

Space scientists to build sensor for next-generation weather satellites

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With an award in excess of \$10 million, scientists from the University of New Hampshire's Space Science Center have been selected to build an instrument for the National Oceanic and Atmospheric Administration's (NOAA) third-generation weather satellites under the Geostationary Operational Environmental Satellite (GOES-R) Program. The principal parties involved in the mission will hold their first operational meeting next week.

UNH scientists and engineers will design and build the Energetic Heavy Ion Sensor, or EHIS, for the Space Environment In-Situ Suite (SEISS), which will monitor potentially dangerous energetic atomic nuclei and electrons as they hurtle through space near Earth.

As part of the suite, the UNH-built instrument will measure particles with the highest energy ranges – particles that can pose great risk to satellites, astronauts, and transpolar aircraft crews. Large increases in the energetic particle flux often precede the arrival of magnetic storms generated by solar activity, and these storms can damage ground-based electronics and power systems.

The UNH contract comes in the wake of the award by the National Aeronautic and Space Administration (NASA), working in coordination with the NOAA GOES-R program, of a \$101.7 million contract to Assurance Technologies Corporation (ATC) of Chelmsford, Mass. for development of the SEISS. Next week's operational meeting will be held at ATC.

NOAA funds, operates, and manages the GOES program. NASA's Goddard Space Flight Center oversees the acquisition of GOES-R instruments and manages the instrument design, building, and integration for NOAA. GOES satellites have been operating for over 30 years. The weather pictures seen on television are generally from GOES satellites.

While some 80 percent of the instrumentation aboard the GOES-R satellites will be dedicated to tracking Earth-based weather, the space environment suite of which the EHIS is a part will point upward towards space to monitor one of the components of "space weather" – the constant stream of energetic particles in space that is sometimes greatly enhanced by activity on the Sun.

Research Associate Professor Clifford Lopate of the UNH Institute for the Study of Earth, Oceans, and Space (EOS) and Department of Physics is the lead scientist for the EHIS instrument.

Says Lopate, "Space weather is now considered a part of weather. It's known that the effects of these large solar storms can generate charging effects that can impact satellites and, when they hit Earth, generators on the ground." He adds, "The technology that's up on the GOES satellites today is now fairly old. After some 30 years our understanding of what's happening out in space has changed, so our needs for measurements have changed."

The in-situ measurements made by EHIS and the other instruments in the space environment suite will help refine computer models currently used to predict space weather events. Explains Lopate, "By accurately measuring the flux of as many different charges and masses of space-based ions as possible you can put more constraints on the models and make them more accurate with respect to forecasting."

Notes EOS director Berrien Moore III, "GOES-R is an operational

satellite on which the nation depends for space weather forecasting. To know that instruments built here at the Space Science Center will be onboard satellites launched years from now is exciting. In addition, we believe that involving our students with cutting-edge technologies and science is central to their education at UNH."

The Energetic Heavy Ion Sensor incorporates a unique design, developed by Lopate's UNH colleague, astrophysicist James Connell, called the Angle Detecting Inclined Sensor system, or ADIS. The sensor is a very simple and conservative approach in terms of the technology and replaces heavier, more complex detectors. ADIS is therefore very reliable, and this is precisely what's needed for an operational mission like GOES-R, which will launch a series of satellites in the years ahead.

"The GOES mission provides a long-term research effort that complements the studies within the Space Science Center on solar and galactic cosmic rays," says center director Roy Torbert. Referring to Lopate, Connell, and their colleague Bruce McKibben, all of whom came to UNH from the University of Chicago where they worked with famed astrophysicist John Simpson, Torbert adds, "They are world experts in these areas and look forward to working with a new generation of students on these exciting topics."

Says Joseph Klewicki, dean of the College of Engineering and Physical Sciences at UNH, "Obtaining the GOES award will serve to maintain and strengthen UNH's leadership position in satellite-based sensing technologies and further our understanding of space weather physics. It is anticipated that this project will have a strong and positive influence on the associated scholarly activities for both faculty and students."

The first launch of the GOES-R series satellite is scheduled for 2012.

Source: University of New Hampshire

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