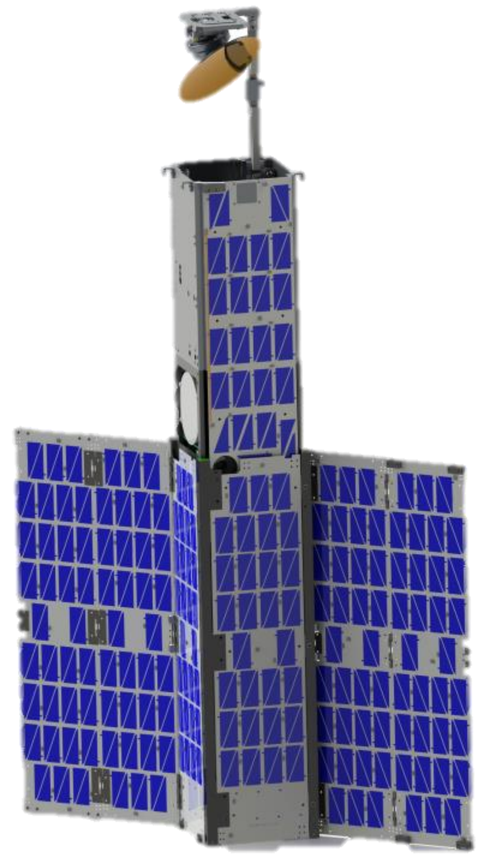
Karlsruhe Institute of Technology

Institute of Radio Frequency Engineering and Electronics

Application of a CubeSat-Based Passive Microwave Constellation to Operational Meteorology

Talk by Prof. Albin J. Gasiewski, University of Colorado at Boulder, Boulder, CO, USA
March 14th, 2:00 p.m., Room 022 (LTI-Hörsaal), Building 30.34

In their most recent decadal assessment (Earth Application from Space, 2007) of Earth science space missions the U.S. National Research Council identified the Precipitation and All-weather Temperature and Humidity (PATH) mission as one of ten recommended medium cost missions. Based on the NRC's outlined goals, PATH would have the unique capability of providing all-weather temperature and moisture soundings and cloud and raincell imagery at spatial scales comparable to AMSU-A/B or ATMS, but at sub-hourly temporal resolution. The essential need is to provide the atmospheric penetrability and spatial resolution of operational microwave sensors but with temporal resolution commensurate with the natural rate of evolution of convectively driven weather. This seminar will focus on the merits of a constellation of passive microwave sounding and imaging CubeSats for achieving PATH goals from the multiple viewpoints of calibration accuracy, data assimilation and global sampling, downlink capability and latency, and orbital lifetime and launch availability. Microwave spectral imagery at 50, 118, and 183 GHz with spatial resolution of ~10-30 km and temporal resolution of ~15-60 minutes from such a fleet could be expected to significantly enhance forecasting of mesoscale convective weather and hurricane rain band evolution, along with provide valuable temporal gap-filling data for synoptic weather forecasting. It is argued that from a joint technology, science, and operational standpoint that a cost-effective realization of the PATH goals, but with the additional features of global coverage and improved NWP sensitivity, can be achieved by a low-cost random-orbit constellation of CubeSats supporting the ATMS and 118 GHz bands. The CU PolarCube mission will be discussed as a basis for this fleet concept.



Dr. Gasiewski is Professor of Electrical and Computer Engineering at the University of Colorado at Boulder and Director of the CU Center for Environmental Technology. He received the Ph.D. degree in electrical engineering and computer science from the Massachusetts Institute of Technology in 1989. Previously, he received the M.S. and B.S. degrees in electrical engineering and the B.S. degree in mathematics from Case Western Reserve University in 1983. From 1997 through 2005 he was at the U.S. National Oceanic and Atmospheric Administration's (NOAA) Environmental Technology Laboratory in Boulder, Colorado, USA, where he was Chief of ETL's Microwave Systems Development Division. From 1989 to 1997 he was a faculty member at the Georgia Institute of Technology. He has developed and taught courses on electromagnetics, remote sensing, instrumentation, and wave propagation theory.

Prof. Gasiewski is a Fellow of the IEEE, and Past President (2004-2005) of the IEEE Geoscience and Remote Sensing Society. He is a member of the American Meteorological Society, the American Geophysical Union, and from 2009-2011 served as Chair of USNC/URSI Commission F. He is a recipient of the 2006 Outstanding Service Award from the GRSS, and author or coauthor of 54 peer reviewed publications and over 400 conference presentations and seminars in the areas of remote sensing and radio science.

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