EXTERNAL REVIEW OF THE

COOPERATIVE INSTITUTE FOR METEOROLOGICAL SATELLITE STUDIES (CIMSS)

UNIVERSITY OF WISCONSIN

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Executive Summary

An external review of the Strategic Plan, Science, Education/Outreach and Science Management of the Cooperative Institute for Meteorological Satellite Studies (CIMSS), at University of Wisconsin (UW) at Madison, was conducted on December 16 and 17, 2013 in Madison, WI. Guidelines for conducting the review were provided by the Cooperative Institute Program Office within the National Oceanic and Atmospheric Administration's (NOAA) National Environmental Satellite, Data and Information Services (NESDIS). The review was conducted under the auspices of the NOAA Science Advisory Board (SAB), subject to the requirements of the Federal Advisory Committee Act (FACA). A list of Review Panel members is provided in Appendix I. The Review Panel's on-site agenda is provided in Appendix II. Guidelines for conducting the review were provided via the Interim Cooperative Institute Handbook of NOAA.

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 (UW)-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. The review panel found CIMSS science to be impressive with clear operational potential related to the NOAA mission and obvious connections to the 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 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.

The 6 major recommendations are:

1) The UW Chancellor and the National Weather Service (NWS) Director should work to affect the transfer of the regional Weather Forecast Office (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;

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, faculty and investigators from other NOAA CIs and Universities and with the International Community, especially those countries that have launched environmental satellites and sensors;

4) CIMSS should work more closely with AOS for mutual benefit, greater participation with the National Science Foundation (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;

5) The Office of Education and Outreach should be supported by a to-be-determined 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; and

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.

I. Overview of CIMSS

First established in 1980, CIMSS works to foster collaborative research among NOAA, other federal agencies and the University in those aspects of atmospheric and earth system science that exploit the use of environmental satellite technology and serve as a center at which atmospheric scientists and instrument/sensor engineers can work together on problems of mutual interest to focus on satellite-related research in atmospheric and earth system science. CIMSS also works to stimulate the training of scientists and engineers in the disciplines involved with remote sensing of the atmosphere. Many of these activities are collaborative efforts with NOAA partners, particularly NESDIS' collocated personnel. There has been a NESDIS federal branch collocated with the University since 1977, the Advanced Satellite Products Branch (ASPB).

In November 2009, NOAA published a Federal Funding Opportunity (FFO) announcement reflecting NOAA's intention to fund a cooperative institute with expertise in satellite meteorology. The University of Wisconsin was selected in the spring of 2010 to serve this role by continuing their existing Cooperative Institute for Meteorological Satellite Studies (CIMSS) within their existing Space Science and Engineering Center (SSEC). A Memorandum of Agreement (MOA) governing CIMSS organization and operation was concluded between UW and NOAA in 2011. The MOA describes the configuration and governance of CIMSS, and summarizes the functions of its several elements. This MOA will expire at the end of the initial 5-year term of CIMSS. The CIMSS Board of Directors includes NOAA and UW-Madison senior employees to provide advice regarding policies, research, budget and activities. The CIMSS Science Advisory Council members serve three-year terms and provide guidance related to broad scientific content and related partnerships, focusing on aligning CIMSS, NOAA and

National Aeronautics and Space Administration (NASA) activities. The total CIMSS funding during the current award, which includes grant years one through three as well as the initial increment for year 4, is approximately $36M.

CIMSS is led by Dr. Steve Ackerman, a Professor in the Department of Atmospheric and Oceanic Sciences (AOS) and is hosted 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 a number of graduate research assistants at UW. CIMSS financial and personnel operations are supported by each employing unit.

As proscribed in the MOA, CIMSS conducts research in four 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 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.

It is of note here that CIMSS is one in the collective constellation of NOAA NESDIS and the Office of Oceanic & Atmospheric Research (OAR) Cooperative Institutes (CIs) that collectively been responsible for 27% of the entirety of NOAA's "research" portfolio. This demonstrates that the nationwide leveraging of university assets, including physical, computational, intellectual, and financial via the CIs that 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.

