Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Fate of internal waves on a shallow shelf[1] KRISTEN DAVIS, University of California, Irvine, ROBERT ARTHUR, Lawrence Livermore National Laboratory, EMMA REID, University of California, Irvine, THOMAS DECARLO, University of Western Australia, ANNE COHEN, Woods Hole Oceanographic Institution — Internal waves strongly influence the physical and chemical environment of coastal ecosystems worldwide. We report novel observations from a distributed temperature sensing (DTS) system that tracked the transformation of internal waves from the shelf break to the surf zone over a shelf-slope region of a coral atoll in the South China Sea. The spatially-continuous view of the near-bottom temperature field provided by the DTS offers a perspective of physical processes previously available only in laboratory settings or numerical models. These processes include internal wave reflection off a natural slope, shoreward transport of dense fluid within trapped cores, internal "tide pools" (dense water left behind after the retreat of an internal wave), and internal run-down (near-bottom, offshore-directed jets of water preceding a breaking internal wave). Analysis shows that the fate of internal waves on this shelf – whether they are transmitted into shallow waters or reflected back offshore – is mediated by local water column density and shear structure, with important implications for nearshore distributions of energy, heat, and nutrients.

[1]We acknowledge the US Army Research Laboratory DoD Supercomputing Resource Center for computer time on Excalibur, which was used for the numerical simulations in this work. Funding for field work supported by Academia Sinica and for K.D. and E.R. from NSF

Kristen Davis
University of California, Irvine

Date submitted: 26 Jul 2017 Electronic form version 1.4