

Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Sediment wave formation by unstable internal waves in a turbidity current boundary layer LUTZ LESSHAFFT, CNRS / Ecole Polytechnique, BRENDON HALL, ECKART MEIBURG, UC Santa Barbara, BEN KNELLER, University of Aberdeen — The bedform of sediment that is deposited from turbidity currents onto the ocean floor is often found to exhibit long-wavelength variations, with crest lines perpendicular to the flow direction (“sediment waves”). A temporal stability analysis, based on the 2D Navier–Stokes equations, reveals the presence of unstable internal waves in the bottom boundary layer of a turbidity current. Instability arises from the interaction between the current and the sediment bed, via the competing effects of particle deposition and erosion. Due to the velocity and density variations within the boundary layer, near-stationary internal waves near the bottom may exist under both sub- and supercritical outer flow conditions. Unstable internal waves display long wavelengths and are typically found to slowly travel upstream. Both features are in qualitative agreement with field observations on sediment waves.

Lutz Lesshafft
CNRS / Ecole Polytechnique

Date submitted: 07 Aug 2009

Electronic form version 1.4