

Highlights of the 6th GOES Users' Conference

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The 6th Geostationary Operational Environmental Satellite (GOES) Users' Conference (GUC-6) was held in Madison, Wisconsin, November 3-5, 2009. There were over 260 participants, from Government, private industry, academia, and the international community, including representatives from EUMETSAT, the WMO, China, Japan, Korea, India, Brazil and Canada. The conference consisted of oral presentations, poster sessions, panel discussions, a town hall meeting, and breakout sessions, giving an overview of the current, near-term and future GOES systems.

In the opening session on Tuesday, Nov. 3, the GOES-R System Program Director, Greg Mandt, welcomed and thanked the participants for joining the GOES-R team in GUC-6 to ensure that the user communities will continue to reap the benefits from the current GOES and will be ready for the transition to the GOES-R Series. Mr. Mandt reminded the audience that past GUC recommendations have had a significant impact on shaping the plans for the GOES-R instruments, spacecraft, and ground system. However, he said we still face the important task of ensuring user readiness for the tremendous improvements in observational capability in the GOES-R era.

Don Berchoff, Director of the NWS Office of Science and Technology, presented the keynote address, titled: "Leveraging GOES Capabilities to Maximize Response to User Needs." He started with a review of the progress made in improving the capabilities of GOES from the launch of GOES-1 in 1975 to the present. GOES observations are a critical part of NWS operations, providing essential information on hurricanes, severe convective storms, flash flood potential, climate variability, space weather and input to numerical weather prediction. He noted the exciting possibilities for GOES-R include: greater high impact event warning lead times to reduce loss of life and property; contribution to storm scale modeling and forecasts, critical to enhancing people's lives and the nation's economy; and improved solar/space monitoring and forecasts to mitigate impacts to vital national infrastructure assets. In order to fully realize the potential benefits of GOES-R, we have many challenges to overcome, including dealing with an explosion in data volume. As the data volume is going up, the time to digest the information and make critical decisions is going down. Thus, the demand for decision support tools is increasing. Another challenge is to overcome observational "stovepipes" (separate streams of data??) and to integrate development efforts based on the unique strengths inherent to each observing system. He outlined the strategic goal as taking observations from a variety of sources and combining all observations into a single merged source, the "weather cube," whether the data be from radiosondes, polar orbiting satellites, geostationary satellites, radar, or Numerical Weather Prediction. Mr. Berchoff summarized by saying that GOES has proven its operational value, and GOES-R will provide exciting new capabilities. He closed by challenging the group to translate these improved observations into societal benefits by building enabling technologies and architectures and by forging strong partnerships.

Session 2 focused on the current GOES constellation and the GOES-13/14/P series, including launch schedules, and an overview of user services and benefits. This included that GOES-14 was then in post-launch testing. A lunch panel followed, covering the status and plans for geostationary and High Earth Orbiting Satellites (HEO) in the international communities.

Session 3 covered the GOES-R Program Status including the development schedule and status for the spacecraft. Current plans are for a late 2015 GOES-R launch, to be operational in early 2017. Additional topics included the benefits and development status of the Advanced Baseline Imager (ABI) and the Geostationary Lightning Mapper (GLM).

Session 4 focused on the GOES-R Ground Segment architecture, and planned GOES-R products and algorithms. Additional topics included the High Rate Information Transmission (HRIT), Emergency Managers Weather Information Network (EMWIN), and the benefits of solar and space environment data products.

The evening session on Tuesday, showcased more than 80 posters on topics including hazards, user readiness, user education, hydrology, atmospheric applications, ocean applications, land applications, solar and space observation, instruments, data processing and distribution, and climate applications.

Session 5, on Wednesday morning, focused on GOES-R User readiness with presentations on the GOES-R Proving Ground activities, user education and training, direct readout systems, and CLASS.

