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4:05 PM–6:41 PM, Monday, November 23, 2015
Room: 311

Chair: Colm-Cille Caulfield, University of Cambridge

Abstract: L30.00004 : Energy and water vapor transport in a turbulent stratified environment
4:44 PM–4:57 PM

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We present direct numerical simulations about the transport of kinetic energy and unsaturated water vapor across a thin layer which separates two decaying turbulent flows with different energy. This interface lies in a shearless stratified environment modeled by means of Boussinesq's approximation. Water vapor is treated as a passive scalar (Kumar et al. 2014). Initial conditions have Fr^2 between 0.64 and 64 (stable case) and between -3.2 and -19 (unstable case) and $Re_\lambda = 250$. Dry air is in the lower half of the domain and has a higher turbulent energy, seven times higher than the energy of moist air in the upper half. In the early stage of evolution, as long as $|Fr^2|>1$, stratification plays a minor role and the flows follows closely neutral stratification mixing. As the buoyancy terms grows, $Fr^2 \sim O(1)$, the mixing process deeply changes. A stable stratification generates a separation layer which blocks the entrainment of dry air into the moist one, characterized by a relative increment of the turbulent dissipation rate compared to the local turbulent energy. On the contrary, an unstable stratification sligthy enhances the entrainment. Growth-decay of energy and mixing layer thichness are discussed and compared with laboratory and numerical experiments.