INVESTIGATING GRAVITY WAVE PROPERTIES IN THE SUMMER POLAR REGIONS

MICHAEL J. TAYLOR 1, Y. Zhao 1, P-D. Pautet 1, C. E. Randall 2, S. M. Bailey 3, J. M. Russell III 4

1. Center for Atmospheric and Space Sciences, Utah State University, 4405 Old Main Hill, Logan, UT 84322, USA. e-mail: mike.taylor@usu.edu.
2. Laboratory for Atmospheric and Space Physics, University of Colorado, 1234 Innovation Drive, Boulder, CO 80303, USA.
3. Virginia Polytechnic Institute and State University, 645 Whittemore Electrical & Computer Eng, Blacksburg, VA 24061, USA.
4. Center for Atmospheric Sciences, Hampton University, Center for Atmospheric Sciences, Hampton University, Hampton, VA 23668, USA.

Gravity waves are ubiquitous throughout the atmosphere transporting large amounts of energy and momentum from sources in the lower atmosphere up into the mesosphere and lower thermosphere (MLT) region where they dissipate. It is now widely understood that this transport mechanism plays a key role in large-scale circulation, thermal structure and variability of the MLT region. At high latitudes, during the summer months, noctilucent clouds (NLC) have provided an important medium for investigating gravity wave properties in the vicinity of the cold summer mesopause. Ground-based NLC measurements are limited to twilight conditions and are practical over a latitude range of typically 50-65°. Satellite measurements of these clouds, termed polar mesospheric clouds (PMCs), provide an unique opportunity to investigate gravity wave occurrence and properties at higher latitudes extending over the sunlit polar cap region. The Aeronomy of Ice in the Mesosphere (AIM) satellite was launched in April, 2007 with a primary goal to explore PMC structure, formation and evolution. One of the instruments onboard AIM is the Cloud Imaging and Particle Size (CIPS), which is a four camera, wide-field (120° x 80°) UV imager designed to measure PMC morphology with high spatial resolution (2 km) facilitating detailed analysis of mesospheric wave structures. Initial investigations using CIPS imagery have revealed a variety of cloud and wave-like structures, the latter due primarily to gravity waves with a broad range of scale-sizes (from 10s to a few 1000 km). In this talk, I will summarize current knowledge of gravity wave characteristics determined from NLC data and will present new measurements of periodic PMC structures by the AIM satellite, comparing and contrasting their properties over the northern (summer 2007) and southern (summer 2007/8) hemispheres. The measurements illustrate the high utility of the AIM data.

Mesospheric dynamics, Atmospheric gravity waves, Noctilucent clouds, Polar mesospheric clouds

Michael J. Taylor, Center for Atmospheric and Space Sciences, Utah State University, 4405 Old Main Hill, Logan, UT 84322, USA. Tel: 1-435-7973919, Fax: 1-435-7972992, e-mail: mike.taylor@usu.edu