

# Weekly CEAFM Seminar: Fall 2015



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Date: **Friday, October 23, 2015**  
Time: 11:00 AM  
Location: Gilman Hall # 132  
Speaker: **Prof. Ronald Smith** (Yale University)  
Title: ***“DEEPWAVE 2014: Observing Gravity Waves from the Troposphere to the Mesosphere”***

## Abstract

The recent DEEPWAVE field project in New Zealand ran from May 25 to July 28, 2014. Its objectives were to observe, understand and predict the deep propagation of gravity waves from the Troposphere into the Stratosphere, Mesosphere and Thermosphere. Aircraft flight level wave energy flux data included 97 aircraft legs (49.1 hours) over the terrain of New Zealand and the 157 aircraft legs (84.3 hours) over the Southern Ocean. The vertical energy flux at  $Z=12\text{km}$  for the terrain flights varied from zero to  $22\text{ W/m}^2$  with an average value of about  $4\text{ W/m}^2$ .

An emerging hypothesis from the DEEPWAVE projects is that the deep propagation of gravity waves over NZ is controlled by a “valve layer” from 16 to 20km. This hypothesis is tested using flight data and a high-resolution numerical model. A newly designed spatial filter is used to identify the gravity waves in the complex numerical model output. Vorticity and potential vorticity are used to see the influence of wave momentum flux deposition on the mean flow.

## Bio

Prof. Smith leads Yale’s program in mesoscale meteorology and regional climate. This program includes 1) atmospheric dynamics emphasizing density-stratified fluid dynamics and applied mathematics, 2) observations of the atmosphere using aircraft and satellite, 3) hydrometeorology using stable isotopes of water and theories of evaporation and rain, 4) satellite remote sensing of landscape changes and climate sensitivity. Current projects include: orographic precipitation in the tropics, gravity waves in the stratosphere, satellite analysis of surface climate feedbacks, stable isotope gradients across mountain ranges, mathematical models of dispersion.