II. Strategic Planning

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. To meet this scientific vision, CIMSS' mission is to develop, advance, and promote satellite meteorology. Metrics include publications, number of

international visitors, PhD and Master's degree students produced and number of co-publications with NOAA.

Findings and Recommendations

Finding: CIMSS has made a concerted effort to address the four research themes areas. They are the most prolific in Themes 1 and 2 but are making great strides in Theme 3. Theme 4 now has an ambitious director and is gaining momentum.

Recommendation 1. CIMSS should further focus on alignment with new areas of the NOAA strategic plan and new partners (examples in Appendix III).

Recommendation 2. CIMSS should consider additional metrics related to strategic planning such as those that measure diversity in funding sources, number of new NOAA-related partnerships, new NOAA strategic goals/objectives addressed, the percent of CIMSS employees engaged in outreach and the types of audiences reached by outreach activities. This will improve communication of successes and challenges so that appropriate and timely recognition/actions will happen.

Recommendation 3. CIMSS should associate relevant metrics such as publications to the appropriate CIMSS research theme and track changes annually so that trends can be more easily identified and appropriately recognized/addressed.

Finding: A significant number of CIMSS projects are related to NOAA and the NASA Algorithm development for new satellite sensors to pursue benefits related to NWS objectives and NOAA's Weather Ready Nation goal. The budget to pursue this work appears likely to decrease significantly in the next five years even given the launches of the Joint Polar Satellite System (JPSS)-1 and Geostationary Operational Environmental Satellite-R Series (GOES-R) satellites.

Recommendation 4: 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.

Finding: CIMSS has an enviable track record working with NOAA NWS Weather Forecast Offices (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-Madison Campus and the local WFO. Research to Operations (R2O) and Operations to Research (O2R) forecasting enhancements have been shown to have occurred where local WFOs are collocated on University campuses; examples are Norman OK, Raleigh NC, Albany NY and Seattle WA, to name but several. This would establish a center of excellence in research-to-operations that is needed to support improved forecasting, including a satellite test-bed. An

obvious model for this initiative is the successful partnership between the University of Oklahoma and NOAA/NWS involving the Cooperative Institute for Mesoscale Meteorology Studies (CIMMS). There appears to be a window of opportunity to do this because the new UW-Madison Chancellor recently served in top positions at the U.S. Department of Commerce, and the new Director of NOAA/NWS is a UW alumni and well-informed of the activities at CIMSS.

Recommendation 5: The UW Chancellor and the NWS Director should work to affect the transfer of the regional WFO to be collocated on the UW-Madison Campus. This would establish a center of excellence in research to operations that is needed to support improved forecasting, including a satellite test-bed. An obvious model for this initiative is the successful partnership between University of Oklahoma and NOAA/NWS involving CIMMS.

Finding: NOAA and NASA Algorithm development budgets may decrease significantly over the next four to five years and this has implications for CIMSS. However CIMSS has archives of satellite data that now has reached more than three decades in extent and CIMSS could adjust its range of applications and portfolio of products and services.

Finding: CIMSS has untapped value in its present 36 year data archive (back to 1978) which could be exploited for longer time series revelations across the weather to climate scale spectrum of phenomena.

Recommendation 6: Given the long time series of satellite data sets, now more than 36 years, (starting in 1978) CIMSS should apply an additional focus on using the long time series for extended temporal investigations, specifically the scientific investigation of monthly to seasonal to annual to inter-annual to decadal to multi-decadal regional climate variability, including weather extremes. This would capitalize on CIMSS' long history of algorithm development, and hence understanding of key resulting data sets. In this way CIMSS would position itself to compete successfully for non-National Environmental Space & Data Information Systems (NESDIS) NOAA (e.g., Climate Program Office) and non-NOAA [(e.g., National Science Foundation (NSF), U.S. Department of Energy (DoE)] funding for satellite-based research into climate variability and change.

