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Scientific "Spy" Plane Photographs UNH/Durham Area From Near Space

David Sims
UNH Institute for the Study of Earth, Oceans and Space

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UNH Media Relations

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Media Contact: David Sims
603-862-5369
Science Writer
Institute for the Study of Earth, Oceans, and Space

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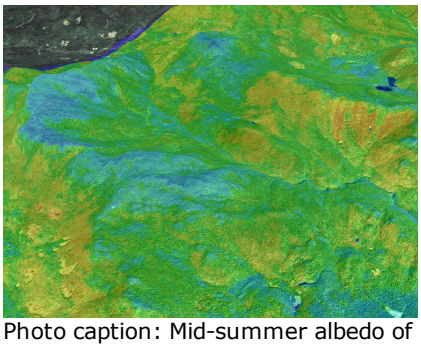

Photo caption: Mid-summer albedo of the Hubbard Brook Experimental Forest in New Hampshire, as seen by NASA's AVIRIS sensor. Yellow, orange, and red colors correspond to areas where trees have high foliar nitrogen levels and reflect more solar energy than their low nitrogen counterparts. The low albedo (blue) band of forest to the left is an upper elevation ridgeline dominated by spruce. Image courtesy of Lucie Plourde, UNH Complex Systems Research Center.

DURHAM, N.H. - Look, up in the sky! It's a bird! It's a plane! It *is* a plane - a modified U-2 spy plane shooting pictures of Durham from 70,000 feet above Earth!

It would have been hard to spot without binoculars and no one would have heard the stealthy aircraft, but a National Aeronautics and Space Administration (NASA) ER-2 scientific plane did indeed recently photograph the Durham/UNH campus area from the edge of outer space with a camera that "sees" in 242 spectral bands of light.

The visible and infrared "hyperspectral" images provide scientists, like UNH associate professor Scott Ollinger of the Institute for the Study of Earth, Oceans, and Space, with the ability to study things like the chemical makeup of tree leaves, which influences the leaves' ability to reflect sunlight back to outer space and thus help regulate global temperatures.

Specifically, Ollinger has been studying the relationship between leaves' nitrogen (a key plant nutrient) content and their reflectivity. Ollinger and colleagues published a study late last year showing that tree leaves with a higher nitrogen content have a two-fold effect on climate by both absorbing more carbon dioxide and reflecting more solar radiation.

The recent Durham overflight by NASA's ER-2 was something of an add-on to work Ollinger has been conducting for years using the Airborne Visible-Infrared Imaging Spectrometer (AVIRIS) onboard the high-flying aircraft. The ER-2 is a modified version of the Air Force U-2 spy plane famous for taking photographs of missiles in Cuba sparking the Cuban Missile Crisis of 1962.

With AVIRIS, Ollinger and colleagues have been mapping large regions of North America gathering data on forest canopy foliar nitrogen content. The effort has largely been aimed at understanding forest productivity vis-à-vis their ability to absorb carbon. Using a wealth of data they had gathered using AVIRIS and other scientific platforms over the years, the scientists discovered the nitrogen-reflectivity connection almost by accident.

The finding will provide scientists with a powerful new way of accurately assessing planetary "albedo" - a measure of how much light an object reflects - for inclusion in climate models. To date, the albedo of plants has not been as accurately characterized as, say, that of the icy Polar Regions; the more accurate model input is, the more precise climate projections can be.

When Ollinger was charting out this summer's flight path for the E-2 to continue his AVIRIS research, it dawned on him that it would be doable and worthwhile to have the plane fly over the Durham-UNH area to obtain the hyperspectral imagery for use on campus.

"We've never had this high-altitude, high-resolution spectral data for our local area and I know from talking to other faculty on campus that there are a lot of research projects and classes where this will be extremely useful," Ollinger says. He adds that undergraduates in particular will benefit from having the imagery since, typically, such high-end data is only available to graduate students and researchers.

The University of New Hampshire, founded in 1866, is a world-class public research university with the feel of a New England liberal arts college. A land, sea and space-grant university, UNH is the state's flagship public institution, enrolling 11,800 undergraduate and 2,400 graduate students.

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Photo available to download:
http://www.unh.edu/news/cj_nr/2009/july/eos.jpg
Photo caption: Mid-summer albedo of the Hubbard Brook Experimental Forest in New Hampshire, as seen by NASA's AVIRIS sensor. Yellow, orange, and red colors correspond to areas where trees have high foliar nitrogen levels and reflect more solar energy than their low nitrogen counterparts. The low albedo (blue) band of forest to the left is an upper elevation ridgeline dominated by spruce. Image courtesy of Lucie Plourde, UNH Complex Systems Research Center.