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Targeted detection of an oceanic Lagrangian transport structure MARGAUX FILIPPI, Massachusetts Institute of Technology / Woods Hole Oceanographic Institution, ALIREZA HADJIGHASEM, Massachusetts Institute of Technology, MATT RAYSON, GREG IVEY, University of Western Australia, JAMES GILMOUR, Australian Institute of Marine Science, THOMAS PEACOCK, Massachusetts Institute of Technology — To investigate the application of concepts regarding Lagrangian transport structures to oceanic flows, a field experiment was conducted at Scott Reef, a coral-reef atoll system off Western Australia. Surface velocity fields output by a numerical ocean model of the region and subsequent FTLE processing of the data revealed the existence of a pronounced Lagrangian transport structure forming at a critical time of the tidal cycle. This transport feature defined a clear, transient boundary between two bodies of water: one that remained within the atolls lagoon and one that was expelled via the channel. To demonstrate the actual occurrence of this feature in a field experiment, sparse arrays of surface drifters were released around the predicted time and location. The patterns of these drifter trajectories validate the predictions from our analysis. The results are a demonstration of the reliability and utility of Lagrangian processing methods for natural flows, with application, in this case, to coral reef connectivity. The specific Lagrangian feature we detected is perhaps ubiquitous to tidally-driven channel flows.

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