Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Transient eddies over ridged substrates enhance trapping and settlement of coral larvae DANIEL GYSBERS, MARK LEVENSTEIN, University of Illinois at Urbana-Champaign, MARK VERMEIJ, KRISTEN MARHAVER, CARMABI Foundation, AMY J. WAGONER JOHNSON, GABRIEL JUAREZ, University of Illinois at Urbana-Champaign — The low settlement success of planktonic larvae is an important problem that can inhibit the recovery of reefs from environmental damage. Tiny coral larvae ($<$ 1mm) must navigate the water column to find a suitable surface for permanent settlement, a process influenced by diverse chemical, biological, and physical mechanisms acting over multiple length scales. Using a custom-built oscillatory flume tank, we investigate coral larval settlement on substrates of different roughness scales to understand the effect of hydromechanical forces on larvae due to boundary layer flows. Dynamic flow fields, characterized by particle image velocimetry, contain regions of recirculation near millimeter-scale substrate features that correlate strongly with larvae settlement positions, despite the mean flow speed in the flume tank being an order of magnitude higher than the larval swimming speed. Using simulations, we explore how the recirculation regions influence the settlement of active swimmers over substrates of varying surface topography.

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Date submitted: 03 Aug 2020 Electronic form version 1.4