The luncheon town hall meeting provided the opportunity for lively discussion on “The Need for an Advanced Sounder on GOES”. This is a topic that sparked considerable interest in the NWA. In August 2006, the NWA president with the endorsement of the NWA Council sent a letter of advocacy to its members and to NOAA for the inclusion of an advanced sounder on the GOES-R series. (Letter can be found at: http://www.nwas.org/committees/rs/HES_Letter_of_Support.pdf)

The luncheon panel consisted of five members broadly representing the potential advanced sounder user community, along with an introduction and summary given by Abby Harper, the NOAA/NESDIS Deputy Assistant Administrator for Systems. Tim Schmit, NOAA/NESDIS, served as the session moderator.

Dr. Hank Revercomb, Director of UW/SSEC provided an overview of hyperspectral sounding opportunities. He showed how the advanced GEO sounder concept represents a dramatic new capability to provide longer lead times for severe weather. He pointed out that one of the National Research Council’s (NRC) Decadal Survey recommendations was that NOAA/ NASA should “Develop a strategy to restore the previously planned capability to make high-temporal- and high-vertical-resolution measurements of temperature and water vapor from geosynchronous orbit”, and called this the “forgotten” recommendation. Dr. Revercomb strongly suggested that plans for a NOAA/ NASA advanced geostationary sounder need a fresh look.

The NWP perspectives were covered by Robert Aune, NOAA/NESDIS’ Center for Satellite Applications and Research . He suggested that advanced GEO sounder data would be useful for both ‘nearcasting’

and short-term forecasting. Nearcasting severe weather up to 6 hours in advance fills the gap between nowcasting observations and regular numerical weather prediction. The improved vertical resolution offered by the advanced sounder would be the key contributing factor to the data. Aune also noted previous Observing System Simulation Experiments (OSSE) that suggested both high-spectral and high-temporal resolution data are needed for regional scale models. This is supported by more recent results (QJRMS, Oct, 2009) that show the top three observing systems that contribute to ECMWF forecast error reduction are: (1) AMSU-A (4 satellites) [17.2%], (2) IASI (one satellite) [12.0%] and (3) AIRS (one satellite) [11.8%]. Finally, Aune noted that a geostationary hyper-spectral sounder located upstream of North America will provide a significant improvement in mesoscale models 24-48 hour forecast accuracy for the U.S.

NWS forecasting perspectives were given by Jeff Craven, SOO, NWS/MKE. Craven was a strong advocate, and noted that a GEO sounder could help to “Warn on Forecast” by providing a better analysis and prediction of convective initiation, which could also be used as input to high resolution NWP models. An advanced GEO sounder would also help populate the planned NextGEN – 4D data Cube.

Hurricane forecasting perspectives were covered by Jack Beven, Lead Hurricane Forecaster, NWS/NHC. He pointed out that low-earth-orbiting (LEO) sounders at best provide data over an area of interest once every few hours and that evolving/translating meteorological features such as hurricanes can easily slip through the swath gaps in LEO sounder coverage. A GEO sounder would produce higher temporal resolution data and cover the swath gaps over the tropics. Beven thought that the NHC could significantly benefit from an advanced sounder on the GOES-R satellite series, but that the greatest benefit might result indirectly from assimilation of the data into NWP models that forecast hurricane track and intensity. Sounder data could also be used more directly in hurricane-specific products such as eye sounding intensity estimates, and in other derived environmental products such as TPW.

International perspectives were nicely articulated by Johannes Schmetz, EUMETSAT. One of his many points was the WMO recommendation for inclusion of hyperspectral sounders on future geostationary environmental satellites. Also, the 2003 Coordination Group for Meteorological Satellites (CGMS) report prescribed that all international geostationary meteorological satellites should have sounders by 2015; the 2007 decadal survey indicated the high priority for GEO hyperspectral sounders; and the 2008 GEO partners meeting in Geneva specifying that all meteorological GEO satellites should have sounders as part of the global observation system. EUMETSAT has started phase-A studies to implement an advanced sounder on the Meteosat Third Generation (MTG) series late in this coming decade.

