Welcome from SSEC

Hank Revercomb, SSEC Director

University of Wisconsin - Madison
Space Science and Engineering Center (SSEC)

McIDAS Users Group (MUG) Meeting
South Union, 8 July 2015
Mission: To conduct atmospheric, oceanic, environmental, and astronomical research using space or space-age techniques to discover and apply the physical properties of our universe for the benefit of humanity
From Idea, to Concept, to Implementation, to Information about the world

Symbiotic relationship with Department of Atmospheric & Oceanic Sciences symbolized by shared building provided by NSF, NASA, & the State
SSEC works to maintain the spirit of exploration of its founder, Verner E. Suomi (1915-1995)

1959: 1st Meteorological Satellite Experiment

Earth Radiation Balance Observations on Explorer VII

1966: 1st Earth Imaging from GEO

Spin-scan Camera on 1st Advanced Technology Satellite

1980: 1st Infrared Sounder from GEO

VISSR Atmospheric Sounder on GOES-4

“Father of Satellite Meteorology”
McIDAS
(Man-computer Interactive Data Access System)

- Initially developed to derive winds from cloud tracking; inspiration for earliest digital TV weather forecasts
- McIDAS going strong at over 40 100’s of National and International users, including international weather services, aviation weather providers, researchers, NOAA Storm Prediction Center…
- New McIDAS-V version 1.0 for dealing with newer IR hyperspectral data and distributed data/computer resources has become heavily used
Weather Satellite renamed “Suomi NPP”

On 25 January 2012 NASA & NOAA renamed their newest Earth-observing satellite after UW-Madison space pioneer.
Weather Satellite renamed “Suomi NPP”

On 25 January 2012, NASA & NOAA renamed their newest Earth-observing satellite after UW-Madison space pioneer And SSEC provided the 1st Light Products for the 2 Main Instruments! & Phase A CrIS Sounder Design in 1991
Nature of the Organization (1)

Space Science & Engineering Center

- **Matrix Organization**: PIs are the Cornerstone (~30)
- **Staff / Budget**: 250-300 staff members
- **A diverse Center**: support distributed among agencies, including NASA, NOAA, NSF, DoD, DoE
- **Director is a scientist supported by 3 Executive Directors**
  - Executive Director for Administration: **Jenny Hackel**
    With part time support from John Roberts, recently retired as Executive Director since 2000, and SSEC Administration since 1975
  - Executive Director for Science: **Wayne Feltz**
    Also an active project leader and CIMSS Executive Director
  - Executive Director for Technology: **Fred Best**
    Also an active project leader and supported by Associate Director Mark Mulligan
SSEC includes a major institute & long-term projects

Cooperative Institute for Meteorological Satellite Studies (CIMSS): SSEC includes a cooperative institute with NOAA and NASA established 1980, Professor Steve Ackerman, Director (Verner Suomi, founder)

Antarctic Meteorological Research Center (AMRC): Providing Automated Weather Stations since 1980, Matthew Lazzara, Director (Professor Charles Stearns, founder)

US Ice Drilling Design & Operations (IDDO): Providing NSF-sponsored researchers with ice coring & drilling capabilities in polar and high-altitude sites; Kristina Slawny, Director; Mark Mulligan, PI (Professor Charles Bentley, founder)

Office of Space Science Education (OSSE): K-12 programs, public outreach, internships; Rosalyn Pertzborn, Director (Dr. Sanjay Limaye, founder)
Cooperative Institute for Meteorological Satellite Studies (CIMSS)
SSEC/CIMSS
Legacy for over 90% of current GOES Operational Products
Forecaster Training for the GOES-R Fog/low stratus (FLS) Products

Mike Pavolonis
(NOAA/NESDIS)

Corey Calvert
(UW-CIMSS)

University of Wisconsin Convective Initiation (UWCI) and Cloud-Top Cooling (UW-CTC)

Developed by
Justin Sieglaff, Lee Cronce, Wayne Feltz
CIMSS UW-MADISON, MADISON, WI

Kris Bedka
SSAI, HAMPTON VA

Mike Pavolonis and Andy Heidinger
NOAA/STAR/ASPT MADISON, WI

Virtual Institute for Satellite Integration Training (VISIT)