III. Science

CIMSS scientific efforts range from those related to the current GOES instrument, preparations for GOES-R through risk reduction and algorithm development and proving ground activities, research to support the Suomi-NPP and JPSS programs, improvements in the areas of data assimilation and modeling, calibration/validation, climate studies, and education and training.

Findings and Recommendations

Finding: CIMSS science is impressive with clear operational potential related to the NOAA mission and obvious connection to the CIMSS research themes.

Finding: CIMSS is uniquely positioned to be the national leader in the arena of coupled data assimilation and operational modeling and the use of fused satellite and radar data in numerical models to understand complex atmospheric phenomenon. Other countries have launched and are launching satellites and CIMSS cold play an important international role.

Recommendation 7: CIMSS should capitalize and leverage its Data Assimilation – Operational Modeling (DA-OM) capabilities to expand partnerships with AOS faculty, faculty and investigators from other NOAA CIs and Universities and with the International Community, especially those from countries that have launched environmental satellites and sensors. CIMSS capabilities can be matched with external communities who have models and DA-OM needs to diversify their long-term research portfolio. CIMSS and the CI for Mesoscale Meteorology Studies (CIMMS) should continue to enhance partnerships to further the growth of satellite/radar fusion and data assimilation techniques.

Finding: 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.

Finding: CIMSS has had great success in developing products that are currently used operationally for numerous satellites. Impressively, over 50% of the operational GOES-R ABI products are being developed at CIMSS.

Finding: The International community (many foreign countries) has launched satellites and sensors which are collecting environmental information that is being shared globally.

Recommendation 8: The SSEC Data Center must continue to be fully supported. Stable funding sources should be identified to maintain this essential service.

Finding: The ability of CIMSS personnel to travel to scientific meetings in place of NOAA federal personnel due to strict restrictions on federal travel has been beneficial to NOAA in recent years. 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.

Recommendation 9: NOAA should continue to push to increase travel to scientific meetings for federal personnel.

Finding: Early career scientists at CIMSS like what they are doing and are pleased with the flexible arrangements at CIMSS – uniformly enthusiastic about what they were doing and coming to work. They are pleased with the opportunities for career development. Of particular note was the encouragement for MS level researchers serving as PIs and lead-authors. This model has been and continues to be very successful.

Finding: There is a disconnect between the research conducted at the Atmospheric and Oceanic Sciences (AOS) department and CIMSS. The AOS is 22% funded by NSF and CIMSS has but 2% funding from NSF. NSF and other funding sources are important to diversify CIMSS.

Recommendation 10: CIMSS should work more closely with AOS for mutual benefit. This will also allow greater participation with NSF. CIMSS should consider a metric tracking the number/percentage of new AOS faculty-CIMSS scientist partnerships. There are several possible ways to address this. One way is for AOS and other UW-M departmental faculty to be given appointments in CIMSS as CI-Associates and CIMSS PhD scientists given department appointments as CI Adjuncts. As such the two cadres could serve as Co-Advisors on graduate students' committees. In addition AOS and other UW-M Departmental faculty can serve as PIs and CIMSS scientists can serve as Co-PIs or Associated Scientists on the proposals. The Directors of CIRES and CIMMS can provide their successful models as appropriate.

Recommendation 11: CIMSS should track the number/percentage of new faculty-CIMSS scientist partnerships to ensure it increases and/or appropriate actions are taken.

IV. Education, Training, and Outreach

The CIMSS Director formally established the CIMSS Education and Public Outreach Office in 2012. CIMSS EPO promotes satellite meteorology resources to advance weather and climate literacy, often in collaboration with national and international partners.

Findings and Recommendations

Finding: 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.

Recommendation 12: In order to develop the best benefit for CIMSS and NOAA, the office of education and outreach should be supported by some level of ongoing base funding. This would allow the director to be a catalyst for education and outreach within the institute and to develop robust programmatic elements.

