Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Low-Level Jets, Coherent Structures and Turbulence in a Stably Stratified Atmospheric Boundary Layer IMAN GOHARI, MASOUD JALALI B., PhD Student, SCOTT BADEN, SUTANU SARKAR, professor — Accurate numerical modeling of stably stratified Atmospheric Boundary Layers (SABL) is known to be a pacing item for progress in numerical weather prediction, atmospheric dispersion and other related applications such as harnessing wind energy. The stabilizing effect of buoyancy not only dampens the strength of turbulence relative to near-neutral and convectively unstable cases but also qualitatively affects turbulence structure by changing anisotropy in velocity, anisotropy in length scale and spatio-temporal intermittency. Low-Level Jets (LLJs) form at O(100) m heights in the rotation-influenced SABL. It is thought that the LLJ leads to two turbulent layers, wherein the turbulence in the top layer originates from shear production and that in the lower one is mainly controlled by surface conditions. Properties of the SABL during the evolution of LLJ are not well understood. Therefore, Large Eddy Simulations of a rotation-influenced SABL with different surface cooling rates have been performed. Fluctuations (coherent structures, turbulence, and internal gravity waves) during LLJ evolution are quantified through second-order moments, high-order derivative statistics, spectra, length scales and eduction of coherent structures.

Iman Gohari
PhD Student

Date submitted: 29 Jul 2014 Electronic form version 1.4