The Role of Airborne Remote Sensing in the National Ecological Observatory Network (NEON)

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Abstract
The National Ecological Observatory Network (NEON) will be the first observatory of its kind designed to detect and enable forecasting of ecological change at continental scales over multiple decades. NEON will collect data at sites distributed over 20 eco-climatic domains across the United States on the impacts of climate change, land use change, and invasive species on natural resources and biodiversity. The Airborne Observation Platform (AOP) is an aircraft platform carrying remote sensing instrumentation designed to achieve sub-meter to meter scale ground resolution, bridging the scales from individual organisms and stands of vegetation to that of satellite-based remote sensing. Fused airborne spectroscopy and waveform LiDAR will be used to quantify vegetation composition and structure. Panchromatic photography at better than 30 cm resolution will retrieve fine-scale information on land use, roads, impervious surfaces, and built structures. NEON will build three airborne systems to allow for routine coverage of NEON sites and the capacity to respond to investigator requests for specific projects. To reduce risk during NEON construction, NEON is developing an imaging spectrometer Design Verification Unit at the Jet Propulsion Laboratory to demonstrate that operational and performance requirements can be met. As part of this near-term effort, NEON is also focusing on science algorithm development, computing hardware prototyping, and early airborne test flights. Pathfinder Flight Campaigns have been conducted over the last several summers to collect representative AOP data over NEON sites, including the University of Florida Ordway-Swisher Biological Station near Gainesville Florida and the San Joaquin Experimental Range in central California. In this talk, we present an overview of NEON observatory, its mission, and its development status, with a focus on the Airborne Observatory Platform.

Short-bio
Dr. Thomas Kampe is the Product Team Lead responsible for managing the construction, commissioning, and operations of the NEON Airborne Observatory Platform. He earned his B.S. in physics from the University of California, Los Angeles, and his M.S. and Ph.D. in astrophysical, planetary, and atmospheric sciences from the University of Colorado, Boulder. From 1993 to 1996, Dr. Kampe served as the responsible optical engineer for the MODIS instrument while at the Santa Barbara Research Center and then served as Principal Optical Engineer and Staff Consultant at Ball Aerospace & Technologies Corp. in Boulder, Colorado. He led the SIRAS-G NASA Instrument Incubator Project, has authored over 25 technical and scientific papers, and holds several patents on hyperspectral technology. He has been with NEON since 2008. His research interests include sensor development, the use of imaging spectroscopy and LiDAR for terrestrial ecology, and the application of remotely sensed data to atmospheric, climate, and ecosystem studies.