About 30 minutes was available after the presentations for audience discussion time. In general, the comments strongly advocated for the U.S. need to have advanced geostationary sounders. At the very least, a demonstrable prototype needs to be flown to clearly show the importance to impacts on U.S. forecasts. In addition, it was mentioned that recent findings from the international climate community indicate that water vapor data is one of the most important parameters in climate forecasting and assessment. And it was stated that the GEO sounder data would accurately measure water vapor in four dimensions, including the motion that could be used to better describe the transport.

A final question was asked about how the community can better champion this cause. To whom do we advocate, and what is the best approach to do so? The session was adjourned by Abby Harper, who addressed these questions. She ended with an optimistic, but also realistic tone: that NOAA/NESDIS is very focused on getting the currently planned instrumentation into space as soon as possible, and that new or higher-risk options are much lower on the radar screen. But that if the science and user communities feel strongly about the GEO sounder, then the push should continue.

The breakout sessions followed the town hall meeting with the opportunity for two way communications between NOAA/NESDIS and the user communities. Numerous questions and suggestions were discussed on a wide range of topics. Some of the more frequently mentioned issues included recommendations/ questions on:

A) Data and Product Access

- a. GOES Access System (GAS) priority policy on data access;
- b. interface specifications for GAS;
- c. back-up capability for GAS;
- d. smart generation of products by geographical location on the fly;
- e. mitigation of data loss;
- f. limits for the number of simultaneous users of GAS;
- g. need for more information on GOES Re-Broadcast (GRB) and eGVAR (emulated GVAR);
- h. need for data/ product push and pull, with select products pushed to users based on user requests;

B) GOES-R Products as part of an integrated data set

- a. eliminating “stovepipe products” so that GOES-R products become part of an integrated data set;
- b. explore a new concept of operations
- c. continue and expand the GOES-R Proving Ground and risk reduction activities
- d. advances with current GOES integrated into the GOES-R system;

C) Product Formats and Metadata

- a. providing matching formats for real-time and archived data;
- b. need for searchable/ consistent metadata throughout the data processing pipeline;

D) Pre-Operational User Readiness

- a. need for GAS products for pre-operational testing;
- b. schedule information for ground segment and GAS testing for users that are critical to end-to-end test success;
- c. creation of proxy data and algorithm test plans to validate data products;
- d. assuring end-to-end capabilities (building, training, user access);
- e. continue to expand the GOES-R Proving Ground and risk reduction activities;
- f. need for more information on GOES Re-Broadcast (GRB) and eGVAR (emulated GVAR);
- g. provide proxy data/ code to users early showing exponential increase in data for GOES-R;

E) User Education and Training and Outreach

- a. need for documentation and training on products and product use;

- b. use a variety of methods for communicating, educating, and demonstrating use of GOES-R data and products;
- c. improve outreach to NWS offices and National Centers;
- d. invest in outreach to smaller user communities;
- e. assuring end-to-end capabilities (building, training, user access);

NOAA/NESDIS responses to the user recommendations and questions on topics such as those above, will be posted to the GOES-R web site <http://www.goes-r.gov>.

The final sessions on Thursday included a summary of the breakout session discussions, a session on a "Look into the Future" which included a preview of future NASA missions, a roadmap for satellite data in AWIPS, and a luncheon presentation by Dr. Steve Ackerman "Imagining the Future". The final event of the conference was a demonstration of McIDAS-V.

All presentations from GUC-6 are available on line:

- 1) Go to www.goes-r.gov
- 2) Under "past conference materials" select "view all"
- 3) Next to the "Sixth Annual GOES Users' Conference" select "Conference Activities"
- 4) On the right side, under Final Agenda, click on "PDF"
- 5) On the agenda, click on the name of a presenter to access the presentation.

More details about the conference, can be found at http://cimss.ssec.wisc.edu/goes_r/meetings/guc2009/