Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Turbulence and dissipation in a computational model of Luzon Strait MASOUD JALALI, SUTANU SARKAR, University of California, San Diego — Generation sites for topographic internal gravity waves can also be sites of intense turbulence. Bottom-intensified flow at critical slopes leads to convective instability and turbulent overturns [Gayen & Sarkar (2011)]. A steep ridge with small excursion number, Ex, but large super criticality can lead to nonlinear features according to observations [Klymak et al. (2008)] and numerical simulations [Legg & Klymak (2008)]. The present work uses high resolution 3-D LES to simulate flow over a model with multiscale topography patterned after a cross-section of Luzon Strait, a double-ridge generation site which was the subject of the recent IWISE experiment. A 1:100 scaling of topography was employed and environmental parameters were chosen to match the slope criticality and Fr number in the field. Several turbulent zones were identified including breaking lee waves, critical slope boundary layer, downslope jets, internal wave beams, and vortical valley flows. The multiscale model topography has subridges where a local Ex may be defined. Wave breaking and turbulence at these subridges can be understood if the local value of Ex is employed when using the Ex-based regimes identified by Jalali et al. (2014) in their DNS of oscillating flow over a single triangular obstacle.

Sutanu Sarkar
University of California, San Diego

Date submitted: 30 Jul 2014 Electronic form version 1.4