

# **Review of the Cooperative Institute for Meteorological Satellite Studies (CIMSS)**

**Len Pietrafesa**

**North Carolina State University**

**CIMSS Review Chair**

**July 29, 2014**



# CIMMS Review Panel



## Science Review Panel Members:

- **Dr. Len Pietrafesa, Chair, North Carolina State University**
- **Dr. Peter Lamb, CI for Mesoscale Meteorological Studies, University of Oklahoma (\*deceased 28 May 2014)**
- **Dr. Tammy M. Weckwerth, National Center for Atmospheric Research**
- **Dr. Susan Buhr Sullivan, CI for Research in Environmental Sciences, University of Colorado**
- **Mr. Carven A. Scott, National Weather Service, WFO, Alaska**



# Outline

- **Overview**
- **Themes**
- **Findings**
- **Major Recommendations**
  - **Strategic Plan**
  - **Science Plan**
  - **Education and Outreach Plan**
  - **Science Management Plan**
- **Final Comments**
- **Request for SAB Approval**



# Overview

- **An External Review of the Strategic, Science, Education & Outreach and Science Management Plans of CIMSS, at the University of Wisconsin at Madison (UW-M), was conducted on December 16 - 17, 2013 in Madison, WI.**
- **Guidelines for conducting the review were provided by the CI Program Office within NOAA – NESDIS and facilitated by Ms. Ingrid Guch**
- **Review Panel members are summarized in Appendix I.**
- **The On-Site Agenda is provided in Appendix II.**



# Overview- Origin of CIMSS



- **NOAA established the Cooperative Institute for Meteorological Satellite Studies (CIMSS) in 1980 within the Space Science and Engineering Center (SSEC) at the University of Wisconsin-Madison.**
- **The CIMSS scientific vision is to conduct interdisciplinary research in the atmospheric sciences, focusing on using satellite observations and mathematical models to better understand the behavior of the Earth system.**



# Overview-2009 Recompete



- **In November 2009, NOAA published a Federal Funding Opportunity announcement for a CI with expertise in satellite meteorology.**
- **The UW-M was selected in the spring of 2010 to serve this role by continuing CIMSS within their existing Space Science and Engineering Center (SSEC).**
- **A MOA governing CIMSS's organization and operation was concluded between the UW-M and NOAA in 2011.**
- **This MOA will expire in 2016.**
- **The CIMSS BoDs includes NOAA and UW-M senior employees to provide advice regarding policies, research, the budget and activities.**
- **The CIMSS Science Advisory Council members serve 3-year terms and provide guidance related to broad scientific content and related partnerships, focusing on aligning CIMSS, NOAA and NASA activities**



# Leadership and Basic Support



- **CIMSS is led by Dr. Steve Ackerman, a Professor in the Department of Atmospheric and Oceanic Sciences (AOS)**
- **CIMSS is housed on-campus by the Space and Science Engineering Center (SSEC).**
- **CIMSS primarily includes researchers from SSEC, and supports a number of Faculty Research Associate and Research Assistants in AOS and Graduate RAs at the UW - M.**
- **CIMSS financial and personnel operations are supported by each employing unit.**
- **Total CIMSS funding during the current award is approximately \$36M.**



# CIMSS Theme Areas



- (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 and products into NOAA operations.**
- (2) Satellite Sensors and Techniques, to conduct instrument performance studies and sensor performance analyses supporting NOAA's future satellite needs as well as assisting in the long term calibration and validation of remote sensing data and derived products.**



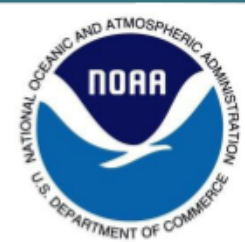


# CIMSS Theme Areas

- 3) Environmental Models and Data Assimilation to work (with the Joint Center for Satellite Data Assimilation (JCSDA)) on improving satellite DA techniques in operational weather forecast models.**
  
- (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.**



# BRIEF SUMMARY OF EXTERNAL REVIEW



- **The review panel found CIMSS science to be impressive with clear paths from O2R related to the NOAA mission and clear, strong connections to the four CIMSS research themes.**
- **The value to NOAA of the internal cost-sharing provided to CIMSS by the UW Administration (through the SSEC) was strongly acknowledged and has helped UW establish and maintain its top-3 national ranking in sponsored research \$ as well as the international pre-eminence of CIMSS and SSEC.**
- **The review panel made 30 findings, from which there were 21 general recommendations, out of which there were 6 major recommendations.**