Finding: CIMSS has not been and is not being significantly funded from NOAA Education despite clearly supporting the mission of NOAA Education.

Recommendation 13: CIMSS and the NOAA Office of Education should explore a more formal partnership

Finding: The education and outreach personnel at CIMSS 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.

Recommendation 14: The CIMSS leadership and Director of the education and outreach office should establish programmatic goals and metrics for the effort as a whole in order to act as a guide for project portfolio selection and to guide evaluation metrics within projects.

Finding: The activities conducted through the education and outreach office have leveraged other communities and resources and have been successful. The audiences served are broad and appropriate, and on relevant and timely topics.

Finding: CIMSS outreach is well positioned to assist with NSF broader impacts elements on grant proposals, which is currently not a large segment of CIMSS funding. AOS faculties are aware of the resources available through CIMSS.

Recommendation 15: As CIMSS develops a more commensurate scientific relationship with AOS, CIMSS outreach personnel should develop more relationships with AOS faculty, especially with respect to partnership on proposals, to the extent that such relationships are beneficial.

Finding: CIMSS education and outreach personnel are active in wider environmental sustainability efforts through CIMSS and U. of Wisconsin. This is appropriate and reflects internal integrity given the interests of CIMSS.

Finding: Diversity at CIMSS is low, but is reflective of the diversity of geosciences as a whole.

Recommendation 16: CIMSS should consider a metric related to the diversity of its students/workforce relative to the larger geosciences community.

Finding: Early career faculty are satisfied with their career prospects and support. Many have worked with the office of education and outreach in the past.

Recommendation 17: Opportunities should be explored to train DHS, Department of Interior and other agencies in satellite boot-camp like activities (service oriented).

V. Science Management

Within the context of the CIMSS mission and vision established through strategic planning, the organizational environment with SSEC, AOS and the Graduate School, CIMSS has developed operating principles to guide the specific activities, partnerships and projects to pursue the ones most likely to promote shared discovery and learning, connections to other related research/applications and life experiences, functional connections among researchers and an inclusive environment.

Findings and Recommendations

Finding: 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, which 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 in CIMSS 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 ranking as well as the international pre-eminence of CIMSS and SSEC.

Recommendation 18: 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 should consider this approach as a model for new or improving existing CI performance.

Finding: 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 SSEC offices such as the business office and human resources. NOAA benefits from the long-time linkage of SSEC with NASA.

Finding: The 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 Graduate Research Assistants, while "most AOS faculty are not really conscious of what assets exist in CIMSS/SSEC" (Dr. Grant Petty, Chair, AOS).

Recommendation 19: 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. Dr. Petty seemed to recognize and regret this problem, since the current situation could start to undermine CIMSS-SSEC, which would be to the long-term disadvantage of UW. There are several possible ways to address this. One way is for AOS and other UW-M departmental faculty to be given appointments in CIMSS as CI-Associates and

CIMSS PhD scientists given department appointments as CI Adjuncts. As such the two cadres could serve as Co-Advisors on students' graduate committees. In addition AOS and other UW-M Departmental faculty can serve as PIs and CIMSS scientists can serve as Co-PIs or Associated Scientists on proposals. The Directors of CIRES and CIMMS can provide their successful models as appropriate. CIMSS should track the number/percentage of new faculty-CIMSS scientist partnerships to ensure it increases and/or appropriate actions are taken.

Finding: Over the last two decades the annual dollars to support CIMSS "seed" projects have been fixed at $235K/year. Given inflation, the real value of this constant level is worth but half 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 CI's in general and CIMSS in particular wanes in the near-present and future, CIMSS ability to innovate is further at risk.

