MMM SEMINAR NCAR

Gravity Currents in Sheared Environments

George Bryan

National Center for Atmospheric Research Mesoscale and Microscale Meteorology Division Boulder, Colorado

Gravity currents (also known as density currents) are flows associated with a fluid of one density that is spreading along a surface and displacing a fluid of different density. In the atmospheric sciences, gravity current dynamics are commonly invoked to explain the behavior of "cold pools," the evaporatively generated cool/dense air that is often found underneath precipitating clouds and convective systems. This talk examines the effects that environmental shear has on gravity currents, where shear is defined as increasing horizontal windspeed with height. Two perspectives from previous studies are considered. One perspective assumes steady flow in a confined channel with a rigid upper boundary, which yields a very broad range of precise quantitative solutions. The other perspective assumes steady flow without an upper boundary and yields only one quantitative solution (the "optimal state"); this perspective also provides a simple qualitative framework that has been used to explain various aspects of gravity currents and squall lines. Numerical simulations are used in this talk to evaluate the two perspectives, focusing on processes that are difficult to study analytically, such as the effects of viscous dissipation, and the behavior of unsteady gravity currents.

This seminar will be recorded and available via webcast at: http://www.fin.ucar.edu/it/mms/fl-live.htm

> Thursday, 13 February 2014, 3:30 PM Refreshments 3:15 PM NCAR-Foothills Laboratory 3450 Mitchell Lane Bldg 2 Main Auditorium, Room 1022

MMM SEMINAR COORDINATORS: Rich Rotunno, 303.497.8904, rotunno@ucar.edu Chris Snyder, 303.497.8966, chriss@ucar.edu http://www.mmm.ucar.edu/sem/seminars.html