

**Sandy Supplemental Grant Recipient Quarterly Progress Report**

**Network of Direct Broadcast Antenna Systems to Provide Real-Time  
Infrared and Microwave Sounder Data to NOAA for Numerical  
Weather Prediction**

**Award Number: NA13NES4830007**

The National Oceanic and Atmospheric Administration  
National Environmental Satellite Data and Information Service  
Center for SaTellite Applications and Research (STAR)

For the Period  
1 July 2014 – 30 September 2014

On behalf of  
The Cooperative Institute for Meteorological Satellite Studies (CIMSS)  
Space Science and Engineering Center (SSEC)  
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# **Sandy Supplemental Grant Recipient Quarterly Progress Report Network of Direct Broadcast Antenna Systems to Provide Real-Time Infrared and Microwave Sounder Data to NOAA for Numerical Weather Prediction**

## **I. Introduction**

### **Cooperative Institute Description**

The Cooperative Institute for Meteorological Satellite Studies (CIMSS) is a collaborative relationship between the National Oceanic and Atmospheric Administration (NOAA) and the University of Wisconsin-Madison (UW-Madison). This partnership has and continues to provide outstanding benefits to the atmospheric science community and to the nation through improved use of remote sensing measurements for weather forecasting, climate analysis and monitoring environmental conditions. Under the auspices of CIMSS, scientists from NOAA/NESDIS and the UW-Madison Space Science and Engineering Center (SSEC) have a formal basis for ongoing collaborative research efforts. CIMSS scientists work closely with the NOAA/NESDIS Advanced Satellite Product Branch (ASPB) stationed at the UW-Madison campus. This collaboration includes a scientist from the National Climate Data Center (NCDC), who joined the NOAA NESDIS employees stationed at CIMSS.

CIMSS conducts a broad array of research and education activities, many of which are projects funded through this Cooperative Agreement with NOAA. This Cooperative Agreement identifies four CIMSS themes:

1. Satellite Meteorology Research and Applications, to support weather analysis and forecasting through participation in NESDIS product assurance and risk reduction programs and the associated transitioning of research progress into NOAA operations,
2. Satellite Sensors and Techniques, to conduct instrument trade studies and sensor performance analysis supporting NOAA's future satellite needs as well as assisting in the long term calibration and validation of remote sensing data and derived products,
3. Environmental Models and Data Assimilation, to work with the Joint Center for Satellite Data Assimilation (JCSDA) on improving satellite data assimilation techniques in operational weather forecast models, and
4. Outreach and Education, to engage the workforce of the future in understanding and using environmental satellite observations for the benefit of an informed society.

### **CI Management and Organizational Structure**

CIMSS resides as an integral part of the Space Science and Engineering Center (SSEC). CIMSS is led by its Director, Dr. Steven Ackerman, who is also a faculty member within the UW-Madison Department of Atmospheric and Oceanic Sciences. Executive Director – Science Wayne Feltz provides day-to-day oversight of the CIMSS staff, science programs, and facilities. The education and outreach activities at CIMSS are coordinated

by Senior Outreach Specialist Margaret Mooney. The individual science projects are led by University Principal Investigators (PIs) in conjunction with a strong and diverse support staff who provide additional expertise to the research programs. CIMSS is advised by a Board of Directors and a Science Advisory Council.

The CIMSS administrative home is within the Space Science and Engineering Center (SSEC), a research and development center within the UW–Madison’s Office of the Vice Chancellor of Research. The independent CIMSS 5-year review panel for administration wrote that they were “...impressed by the people, systems and processes in place.” The SSEC mission focuses on geophysical research and technology to enhance understanding of the Earth, other planets in the Solar System, and the cosmos. To conduct its science mission on the UW-Madison campus, SSEC has developed a strong administrative and programmatic infrastructure. This infrastructure serves all SSEC/CIMSS staff.

The CIMSS mission includes three goals:

- Foster collaborative research among NOAA, NASA, and the University in those aspects of atmospheric and earth system science that exploit the use of satellite technology;
- Serve as a center at which scientists and engineers working on problems of mutual interest can focus on satellite-related research in atmospheric and earth system science;
- Stimulate the training of scientists and engineers in the disciplines involved in atmospheric and earth sciences.

### **Executive Summary of CI Banner Research Activities**

CIMSS is a collaboration between NOAA and UW–Madison that has increased the effectiveness of research and the quality of education in the environmental sciences. In a *Space Policy* article in 1986, William Bishop, former acting Director of NESDIS, noted, “Remote sensing from space can only thrive as a series of partnerships.” He used CIMSS as a positive working example of the government-academia partnership, noting “The Institute pioneered the computation of wind speeds at cloud heights by tracking cloud features from image to image. These are now a stable product provided from the satellites to the global models at the National Meteorological Center.” CIMSS continues to be a leader in the measurement of winds from satellite observations and leads the way in many other research endeavors as outlined above. There is great value to NOAA and UW-Madison in this long-term collaboration known as CIMSS.

