



Goddard and Northrop Grumman Partner to Answer Key Questions in Climate Change and Planetary Science

Answering bold questions about life and climate on Earth and other planets is the goal behind a new Space Act Agreement (SAA) between NASA Goddard Space Flight Center and Northrop Grumman's Electronic Systems sector. Through the agreement, researchers from the two Maryland-based organizations will collaborate on the development of advanced civil radar-system architectures that can be leveraged into new space-based remote sensing instruments with revolutionary performance characteristics. These systems will help scientists measure with far greater accuracy, precision, and detail such things as three-dimensional (3D) characteristics of Mars and other planets, as well as cloud composition and other characteristics on Earth, to better understand climate change.



Benefits of Technology Transfer

- A new class of planetary measurements will enable scientists to better understand the history and habitability of Mars and other planets.
- Remote sensing of environmental change from space will have huge implications for Earth science and our understanding of global warming and the carbon cycle.
- The partnership will enable NASA to conduct more exploration with less of its own investment.
- NASA will benefit from significant expansion of its instrument development programs with new hardware capabilities.
- Northrop Grumman will be able to leverage its mature radar technology developed for Department of Defense applications into a valuable scientific tool that will benefit emerging science needs.

On the Record

“This is a strategic partnership that blends the best of Goddard’s and Northrop Grumman’s advanced sensing capabilities. Our goal is to expand NASA’s instrument technologies, while advancing new and innovative space-based mission concepts capable of making critical science observations in support of NASA goals.” — *Dr. Laurie Lesbin, Goddard’s Deputy Director of Science and Technology*

About Northrop Grumman

Northrop Grumman Corporation is a \$32 billion global defense and technology company whose 120,000 employees provide innovative systems, products, and solutions in information and services, electronics, aerospace and shipbuilding to government and commercial customers worldwide. The company’s Maryland-based Electronics Systems sector will participate in this agreement.

Combining Technology and Expertise

The collaborative agreement brings together the best of Northrop Grumman’s radar technology and Goddard’s scientific expertise. The technology to be used includes Northrop Grumman’s space-qualified electronically scanned arrays, wideband electronics, and lightweight mesh antenna technology. This will be combined with Goddard’s remote sensing expertise, testing facilities, and insight into applications that would help scientists answer key space and Earth science questions. Specific topics that may be more closely studied as a result of this technology include:

- Observing our planetary neighbors to improve our understanding of the evolutionary processes of Earth
- Understanding the climate change that Mars experienced as it relates to the possibility of life on that planet
- Understanding the history of oceans and resurfacing on Venus as a way to understand whether it may have ever been habitable
- Ascertaining the structure of possible oceans on icy moons, such as Jupiter’s Europa
- Characterizing in 3D the global lunar soil cover where resources are located
- Evaluating the Earth’s climate system and how it is evolving
- Understanding the carbon cycle via distribution of above-ground biomass
- More thoroughly understanding Earth’s water cycle
- Monitoring changes in the Earth’s ice cover at the margins of the planet’s largest ice sheets

The current state of the art for remote sensing of planetary and Earth science measurements is large, uses a tremendous amount of power, and is expensive to fly on space missions. By combining the best in space-qualified radar and expertise, researchers at Northrop Grumman and Goddard plan to demonstrate the feasibility of a smaller, lighter, less costly radar system for science and exploration initiatives. In short, such a system would enable scientists to measure what is currently inaccessible. Such observations include aspects of the carbon and water cycles on Earth, the nature of Martian water and ice reservoirs in 3D, and the surface of Venus (and history of its ancient oceans) at never-before-possible scales.

The Transfer Process

Representatives from Northrop Grumman contacted Goddard in 2002 to begin discussions about a potential collaboration. Exploratory meetings were conducted over the following few years. Goddard’s Innovative Partnerships Program (IPP) Office worked as liaison between the technical and legal organizations at Goddard beginning in 2006 in order to draft a more formal cooperation agreement to address shared technology developments and demonstrations.

Looking Ahead

With an agreement in place, researchers have begun their collaborative work. Northrop Grumman is gathering its advanced microwave/millimeter-wave technologies and radar-system architectures for evaluation and testing. Meanwhile, Goddard researchers will test the technology and the planned demonstration radar system. Goddard’s expertise in key technical areas will also be used to further develop Northrop Grumman’s technologies to meet the requirements for space-qualified, advanced remote sensing.

For More Information

If you would like additional information about Goddard’s technology transfer opportunities, please contact:

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