Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

The vertical structure of eddy diffusivity in pure slope flows over smooth surfaces MARCO GIOMETTO, JIANNONG FANG, School of Architecture, Civil and Environmental Engineering, École Polytechnique Fédérale de Lausanne, MARC B. PARLANGE, Faculty of Applied Sciences, University of British Columbia, EPFL / UBC COLLABORATION — Thermally driven slope flows are ubiquitous in nature and play a major role in regulating local microclimates in valleys, glaciers and ice-sheets. They control in large part surface momentum, heat and moisture fluxes, and their effects must be accounted for in weather prediction and climate models. Due to the interplay between shear and buoyancy in generating and destroying turbulence, the thermal and hydrodynamic boundary layers that characterize slope flows are very shallow, with turbulent motions of reduced size, when compared to those populating neutral and convective boundary layers. This poses serious difficulties in terms of computational resolution and modeling requirements for thermally driven slope flows. Not surprisingly, therefore, considerable effort has been devoted in designing parameterizations, for use in larger scale models. In this presentation we explore new parameterizations guided by direct numerical simulations (DNS) to determine the vertical profiles of momentum and buoyancy eddy diffusivities for pure slope flows over smooth surfaces. Mean flow profiles from one-dimensional models are then compared against DNS and results will be discussed.

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Date submitted: 01 Aug 2014 Electronic form version 1.4