

# Physics Seminar

## Michigan Technological University

Wednesday, April 18, 2007

4:00 pm Room 130, Fisher Hall

### **ANALYZING GLOBAL PRECIPITATION FROM A CONSTELLATION OF LOW EARTH-ORBITING MICROWAVE SENSORS**

**Joe Turk**

**Naval Research Laboratory, Marine Meteorology Division  
Monterey, CA**

#### **Abstract:**

The Earth's precipitation has a natural variability which necessitates the use of multiple low-Earth orbiting environmental satellite platforms to sample the underlying space and time variability. The number of satellites, their orbital patterns, and the width of the sensor swath determines the amount of averaging time needed to estimate the mean daily cycle. However, even with an optimally configured number of satellites and orbits, the individual microwave sensors onboard each of the constellation satellites often have different channels, scanning patterns, radiometric accuracies, and even different rainfall estimation algorithms. To properly blend or merge the rainfall estimates together requires knowledge of the relative differences amongst each of the satellites.

After a discussion of the underlying principles of microwave radiometry from space, a multi-year characterization of the retrieved rainfall from various sensors onboard a constellation of satellite platforms is presented. This consists of the NASA Earth Observing System (EOS) Aqua and the Tropical Rainfall Measuring Mission (TRMM), the Naval Research Laboratory's Coriolis/WindSat, and the ongoing series of Defense Meteorological Satellite Platform (DMSP) and National Oceanic and Atmospheric Administration (NOAA) satellites. Precipitation data from each satellite are analyzed with respect to season, latitude, surface background, and local time of observation. In many cases the differences are quite small, especially for detection of precipitation, yet these small differences are important for detecting global changes in rainfall that may be manifestations of climate and other larger-scale changing weather patterns.

#### **Biography:**

Joe Turk received a BS (1982) and MS (1984) in Electrical Engineering from MTU. After working for Motorola (1984-1986) he attended Colorado State University, obtaining a Ph.D. in Electrical Engineering in 1992. He has been a Senior Scientist with the Naval Research Laboratory, Monterey, CA since 1995 where his research includes environmental satellite data applications in numerical weather prediction models, satellite data assimilation, and remote sensing of clouds and precipitation.