrangian coherent structures** JEAN-LUC THIFFEAULT<sup>1</sup>,  
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University of Wisconsin - Madison, MICHAEL ALLSHOUSE<sup>2</sup>, MIT — In many applications, particularly in geophysics, we often have fluid trajectory data from floats, but little or no information about the underlying velocity field. The standard techniques for finding transport barriers, based for example on finite-time Lyapunov exponents, are then inapplicable. However, if there are invariant regions in the flow this will be reflected by a ‘bunching up’ of trajectories. We show that this can be detected by tools from topology. The method relies on examining a large number of topological loops, encoded symbolically. These loops wrap around the trajectories, which are viewed as topological obstacles. As the trajectories move around, they cause most loops to grow. The few loops that do not grow, or grow slowly, can be associated with coherent structures.

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