Recommendation 20: If there are expansions in the base funding of CIMSS, the CIMSS base grant funding set-aside should be re-visited

Finding: CIMSS externally-sponsored annual research expenditures have gone from ~ $0.25 M in 1982 to ~ $2M in 1985 to ~ $15 M in 2012. It is derived principally from NOAA and also secondarily from NASA; with lesser amounts from the Department of Defense (DOD), the Department of Energy (DOE) and NSF in that order.

Finding: CIMSS personnel, including scientists, support staff and students, have risen from ~55 in 1994 to ~145 in 2013; nearly a tripling. They are diverse in age and gender and are formally recognized for honors and supported for professional development and career advancement.

Finding: CIMSS and SSEC have 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.

Recommendation 21: CIMSS leadership should be formally expanded to include an Associate and an Assistant Director to insure that the present Director can fully meet all CI and University responsibilities. This structure should be established in a manner that builds a "succession strategy"

Additional Findings

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.

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.

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.

Final Rating and Summation Statement

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

Appendix I. Review Panel

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Len Pietrafesa received Bachelors (1965) from Fairfield University (Fairfield, CT), Physics & Mathematics, Masters (1967) from Boston College and the University of Chicago, Geophysics/Fluid Physics and a PhD from University of Washington (Seattle, WA), Fluid Physics/Geophysical Fluid Dynamics). He joined NCSU in 1973 and made Full Professor in 1981. He then served as Head of Marine, Earth & Atmospheric Sciences and as Deans for Research and External Affairs. His teaching and research areas include physical oceanographic processes, coastal meteorology, geophysical fluid dynamics, satellite oceanography, air-sea coupling, coastal flooding due to hurricanes and severe storms, air-sea interaction, climate data analyses, and weather and climate impacts. He is former Chair of the NOAA Science Advisory Board, is a Fellow of the American Meteorological Society (AMS), former Chair of the NASULGC/ALU Board on Oceans, Atmosphere and Climate and as the 3rd Commissioner of the AMS Weather & Climate Enterprise Commission. He has been a Fellow of the AMS for several decades.

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Peter J. Lamb received B.A. (1969) and M. A. (1971, with Honours) degrees in Geography from the University of Canterbury (New Zealand), the Ph.D. in Meteorology from the University of Wisconsin in 1976, and a D.Sc. for published research in Climate Science from the University of Canterbury in 2002. In 1991, Dr. Lamb joined The University of Oklahoma as a tenured full Professor in its School of Meteorology, and Director of the NOAA Cooperative Institute for Mesoscale Meteorological Studies (CIMMS). He received a George Lynn Cross Research Professorship in 2001, which is The University of Oklahoma's highest research honor. Dr. Lamb's primary research interests are in the physical and dynamical processes responsible for climate and its short-term fluctuations (intraseasonal, interannual, decadal). Recently, Dr. Lamb

was elected to the Council (2011-2014) and Executive Committee (2012-2014) of the American Meteorological Society.

Dr. Tammy M. Weckwerth
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Tammy Weckwerth received her bachelor's degree in Math & Physics from Cornell College (1988) and PhD in Atmospheric Sciences from UCLA (1995). Currently she is a Scientist in NCAR/EOL. As an instrumentation expert Tammy Weckwerth has been on numerous field expeditions to assure optimal data collection for multiple research objectives defined by university PIs. As a researcher in NCAR's Earth Observing Laboratory, she uses data from radars, lidars, soundings, wind profilers, cloud photographs, aircraft data, satellite imagery, and surface stations. Weckwerth's areas of expertise are observational analyses of mesoscale meteorology, organized structures within the planetary boundary layer, and initiation of thunderstorms.

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Dr. Buhr Sullivan directs the Education Outreach program of the Cooperative Institute for Research in Environmental Sciences (CIRES). Before beginning her work in K-12 education, she conducted research in atmospheric chemistry analytical methods with CIRES and the NOAA Aeronomy Laboratory. Dr. Buhr Sullivan specializes in professional development for teachers, digital learning collections, project evaluation and engagement of scientists in education and outreach. Building on the research strengths at CIRES, CIRES outreach focuses on science in service to society, especially in helping educators build climate literacy and an understanding of climate impacts and solutions.

