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 April 2015 – 30 June 2015

On behalf of
The Cooperative Institute for Meteorological Satellite Studies (CIMSS)
Space Science and Engineering Center (SSEC)
at the University of Wisconsin-Madison
1225 West Dayton Street
Madison, Wisconsin 53706
608/262-0544

Liam Gumley
Principal Investigator
Liam.Gumley@ssec.wisc.edu

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

Table of Contents

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 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 Graduate School. 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 administrative home is within the Space Science and Engineering Center (SSEC), a research and development center within the UW–Madison's Graduate School. 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 April 2015 – 30 June 2015

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.

Improvements in Direct Broadcast Ingest and Processing

1. SSEC team identified issues in the NOAA and Aqua data Level 0 data ingested from NWS in Monterey and worked with Global Imaging to test a solution. These issues are now resolved.

2. SSEC team added automated monitoring tools to all ingest and compute servers used at DB sites to monitor uptime, disk space, and processing problems.

3. SSEC team installed and tested the DB processing system on the compute server destined for installation in Puerto Rico.

4. SSEC enhanced the DB processing stack to include NUCAPS retrieval processing, VIIRS ocean color processing, and AVHRR image processing.

5. - The NESDIS BUFR conversion software was installed and tested at SSEC by NESDIS staff.

6. - SSEC staff installed the NESDIS BUFR conversion software in the DB processing stream for ATMS.

7. - SSEC, NESDIS, and NCEP staff worked in close coordination to resolve a time offset in the DB vs. global ATMS BUFR files. A leap second update at the start of the DB processing chain was identified as the culprit and was resolved.

8. - SSEC staff installed the IASI 616-channel BUFR conversion software supporting variable length granules in DB processing stream.

9. - SSEC staff will continue to work with NESDIS and NCEP staff to ensure that DB BUFR files are identical in format to the global BUFR files already ingested by NCEP.

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. DBRTN is now ingesting data from SNPP, Metop, NOAA, and Aqua sounders from the new antenna at AOML Miami

UPR-Mayaguez, Puerto Rico

Latitude: 18.201 N
Longitude 67.143 W
Elevation: 12 m
Elevation Mask: TBD

1. Antenna equipment rack and data processing server have been integrated and tested at Orbital Systems.
2. Antenna system has been packed for shipment to PR.
3. Contractor proposal has been has been accepted for local installation work in Mayaguez PR.
4. Fabrication of the adapter plate for the new antenna mount is coordinated with UW-Physical Sciences Laboratory.
5. Installation has been coordinated for early September.
6. Weekly status telecons are being held with all the parties involved.
7. All funding has been committed/invoiced for project completion