# Strategic Planning Findings



- **1. CIMSS has addressed the 4 research themes areas and are most prolific in Themes 1 and 2 and making strides in Theme 3. Theme 4 now has an ambitious director and is gaining momentum.**
- **2. A significant number of CIMSS projects are related to NOAA - NASA Algorithm development for new satellite sensors to pursue benefits related to NWS objectives and NOAA's Weather Ready Nation goal.**
- **3. CIMSS has an enviable track record working with NOAA NWS WFOs across the country and a good collaborative relationship with the local WFO (Sullivan, WI), but a closer collaboration is hindered by tens of miles of separation between the UW-M Campus and the local WFO. R2O and O2R forecasting enhancements have been shown to have occurred where local WFOs are collocated on University campuses; e.g.. Norman OK, Raleigh NC, Albany NY and Seattle WA. This would establish a center of excellence in R2O that is needed to support improved forecasting, including a satellite test-bed. An obvious model for this initiative is the successful partnership between the UO and NOAA/NWS involving the CI for Mesoscale Meteorology Studies. There appears to be a window of opportunity to do this because the UW-M Chancellor recently served in top positions at the U.S. DOC and the Director of NOAA/NWS is a UW alumni and well-informed of the activities at CIMSS.**
- **4. NOAA and NASA Algorithm development budgets may decrease over the next 4-5 years and this has implications for CIMSS.**



# Science Findings

- 1. CIMSS science is impressive with clear operational potential related to NOAA's mission and obvious connection to the CIMSS research themes.**
- 2. CIMSS is uniquely positioned to be the national leader in the arena of coupled DA and operational modeling and in fused satellite and radar data in numerical models.**
- 3. The SSEC Data Center provides a critical archival capability. The Terabytes of data that are collected and distributed daily illustrate the profound impact that these data have on the operational and research communities.**
- 4. CIMSS has had success in developing products that are currently used operationally for satellites. Impressively, over 50% of operational GOES-R products are being developed at CIMSS.**



# Science Findings (cont.)

5. **The ability of CIMSS personnel to travel to scientific meetings in place of NOAA federal personnel due to strict restrictions on federal travel is seemingly beneficial to CIMSS staff, however, the inability of NOAA collaborators to travel to scientific meetings negatively impacts morale and the overall effectiveness of the federal/academic partnerships that CIMSS helps promote.**
  
6. **Early career scientists at CIMSS like what they are doing, are pleased with the flexible arrangements and are uniformly enthusiastic about coming to work and are pleased with the opportunities for career development. Of note was the encouragement for MS level researchers serving as PIs and lead-authors. This model has been and continues to be very successful.**
  
7. **There is a disconnect between the research conducted at the AOS department and CIMSS. AOS is 22% funded by NSF and CIMSS has but 2% funding from NSF. An observation: NSF and other funding sources are important to diversify the CIMSS research portfolio.**



# Education and Outreach (E&O) Findings



- 1. CIMSS education and outreach is extraordinarily active, productive and far-reaching and the establishment of the new Education and Public Outreach office is a positive step to ensure continued high-quality activities. The new office reports to the CIMSS Director's office, allowing the engagement function to be infused throughout the institute.**
- 2. CIMSS has not been and is not being funded from NOAA "Education" despite clearly supporting the mission of NOAA Education.**
- 3. E&O personnel have successfully secured grant funding for projects. The Director of Education and Outreach and the activities done within the office are valued by all CIMSS leadership and partners.**
- 4. The activities conducted through E&O have leveraged other communities and resources and have been very successful. The audiences have been broad and served on relevant and timely topics.**



# Education and Outreach (E&O) Findings (cont.)



5. **CIMSS outreach is well positioned to assist with NSF broader impacts elements on AOS grant proposals, which is currently not a large segment of CIMSS funding.**
6. **CIMSS E&O personnel are active in wider environmental sustainability efforts through CIMSS and UW-M. This is appropriate and reflects internal integrity given the interests of CIMSS.**
7. **Diversity at CIMSS is low, but is reflective of the diversity of geosciences as a whole.**
8. **Early career faculty are satisfied with their career prospects and support. Many have worked with the Office of Education and Outreach in the past.**
9. **Satellite boot-camp is a high-return investment to empower decision makers with information.**



# Scientific Management Findings



- 1. Internal cost-sharing provided to CIMSS by the UW Administration (through SSEC) is hugely beneficial and unique among NOAA CIs. This internal UW cost-sharing constitutes an important UW “sustaining” contribution to CIMSS and NOAA, supports the development of potentially important new research areas, helps bridge funding gaps, and offsets unexpected shortfalls. Specific examples of SSEC support include funding Post-Docs who have brought skill sets which align with new, novel CIMSS scientific directions and funding for CIMSS mobile instrumentation capabilities which support research and instruction. This has helped UW establish and maintain its top-3 national research \$ ranking as well as the international pre-eminence of CIMSS and SSEC.**
- 2. The administrative and scientific “embedding” of CIMSS within SSEC, and the resulting optimum interaction between the two entities, is an exceedingly good arrangement both internally and externally. CIMSS benefits from excellent support from the SSEC business office and human resources. NOAA benefits from the long-time linkage of SSEC with NASA.**





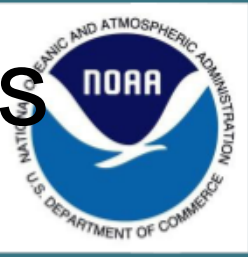
# Scientific Management Findings (cont.)