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Mr. Scott has served as the Chief of the NWS Environmental Scientific Services Division (ESSD) since
2007. He received his BS (1974) and MS (1977) degrees in Meteorology and Computer Science from Texas A&M University. His area of expertise is weather analysis and forecasting.

Appendix II. CIMSS 5 Year Science Review Agenda

Cooperative Institute for Meteorological Satellite Studies (CIMSS) Science Review
Space Science and Engineering Center
Atmospheric, Oceanic and Space Sciences (AOSS) Building Room 351
1225 West Dayton Street, Madison, Wisconsin 53706

Monday, December 16, 2013

8:00 a.m. Review Panel Executive Session
9:00 a.m. Welcome *Martin Cadwallader, Vice Chancellor for Research/Dean of the Graduate School*
9:15 a.m. Welcome and Overview of SSEC *Hank Revercomb, Director, SSEC*
10:15 a.m. Break
10:45 a.m. Overview of CIMSS, Strategic Plan and CIMSS Science Highlights *Steven Ackerman, Director of CIMSS*
12:00 p.m. Working Lunch with early career scientists (B. Cintineo, J. Cintineo, L. Cronce, M. Kulie, A. Lim, A. Merrelli, S. Monette, Min Oo, J. Sieglaff)
1:00 p.m. CIMSS Science: Sarah Monette, Mark Kulie, John Cintineo, Elisabeth Weisz, and Mike Foster
2:30 p.m. CIMSS Education and Outreach *Margaret Mooney, Director of Education and Outreach*
3:00 p.m. Executive Session of Review Panel
4:30 p.m. Debrief of day one with CIMSS Director and Executive Director

Tuesday, December 17, 2013

8:30 a.m. Tour of CIMSS/SSEC Data Center, CAVE, Engineering, 3rd Floor, Roof, posters
9:00 a.m. Overview of AOS Grant Petty, Chair AOS
9:30 a.m. CIMSS Science Management
10:00 a.m. Executive Session of Review Panel
12:00 p.m. Lunch and Teleconference with Stake holders: Jeff Key, Steve Goodman, Mitch Goldberg, Al Powell, Jeff Craven or Stephen Brueske (NWS Sullivan)
1:00 p.m. Debrief and discussion
2:00 p.m. End, transport to airport begins.

Appendix III. Items of interest to CIMSS in the NOAA Strategic Plan

Climate Adaptation and Mitigation

An informed society anticipating and responding to climate and its impacts. *Partner with NOAA's climate science and services, the Environmental protection Agency (EPA),the U.S. Department of Energy (DOE), the U.S. State Department, the U.S. Department of Agriculture (USDA), the U.S. Department of Transportation (DOT), the U.S. Department of the Interior (DOI), the U.S. department of Health and Human Services (HHS), and the U.S. Department of Homeland Security (DHS). Metric: A more comprehensive knowledge of greenhouse gases and other climate forcing agents among partners; Improved basis for confidence in understanding key oceanic, atmospheric, hydrologic, biogeochemical, and socioeconomic components of the climate system and impacts; Advances in climate modeling leading to improved scientific understanding and a new generation of climate predictions and projections on global to regional scales and from monthly to centennial time scales; Increased confidence in assessing and anticipating climate impacts*

