

---

# MMM SEMINAR NCAR

---

## Revisit Monin-Obukhov Similarity Theory and the Bulk Formula for Turbulence Parameterization

***Jielun Sun***

*National Center for Atmospheric Research  
Mesoscale and Microscale Meteorology  
Boulder, CO*

The observations from the Cooperative Atmosphere-Surface Exchange Study in 1999 (CASES-99) field experiment suggest that the turbulent momentum mixing under moderate to strong winds is proportional to the bulk shear (wind speed over observation height), not local wind shear as in Monin-Obukhov similarity theory (MOST). The new result is due to the fact that if the mixing length at a given point in the atmospheric boundary layer is large enough to reach the ground, which happens under near neutral conditions or moderate to strong winds, the effect of the ground on turbulent mixing is significant, and the traditional assumption of the local gradient dependent turbulent mixing is not valid. However, if the mixing length is smaller than the observation height, such as under stable conditions, the effect of the ground on turbulent mixing decreases with height, the local shear becomes more relevant in turbulent strength. Parameterizations of the turbulent momentum and sensible heat fluxes using the traditional bulk formula derived from MOST and a new approach based on the above understanding are compared.

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

**Thursday, 22 May 2014, 3:30 PM**

Refreshments 3:15 PM

NCAR-Foothills Laboratory  
3450 Mitchell Lane

Bldg 2 Main Auditorium, Room 1022