Training modules (17 total) for National Weather Service forecasters
Training focus increased to include GOES-R products developed at CIMSS

36 live teletrainings & 10 ‘Satellite Chats’

Scott Lindstrom, Scott Bachmeier

Improving the utility of GOES products in operational forecasting
SSEC areas of technical expertise

- **Observational Science** (spacecraft system/mission design, instrumentation, field programs, spaceflight instrument fabrication, including CAMPUS SCIENCE SUPPORT to PHYSICS, ASTRONOMY, BOTANY, GEOLOGY)

- **Computational & Visualization Science**
  (hardware & software systems for information generation, data management, & communication)

- **Analytical Science & Applications**
  (satellite & conventional data analysis, technical development & analysis)
GOES-R Launch early 2016

1st of the New Geostationary Environmental Satellite Series
GOES-R Real-time Proxy

- Distribution of real-time proxy ABI radiances, RGB imagery, and Product retrievals for Proving Ground demonstration, ground system testing product validation, and testing for AWIPS II

Validation of proxy Air Mass RGB imagery for Hurricane Sandy (Greenwald et al. 2014)

Real-time GFS/CRTM full disk proxy data

Pierce, Greenwald, Schaack, Bah, Rogal, Lenzen, Otkin,
GOES-15: “1-min” imagery of Igor

Visible data from the NOAA Science Test, lead by Hillger and Schmit
The June 13, 2013 Derecho: 1-minute GOES-14

Tim Schmit, Mat Gunshor, Justin Sieglaff, Scott Bauchmeier, Scott Lindstrom, Chad Gravelle, and Kaba Bah
Atmospheric Motion Vectors (Winds)
From special GOES-14 super-rapid-scan observing period during *Hurricane Sandy*


26 Oct, 2012

**ABOVE:** High-resolution AMVs from 5-min image intervals derived using current processing methods
Himawari-8 enters GEO orbit
Carrying AHI, a close cousin to GOES-R ABI

- **Himawari**, meaning sunflower, is the next-generation Geostationary Met. Satellite of the Japan Meteorological Agency (JMA)
- **Operations to start in mid-2015** after completion of in-orbit testing and checking of overall system
- AHI will provide real data for testing GOES-R algorithms
NOAA/CIMSS ProbSevere Model

**Impressive now—will be even better with GOES-R**

\[ P(\text{severe}) = f(\text{GOES}, \text{NWP}, \text{RADAR}) \]

- Demonstrated at 2014 Hazardous Weather Testbed and NWS MKX
- 98% of forecasters would use it if available at their WFO (need AWIPS 2)
- 78% of forecasters found increased confidence in warning decision-making
- 47% of forecasters found increased lead-time to severe hazards—
  roughly doubles median lead time, adding an extra 10 minutes

Mike Pavolonis, John Cintineo, Justin Sieglaff
University of Wisconsin–Madison
Federal Research Highlights and Impacts 2014

National Aeronautics and Space Administration (NASA)

UW–Madison received $16.3 million in federal research awards from the National Aeronautics and Space Administration (2012).

- **Measuring our atmosphere**: The UW–Madison Space Science and Engineering Center (SSEC) provides new technologies to achieve an irrefutable benchmark measurement of the current state of the earth’s climate using spaceborne observations of emitted radiation.

- **Studying our universe**: SSEC studies outer planets in our solar system to characterize the nature of their atmospheric circulations, dynamics, and clouds. This highly successful comparative planetology effort combines data from a wide array of sources (Hubble Space Telescope, planetary space-flight missions, and ground-based telescopes) with specialized tools to pry a wealth of information from what are often very small signals.

National Oceanic and Atmospheric Administration (NOAA)

- **Improving weather forecasting**: The Cooperative Institute for Meteorological Satellite Studies, or CIMSS, provides critical information to the atmospheric science community and to the nation through improved use of remote-sensing measurements for weather forecasting, climate analysis, and monitoring of environmental conditions. CIMSS and SSEC scientists have developed numerous satellite data analysis algorithms that are used operationally by agencies such as the National Weather Service (NWS).
Lake-side running, walking, biking trails

Lake Mendaota
Memorial Union
Signature Spot on Campus

capitol
State Street

Campus to Capitol
Brats, Beer, and Dairy
Staying longer

Saturday Morning Farmer’s Market