Weather-Ready Nation

Society is prepared for and responds to weather-related events. *Help the NWS strengthen relationships with many existing partners and develop new relationships that enable better integration of information into emerging areas that have economic, environmental, and health impacts. Examples of long-standing partnerships include other Department of Commerce (DOC) Agencies; DHS; the FEMA; DOT; the USGS; and the U.S. army Corps of Engineers (USACE); and numerous regional, state and local agencies. NOAA will provide forecasts and information that compare weather risk to user-defined risk tolerance and redefine warnings to be applicable to a broad range of high-impact events. Key science and technology needs to achieve this objective include improving forecasts of hurricanes, severe weather, space weather, fire weather, and greater knowledge of the weather-climate linkage. Other needs include a better understanding of human behavior and decision-making during weather-related events and the formulation and communication of forecast uncertainty, or forecast confidence. Improving forecast and decision-support tools, and data architecture (including the four-dimensional environmental information database known as the 4-D Cube). Metrics: Fewer weather-related fatalities; Improved community preparedness leading to fewer weather-related fatalities; Avoidance of economic loss from property damage and unnecessary evacuations.*

Managing freshwater quantity and quality. *Metrics: Avoidance of economic loss and property damage from flooding as a result of impact-based decision support; More efficient and effective*

management of municipal water supplies using integrated water forecasts; Economic benefits from increased efficiencies in water usage in the transportation, hydropower, and agriculture sectors.

Improved air, marine and road transportation and safety. *Metrics: Fewer aviation delays due to weather-related events; Reduced grounding or sinking of cargo vessels due to weather-related events; A reduction in transportation fatalities and economic losses due to weather-related events.*

Improved air and water quality services. *Metrics: Improved information on the linkages among human health, weather, water and climate for decision makers; fewer adverse health impacts attributable to air pollution; positive economic and ecological impacts from improved water quality forecasts.*

A more productive and efficient economy through environmental information relevant to key sectors of the U.S. economy. *Metric: Production gains in renewable energy through better information; Mitigated economic loss due to advanced warning of geomagnetic storms; Health sector efficiencies due to improved use of weather, water, and climate information; An integrated suite of information targeted to food security needs; and Growth of America's weather and climate industry.*

Healthy Oceans

Marine fisheries, habitats, and biodiversity are sustained within healthy and productive ecosystems. *Improved understanding of ecosystems to inform resource management decisions. Metric: Living marine resource managers using high-quality data to inform management plans and decisions;*

Resilient Coastal Communities and Economies

Coastal and Great Lakes communities are environmentally and economically sustainable Comprehensive ocean and coastal planning and management. *Metric: National, regional, and local stakeholders engaged in the coastal and marine spatial planning process; Coastal and Great Lakes managers use of new or enhanced models, data, tools, and best practices for informed spatial planning, management and stewardship of resources and ecosystems; Key coastal, marine, and Great Lakes areas acquired or designated for long-term conservation and managed to maintain critical ecosystem function and support coastal economies; Predictable and transparent regulatory mechanisms for ocean and coastal energy, and other sectors; An enhanced geospatial framework and data available to underpin decision-support tools*

Safe, efficient and environmentally sound marine transportation (cross-referenced with Weather Ready Nation). *Metrics: Reduced maritime incidents in U.S. waters through timely and accurate navigational information; Increased capacity in MTS to promote greater efficiency and economic growth; Improved national geospatial framework for increased accuracy of navigation products and services; Reduced hydrographic survey backlog in navigationally significant areas; Increased percentage of national ports with access to real-time navigation products and services; Increased preparedness and response to maritime incidents and emergencies.*

Improved coastal water quality supporting human health and coastal ecosystem services (cross-reference to Weather Ready Nation). *Metric: Greater understanding of the effects of natural and human-induced contaminants on the health of humans and marine life; Reduced impacts to human health and ecosystem services due to degraded water quality; Faster detection of sediments and contaminants in coastal waters; Accelerated recovery and restoration of coastal resources and revitalization of coastal communities through improved water quality.*

Safe, environmentally sound Arctic access and resource management. *Metrics: Reduced risk and impact of maritime incidents on the Arctic environment; Arctic communities and ecosystems prepared for climate change and weather events with adaptation strategies and plans; A stronger foundational geospatial framework to better support economic and community resilience and inform policy options and coastal management responses to the unique challenges in the region; Increased international collaboration to strengthen NOAA and U.S. policy objectives in the region.*