UNIVERSITY of HAWAI'I MĀNOA

Department of Atmospheric Sciences Seminar Announcement

Department of Atmospheric Sciences, S.O.E.S.T., University of Hawai'i at Mānoa
2525 Correa Road, HIG 350; Honolulu, HI 96822 ☎956-8775

SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY

SEMINAR TITLE:

Characterizing the Performance of Haleakala as a Ground Site for Laser Communications

Dr. Randall J. Alliss
Tech Fellow and Manager Atmospheric Sciences Group
Northrop Grumman Information Systems
McLean, VA

Date:	**Wednesday, February 3, 2016**
Refreshments:	**3:00pm at MSB courtyard**
	Free Cookies, Coffee & Tea Provided
Seminar Time:	**3:30pm**
Location:	**Marine Sciences Building, MSB 100**

Abstract:

Radio Frequency signals have been relied on exclusively to communicate with spacecraft for nearly 60 years. However, missions now demand higher data rates to meet their data collection requirements. NASA's Lunar Laser Communications Demonstration (LLCD) successfully demonstrated high data rate communications links to and from the LADEE satellite orbiting the moon during the Fall of 2013. The Laser Communication Relay Demonstration (LCRD) will build upon the experience gained from LLCD and perform multi-year testing of Free-Space Optical Communications (FSOC) from geosynchronous orbit. Planning for these missions has included identifying candidate ground station locations, quantifying the impacts of the atmosphere on the data links, and developing operational concepts for mitigating transmission losses due to clouds, turbulence, and aerosols.

Since space-to-ground optical communications are adversely affected by the presence of clouds, optical turbulence (OT), and other atmospheric phenomena, it is important to study the effects of the atmosphere on the communications link. This work is leading a campaign to measure and model the atmospheric effects on the link between a ground station on the summit of Haleakala, Hawaii and a satellite in geostationary orbit. This effort involves using a numerical weather prediction model to generate climatologies of OT parameters as well as to characterize the atmosphere along the line-of-sight (LOS). While ground-based instruments can be used to measure the effects of turbulence integrated along the entire LOS, they cannot generally be used to identify the vertical structure of turbulence. In this work, WRF is used to generate a three-dimensional representation of Cn2 and other atmospheric parameters in both the planetary boundary layer and the free atmosphere. This allows for the characterization of Cn2 along the LOS from the ground to 20-km along with estimates of the Fried Coherence length (r0) and other seeing parameters along the LOS.