UNH Space Scientists Deliver Twin Instruments To NASA

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DURHAM, N.H. -- The "Critical Care, White Glove Service" Federal Express truck pulled away from Morse Hall at the University of New Hampshire bound for Cape Canaveral, Fla. Inside the big, air-cushioned, climate-controlled truck was a single, small shipping container nestled in a heap of furniture pads and strapped down in a corner of the cavernous space.

There would be no other cargo loaded, no unnecessary stops made, no bumpy roads traveled as the truck headed at a measured pace down to the Kennedy Space Center some 1,400 miles away. But the delicate cargo's ultimate destination is just a bit further – 65 million miles from Earth.

The truck was carrying one of two identical instruments designed and built at UNH's Institute for the Study of Earth, Oceans, and Space (EOS) for NASA's Solar TErrestrial RElations Observatory, or STEREO, mission. Over the last six years and after nearly $10 million in NASA funding, UNH scientists, engineers, technicians, machinists, and graduate and undergraduate students have built and tested Flight Models 1 & 2 of the Plasma and SupraThermal Ion Composition (PLASTIC) investigation onboard the twin STEREO spacecraft, which are slated for launch in late July. UNH's total NASA contract for the STEREO mission is $13.2 million, which includes post-launch activities and data analysis.

Earlier in May, the STEREO spacecraft, with the UNH instruments onboard, underwent a series of rigorous space environment vacuum-chamber tests at the NASA Goddard Space Flight Center and the Johns Hopkins University Applied Physics Laboratory. The twin spacecraft were subjected to intense vibration and noise to mimic the stress of launch and extreme hot and cold in vacuum to simulate deep space conditions.

The two flight models (affectionately dubbed "Thing 1" and "Thing 2" courtesy of Dr. Seuss's Cat in the Hat story) came back to Morse Hall, home of EOS, for final fixes, tweaks, and testing at the 11th hour in the mission's pre-launch schedule. It then became a race against the clock to get the PLASTIC instruments on the truck to Cape Canaveral, where they will be integrated back onto the observatories and run through more tests before being loaded onto a Delta II rocket.

After launch, the two spacecraft will orbit the Earth for a couple of months before using the Moon's gravity as a slingshot to hurtle them into separate orbits around the Sun – one flying well ahead of the Earth and one behind. At the end of the two-year mission, 130 million miles will separate the two spacecraft.

STEREO will, for the first time, unveil the Sun in three dimensions. Its objective is to address the origin, evolution and interplanetary consequences of one the most massive disturbances

in our solar system – coronal mass ejections, or CMEs for short. CMEs are a major source of the magnetic disruptions on Earth and a key component of space weather, which can greatly affect satellite operations, communications, power systems, the lives of humans in space, and global climate.

Among three other science investigations onboard, the PLASTIC instruments will make measurements of the "solar wind" as it passes by the two spacecraft. The solar wind, of which CMEs are just one aspect, is a continuous but highly variable stream of charged particles that flow at millions of miles per hour through space. The wind originates from different regions of the Sun, and its sources and evolution are not completely understood. By combining the PLASTIC observations with those from other STEREO investigations, in particular remote images of the Sun, STEREO will obtain the full global picture of the Sun and its extended atmosphere – from the solar surface out to the orbit of the Earth.

UNH has been the lead institution for PLASTIC, with research associate professor Dr. Antoinette Galvin serving as the principle scientist. Collaborators include the University of Bern in Switzerland, and Germany's Max Planck Institute for Extraterrestrial Physics and the University of Kiel, and NASA Goddard Space Flight Center.

Galvin notes that over the six years, more than 50 faculty, staff, and students at EOS, along with dozens of European and NASA collaborators, have directly participated in some aspect of creating the PLASTIC instruments.

"We all share in the feeling of accomplishment with the final delivery of our flight instruments to Cape Canaveral. But the story of PLASTIC is just beginning," Galvin says. "With a successful launch and commissioning, the STEREO mission will be used by scientists worldwide to help us better understand the relationship between our nearest star, the Sun, and our planet Earth."

Notes Berrien Moore III, director of EOS, "The UNH STEREO-PLASTIC team led by Dr. Toni Galvin demonstrates the remarkable potential for scientific discovery when faculty, staff and students pool their talents towards a common goal. I am immensely proud that EOS fosters this tradition and enthusiastically applaud their success on this mission."

Editors: A photo is available to download here:
http://www.unh.edu/news/img/eos/stereo_johnstan.jpg

Caption: UNH Space Science Center engineers John Gaidos, left, and Stan Ellis benchtest PLASTIC Flight Model No. 1.