## **II. Funded Project**

**Award Number: NA13NES4830007**

**Project Title: Network of Direct Broadcast Antenna Systems to Provide Real-Time Infrared and Microwave Sounder Data to NOAA for Numerical Weather Prediction**

**PI: Liam Gumley**

**PM: Kathy Strabala**

**NOAA Sponsor: Mitch Goldberg, NOAA/NESDIS**

**NOAA Collaborator: Timothy J. Schmit, NOAA/NESDIS/STAR**

**NOAA Sponsoring Organization: NOAA NESDIS**

**Reporting Period: 1 July 2014 – 30 September 2014**

**Description of Task I Activities**

Primarily activity involves quarter reporting.

**NOAA Strategic Goal(s)**

**NOAA Mission Goals**

1. Climate Adaptation and Mitigation: An informed society anticipating and responding to climate and its impacts
2. Weather-Ready Nation: Society is prepared for and responds to weather-related events

**NOAA Strategic Plan-Mission Goals**

1. Serve society's needs for weather and water
2. Understand climate variability and change to enhance society's ability to plan and respond
3. Provide critical support for the NOAA mission

**Research Progress**

The Space Science and Engineering Center at the University of Wisconsin-Madison proposes to operate a network of direct broadcast satellite data reception stations to acquire and process infrared and microwave sounder data from polar orbiting meteorological satellites and deliver the resulting products to NOAA with low latency for assimilation in NCEP numerical weather prediction models.

**General Direct Broadcast Antenna Progress**

1. A new server for monitoring the external DB network servers was installed and configured at SSEC.
2. SSEC supplied Global Imaging with the information they needed to start sending CrIS, ATMS, IASI, AMSU, MHS, and HIRS data from the new antenna in Monterey. Data is now being sent to SSEC routinely from Monterey and processed to Level 1B and BUFR.

3. SSEC initiated a discussion with Dennis Keyser at NCEP about ingest of the BUFR product files.
4. The DB network processing system continues to create real-time Level 1B products with an average latency of 15 minutes, relative to the start of each DB overpass.

### **NOAA/Atlantic Oceanographic and Meteorological Laboratory (AOML), Miami FL**

NOAA/Atlantic Oceanographic and Meteorological Laboratory  
4301 Rickenbacker Causeway  
Miami, FL 33149

Latitude: 25.734 N  
Longitude: 80.162 W  
Elevation in Feet: 4 m  
Elevation Mask: TBD (depending on installation site)

1. SSEC now had a contract in place with a cement contractor for the rooftop work at AOML (Certified Contracting Group) in July 2014. The contractor made a visit to the AOML installation site.
2. SSEC worked with AOML to go over IT security requirements and the deployment plan for the two servers to be installed at AOML in the Orbital rack.
3. Responsibility for AOML installation logistics at SSEC was transitioned from Will Robus to Mark Werner.
4. Mark Werner worked multiple issues with Miami roofing contractor (Certified Construction) and electrical contractor (Stryker Electric), including cable run lengths, electrical specifications, crane scheduling, and installation logistics during August.
5. Rooftop work at AOML began on Aug. 25 with concrete poured on Sept. 5.
6. SSEC has worked out all IT security concerns with the IT director at AOML. The EOS-FES server will be able to get TLE files from Orbital. SSEC is able to ssh to the processing box, and then ssh to the FES. The processing box will be able to send data out via HTTP. Worked on getting all the IP address information from AOML in September 2014.
7. Infrastructure for remote data notification and ingest was redesigned.
8. Rooftop construction at AOML Miami was completed by Certified Contracting in the first week of September.
9. Electrical work at AOML Miami was completed by Stryker Electric in the second week of September.
10. The 2.4-meter antenna, pedestal, radome, and equipment rack was installed at AOML Miami by Orbital Systems on September 15-17.
11. The processing computer was installed at AOML Miami by SSEC on September 15-
12. Multiple networking issues at AOML Miami were solved by collaborative efforts involving AOML, SSEC, and Orbital Systems.
13. AOML Miami antenna is routinely acquiring data from Suomi NPP, NOAA-15/18/19, Metop-A/B, Terra, Aqua, and GCOM-W1.

## **Upcoming events**

October 2014: Training AOML staff on antenna operation

### **UPR-Mayaguez, Puerto Rico**

Latitude: 18.201 N

Longitude 67.143 W

Elevation: 12 m

Elevation Mask: TBD

1. Site visit to Puerto Rico was conducted the week of June 16. Liam Gumley, Will Robus, Jordan Gerth, and Mitch Goldberg were in attendance. Sites visited included the NWS Forecast Office in San Juan and the University of Puerto Rico - Mayaguez. Potential antenna sites were scouted at both locations, however the UPR-Mayaguez emerged as the preferred site because (a) a suitable rooftop site already exists (housing a non-operational Radarsat antenna), and (b) sufficient Internet bandwidth is available from UPR to SSEC (for sending sounder raw data). A dialog with the antenna vendor about an installation at UPR has commenced. The next step is to obtain engineering drawings from UPR showing the roof mounting hardware for the old Radarsat antenna.
2. Procurement and installation logistics for Puerto Rico antenna installation are in development.

## **Upcoming events**

1. SSEC is developing a network security plan for the servers to be deployed at each antenna site.
2. The Puerto Rico system install will be easier since UPR already has an existing rooftop structure with an old antenna that will be removed. The engineering work may be as simple as fabricating a new adapter plate. So it is a possible that we could get the system up and running by the end of this year. The UPR system will be installed and operational by the end of the first quarter in 2015. All installation work for Miami and Puerto Rico will be complete by June 2015 with significant margin.