Date: April 8th, 2005

Time: 10:30 AM

Location: Olin 305

Speaker: Dr. Peter P. Sullivan
National Center of Atmospheric Research (NCAR), Boulder

Title: **"Surface Gravity Waves and Coupled Marine Boundary Layers"**

Abstract

Air-sea interaction processes influence weather, climate, and scalar transport over a wide spectrum of scales ranging from millimeters to hundreds of kilometers. In this presentation, the impact of idealized surface waves on turbulent flow in the atmospheric (marine) PBL is studied using turbulent simulations (direct and large-eddy simulations). Using DNS, I first consider the regime of slow moving waves where non-separated sheltering and critical-layer dynamics are active and discuss how these processes lead to wave growth.

Next, LES is used to examine the influence of large-scale, fast-moving swell on a weak wind atmospheric surface layer. In this special non-equilibrium regime of light winds following fast running waves LES solutions exhibit positive (upward) momentum flux and low-level jets, and the flux-profile relationships are not well predicted by surface similarity theory. Furthermore, if weak winds and swell persist for sufficient time the wave-driven surface layer can induce a large scale collapse of the atmospheric boundary layer. Recent measurements from the recent Coupled-Boundary Layers Air-Sea Transfer (CBLAST) field campaign as well as other outdoor investigations show signatures of wave-driven wind events and support the results from the simulations.