Seminar Talk

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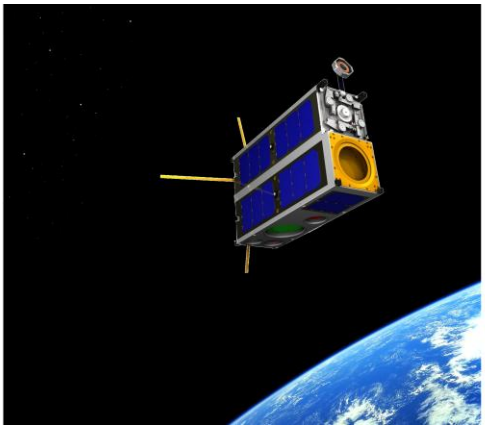
Space Science and Engineering Center
Virginia Tech

Friday, October 09, 2015
3:00 p.m. KH 224

Title: Dynamic Near-Earth Space – A Discussion of the LAICE Cubesat Mission

Abstract:



The Lower Atmosphere-Ionosphere Coupling Experiment (LAICE) is the first 6U CubeSat funded by the NSF's nano-satellite program. Four instruments developed for the LAICE mission are now in their final phases of fabrication and calibration, and will soon be integrated onto the spacecraft. These instruments include a retarding potential analyzer for ion diagnostics, two pressure sensors for simultaneous neutral atmospheric measurements, and a suite of nadir-viewing oxygen photometers. Environmental testing of the integrated LAICE system will commence in 2016, after which the satellite will be delivered to the International Space Station for deployment into a roughly circular orbit at ~400 km altitude. This talk will review some of the science questions in thermospheric & ionospheric dynamics that motivated the LAICE mission, and then describe the instruments aboard the satellite, their capabilities, and their performance as determined through laboratory testing. It will conclude with a synopsis of how the data will be downlinked and handled on the ground using the Wallops Island tracking/receiving station in conjunction with amateur band facilities at Virginia Tech, the University of Illinois, and perhaps ODU.

Bio:

Dr. Gregory D. Earle earned his BS and MS degrees in electrical engineering from Purdue University. He holds a Ph.D. in experimental space plasma physics from Cornell University. From 1988-1996 he was a research scientist in the Laboratory for Atmospheric and Space Sciences at Science Applications International Corporation. He left industry and moved to the Center for Space Sciences at UT Dallas in 1996. In 2011 he left UTD and joined Virginia Tech as a Professor in the Electrical and Computer Engineering Department. At Virginia Tech he is an

active member of the Space@VT research center, which provides a research home for nine full-time faculty members from various engineering disciplines, several post-docs, and over thirty graduate students. Professor Earle has been the principal investigator on nine sounding rocket missions, and a co-investigator on several others. He was a co-investigator on a NASA mission of opportunity called the Coupled Ion Neutral Dynamics Investigation (CINDI). He was the lead scientist for the neutral wind sensors on the CINDI mission, which is part of an Air Force low-Earth orbit satellite mission called C/NOFS. He is currently the PI for an NSF-funded CubeSat mission called LAICE, and has active instrument development grants funded by NASA, Northrop-Grumman, and the USAF. In addition to his research and teaching duties, Professor Earle has served on NASA's sounding rocket working group, the NASA Roadmap committee, and the Platforms Subcommittee for the 2011 Decadal Survey. His research interests include in-situ satellite and rocket instrumentation and systems, ionospheric electrodynamics, plasma irregularities as they pertain to radio propagation, and ion-neutral coupling in the thermosphere. He has published over fifty papers on these subjects in leading science journals, and is a co-author of a book on Advanced HF communication.

Selected Recent Publications:

1. Storm time response of the midlatitude thermosphere: Observations from a network of Fabry-Perot interferometers, J. Geophys. Res. 119, 6758-6773, doi:10.1002/2014JA019832, 2014.
2. A versatile retarding potential analyzer for nano-satellite platforms, Rev. Sci. Instrum, accepted for publication, October 2015.

Recent Invited Talks

1. 2013 International Conference on GPS Radio Occultation, Taipei, Taiwan – Using Cosmic-II Radio Occultation Data to Augment Nano-Satellite Observations of Plasma Structure in LEO.
2. 2015 Conference on Measurement Techniques for Solar and Space Physics, Boulder, CO – Neutral Pressure and Wind Measurement Technologies to Address Thermospheric Science Objectives.