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NASA Terrestrial Ecology Program Awards More Than $1.5 Million To UNH Researchers

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DURHAM, N.H. -- Scientists from the University of New Hampshire's Institute for the Study of Earth, Oceans, and Space (EOS) have been awarded two grants totaling more than $1.5 million from the National Aeronautics and Space Administration's Terrestrial Ecology Program.

The two three-year projects out of the EOS Complex Systems Research Center (CSRC) involve satellite-based investigations of North American forests and were among only 12 selected by NASA out of a pool of 65 proposals from around the nation. Both projects look at different aspects of how forests, and human use of forests, interact with and influence climate.

Associate professor George Hurtt of the Department of Natural Resources and the Environment and director of CSRC is lead investigator for a $1.04 million project aimed at using satellite "remotely sensed" data to reduce uncertainties in forest ecosystem modeling and, ultimately, improve policies crafted to mitigate climate change.

Associate professor Scott Ollinger, also of CSRC and the Department of Natural Resources and the Environment, leads a team that will investigate the effects of disturbance and nitrogen deposition on aspects of forest productivity and land surface reflectivity or "albedo." The current $549K project is an extension to another NASA-funded study during which Ollinger and colleagues serendipitously discovered that forests might influence the Earth's climate in important ways not previously recognized.

NASA terrestrial ecology research addresses Earth's carbon cycle and ecosystems using space-based observations. The focus is on land-based ecosystems, changes in their structure and functioning, and their roles in supporting human life and maintaining planet Earth's habitability. The program's goal is to improve understanding of the structure and function of global terrestrial ecosystems, their interactions with the atmosphere and hydrosphere, and their role in the cycling of the major biogeochemical elements and water.

Central to Hurtt's project is the Ecosystem Demography Model (ED) he co-developed. ED predicts the carbon dynamics of terrestrial ecosystems by modeling the structure of forests as they change through growth or disturbances such as logging, fire, storm damage, etc.

For the project, ED will be coupled with a socio-economic model in an effort to simulate strategies for mitigating climate change, including strategies that involve biofuels and changes to wood products usage.

Says Hurtt, "One objective of our proposal is to quantify the quality and quantity of remote sensing data on vegetation structure needed to produce more accurate estimates of terrestrial

carbon cycling and, in turn, improve the socio-economic estimates of how we should mitigate climate change. The resulting knowledge will inform the design of future environmental satellites."

Hurtt adds that by combining the two models "we will also be able to explore with greater accuracy and detail the potential for afforestation or bioenergy crop production to help stabilize atmospheric carbon dioxide levels."

In an earlier NASA-funded project, a team of researchers led by Ollinger investigated how nitrogen levels in forests were related to carbon uptake by trees. The research led to the surprise discovery that the nitrogen concentration in tree foliage was very strongly related to albedo.

Notes Ollinger, "Albedo is important to climate because, when sunlight hits surfaces that are highly reflective, a lot of energy gets reflected right back to space and the Earth doesn't heat up as much."

The current project will expand that work by looking at the nitrogen-albedo correlation at smaller scales and finer resolutions, in different vegetation types, and along gradients of nitrogen deposition and forest disturbance across North America. The team will examine the underlying causes for why the relationship exists and work with climate modelers to determine how the nitrogen-albedo mechanism will influence predictions of climate change.

In addition to these projects, Hurtt and Ollinger also work collaboratively on a NASA interdisciplinary science investigation designed to develop an improved, integrated understanding of terrestrial ecosystems and climate change.

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 12,200 undergraduate and 2,200 graduate students.

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