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Objective Eulerian Coherent Structures and their Short-Term Prediction MATTIA SERRA, GEORGE HALLER, ETH - Zurich — We discuss a frame-invariant (objective) method for Eulerian Coherent Structure (ECS) identification in two-dimensional unsteady flows. ECSs reveal a time-varying skeleton of fluid flows that instantaneously approximates the most influential material surfaces in transport and mixing. We also describe an objective non-dimensional metric that quantifies the persistence of vortex-type ECSs. In an application to persistent eddy detection in satellite-derived ocean velocity data, we find that our ECS persistence metric significantly outperforms vortex predictions from other customary Eulerian diagnostics, such as the potential vorticity gradient and the Okubo-Weiss criterion.

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