- 3. CIMSS-AOS relationship is far from optimum, being heavily tilted in the direction of CIMSS supporting AOS (e.g., by CIMSS funding and supervising approximately 15 of the AOS GRAs), while “most AOS faculty are not really conscious of what assets exist in CIMSS/SSEC” (Dr. Grant Petty, Chair, AOS).**
- 4. Over the last two decades the annual dollars to support CIMSS “seed” projects has been fixed at \$235K/year. Inflation =>the real value of this constant level is now ½ of its’ original value. This has eroded the ability of CIMSS to support new, novel and envelope pushing scientific ideas. If NOAA’s level of support for CIMSS wanes in the future, CIMSS ability to innovate is further at risk.**
- 5. CIMSS externally sponsored annual research expenditures have gone from ~ \$0.25 M in 1982 to ~ \$2M in 1985 to ~ \$ 15 M in 2012. \$s are derived principally from NOAA, then NASA, with lesser amounts from DOD, DOE and NSF.**



# Scientific Management Findings (cont.)



- 6. CIMSS personnel, including scientists, support staff and students, has risen from ~55 in 1994 to ~145 in 2013. They are diverse in age and gender. They are formally recognized for honors and supported for professional development and career advancement.**
- 7. CIMSS and SSEC has been positively influenced by a tradition of excellent leadership and management through Vern Suomi, Bill Smith, Hank Revercomb and now Steve Ackerman. Steve Ackerman is a dedicated and devoted leader and is an internationally recognized scientist, outstanding administrator and a committed advisor and mentor.**
- 8. CIMSS serves as a unique and beneficial center of excellence at which scientists and engineers can work together on high priority satellite-related research in atmospheric and earth system science to accomplish much more than if the groups were working separately.**
- 9. CIMSS has a culture of respecting and equally-valuing all members of the project teams. Their projects and staff are diversified so their staff are protected in low-budget periods. These philosophies lead to a high degree of job satisfaction and excellent morale.**
- 10. CIMSS has a stated mission of improving Great Lakes observations. This could directly help people in the region and lead to Great Lakes state funding opportunities**



# Six

## Major Recommendations



- **Strategic Planning**
  - 1) **The UW Chancellor and NWS Director should work to affect the transfer of the regional WFO to be collocated with CIMSS on the UW-Madison Campus;**
  - 2) **CIMSS should vigorously advance its recently initiated collaborative research and development work on the potential for the combined use of satellite and radar data in the weather analysis and forecasting context, which could extend across the storm-meso-synoptic scale spectrum;**



# 6 Major Recs

- **Science Planning**
- 3) CIMSS should capitalize and leverage its Data Assimilation – Operational Modeling capabilities to expand partnerships with the UW Department of Atmospheric & Oceanic Sciences (AOS) faculty, investigators from other NOAA Cis, faculty from other Universities and also with the International Community, especially those countries that have launched environmental satellites and sensors;**



# 6 Major Recs

- **Science Planning**

**4) CIMSS should work more closely with AOS for mutual benefit, greater participation with NSF and new AOS faculty-CIMSS scientist partnerships. As such, the combined CIMSS-SSEC-AOS leadership should seriously address the problem of the weak-to-little AOS faculty engagement with CIMSS.**

**The UW Administration should be made aware of this problem, since the current situation could start to undermine CIMSS-SSEC, which would be to the long-term disadvantage of UW;**



# 6 Major Recs

- **Education and Outreach**

**5) The Office of Education and Outreach should be supported by a TBD level of ongoing base funding, thus allowing the Director to be a catalyst for education and outreach within the institute and to develop robust programmatic elements;**

- **Science Management**

**6) The value to NOAA of the internal cost-sharing provided to CIMSS by the UW Administration (through SSEC) should be strongly acknowledged and other Universities could consider this approach as a model for new or improving existing CI performance.**



# Final Rating and Summation Statement



- **Following a thorough review of the CIMSS, the Review Panel unanimously agreed to a performance rating of**
  
- **“Outstanding”.**



# A final note



- **“It is of note here that CIMSS is one in the collective constellation of NOAA NESDIS and OAR CIs which collectively have been responsible for 27% of the entirety of NOAA’s ‘research’ portfolio. “  
(findings of Dr. Peter Lamb)**
- **This shows the nationwide leveraging of university assets, including physical, computational, intellectual, and financial via the CIs and has greatly benefited NOAA and thus the Nation. Moreover, next generations of potential NOAA staff/scientists have been and are introduced to the agency via the CIs.**





# Request for SAB Approval

- **The CIMSS Review Panel requests SAB “approval of the CIMSS review report and transmittal of the report to NOAA”.**
- **Questions?**