CGD SEMINAR

DATE: Tuesday, 16 January 2018

TIME: 11 a.m.

LOCATION: NCAR, 1850 Table Mesa Drive
Mesa Lab, Main Seminar Room

TITLE: Incorporating Non-hydrostatic Pressure Work in Thermal Energy Conservation – Implication of Thermal and Kinetic Energy Exchange

SPEAKER: Jielun Sun, NCAR MMM

ABSTRACT:

In this talk, I will revisit thermal energy conservation through total energy conservation. One important outcome of the investigation is to address the important role of kinetic and thermal energy exchange in the atmosphere as well as the oceans. Because heating/cooling of a system can induce a non-hydrostatic vertical pressure gradient, part of the kinetic energy change is contributed by the work done through this internally-generated non-hydrostatic vertical pressure gradient. Constrained by total energy conservation, the energy available for the internal energy change has to be compensated for the amount of the external thermal work done to the kinetic energy change. This thermal and kinetic energy exchange is included in kinetic energy conservation derived from momentum conservation, however, is missed in the traditional thermal energy conservation equation. I will use observations in the atmospheric boundary layer and numerical results from a one-dimensional model to confirm the role of this extra term in the thermal energy conservation equation. The new understanding may provide explanation for simulated air temperature biases in the atmosphere and observed dissimilarity between temperature and water vapor.

Live webcast: http://www.fin.ucar.edu/it/mms/ml-live.htm

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