Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Mass transport by large and very-large amplitude mode-2 internal solitary waves: experimental observations KARA SHIPLEY, ALAN BRANDT, JHU/APL — The present experiments provide the first quantitative measurements of the mass transport by mode-2 internal solitary waves (ISW) propagating on a thin pycnocline. The ISW were generated by the release of fluid from an initially mixed volume. It was found that the amplitude and amount of mass transported by the leading and second, following ISW was proportional to the level of forcing and was attenuated at an approximately uniform rate as the ISW propagated downstream. At the highest level of ISW forcing, over 40% of the mixed fluid was transported within the leading ISW. Excellent agreement was found with the numerical simulations of Salloum et al. (2012) that were designed to replicate the present experimental configuration. In addition, a new ISW regime was identified, termed very large-amplitude ISW, where the ISW bulge wavelength and extent of mass transported increased with amplitude at a rate greater than the lesser amplitude ISW. In recent years the frequent occurrence of large amplitude ISW in the coastal ocean has been observed. The present experiments and the associated numerical simulations can provide insight into the effects of ISW transport on coastal mixing and biological material distribution.

Alan Brandt
JHU/APL

Date submitted: 18 Jul 2013 Electronic form version 1.4