

Meeting of the NOAA Science Advisory Board
August 27, 2020

Location: Webinar

SAB Members in attendance:

Mr. John Kreider, President, Kreider Consulting LLC (Chair); **Dr. Robert L. Grossman**, Frederick H. Rawson Professor and Jim and Karen Frank Director, Center for Data Intensive Science, University of Chicago; **Mr. M. Christopher Lenhardt**, Domain Scientist, Renaissance Computing Institution; **Dr. Denise Reed**, Professor Gratis, Pontchartrain Institute for Environmental Sciences, University of New Orleans; **Dr. Robert B. Rheault**, Executive Director, East Coast Shellfish Growers Association; **Dr. Martin Storksdieck**, Director, STEM Research Center and Professor, College of Education and School of Public Policy, Oregon State University; **Dr. Elizabeth Weatherhead**, Senior Scientist and Fellow, Jupiter Intelligence; **Mr. Robert S. Winokur**, Consultant (Retired, NOAA, Navy);

NOAA Representatives in attendance:

Dr. Neil Jacobs, Assistant Secretary of Commerce for Environmental Observation and Prediction, performing the duties of Under Secretary of Commerce for Oceans and Atmosphere; **Rear Admiral (Retired, United States Navy) Timothy Gallaudet**, Ph.D., Assistant Secretary of Commerce for Oceans and Atmosphere and Deputy NOAA Administrator; **Mr. Craig McLean**, Assistant Administrator for Oceanic and Atmospheric Research and performing the duties of NOAA Chief Scientist; **Ms. Mary Erickson**, Deputy Director, National Weather Service; **Dr. Steven Thur**, Director, National Centers for Coastal Ocean Sciences, National Ocean Services; **Dr. Stephen Volz**, Assistant Administrator for Satellite and Information Services; **Dr. Gary Matlock**, Deputy Assistant Administrator for Science, Oceanic, and Atmospheric Research; **RDML Michael Silah**, Director, NOAA Office of Marine and Aviation Operations and Director, NOAA Commissioned Officer Corps, Office of Marine and Aviation Operations; **Dr. Mitch Goldberg**, Chief Program Scientist, Joint Polar-Orbiting Satellite System; **Mr. Kevin Cooley**, NOAA National Weather Service Director, Office of Planning & Programming for Service Delivery; **Mr. Roger Griffis**, Climate Change Coordinator for NOAA's National Marine Fisheries Service; **Dr. Frank Schwing**, Division Chief of NOAA Fisheries Office of Science and Technology Science Information Division; **Dr. Stephan Smith**, Office of Science and Technology Integration.

Staff for the Science Advisory Board in attendance:

Dr. Cynthia J. Decker, Executive Director and Designated Federal Officer; Ms. Caren Madsen, Ms. Courtney Edwards.

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Opening Statement of the Chair

John Kreider, Kreider Consulting and Chair, NOAA SAB

Mr. Kreider introduced the first presentation for the afternoon meeting as a review by the Climate Working Group of the Precipitation Prediction Grand Challenge. Dr. Decker explained this was in response to a request from the Weather Water Climate Board of NOAA.

Precipitation Prediction Grand Challenge Strategic Plan Review, Recommendations to NOAA

Dr. Joellen Russell, Professor, Distinguished Chair of Integrative Science and Professor in Geosciences, Planetary Science, Hydrology & Atmospheric Science, University of Arizona

Summary

Dr. Russell represented the Climate Working Group and was joined by her Co-Chair, Kirstin Dow, to help answer questions on the presentation. Version 1.0 of the Strategic Plan for the Precipitation Prediction Grand Challenge was distributed on July 27, 2020, for review and comment by the NOAA Weather Team, Water Team, Climate Team, as well as the Climate Working Group, in collaboration with the Environmental Information Services Working Group (EISWG). Notification about the report was distributed to other NOAA stakeholders at that point as well.

The goals of the Grand Challenge are to provide more accurate, reliable, and timely precipitation forecasts across time scales for weather from subseasonal to seasonal (S2S) and seasonal to decadal (S2D). This will be accomplished through the development and application of a fully coupled Earth system prediction model. Dr. Russell also mentioned that an improvement in global models will help with many other parameters as well, not just precipitation.

She noted the justification for the report, which is that U.S. seasonal temperature skill is increasing compared to precipitation skill, which is decreasing over the same time period.

The review team was led by the Climate Working Group but also included: Dr. Michael Anderson, California State Climatologist; Dr. Rong Fu, University of California, Los Angeles (UCLA); Sr. Le Jiang, IM Systems Group; and Dr. Xubin Zeng, University of Arizona and representing EISWG.

Grand Recommendation: Emphasize the biggest push that will make the biggest difference. Consider emphasizing the top three outcomes. For each, clarify “why now” and how should NOAA make this a continued priority during a pandemic.

Recommendation 1: Consider restructuring the Strategic Plan to align with the standard process steps: prediction first, then outcome second, to begin with observations, then modeling in the

middle, and the end would be users, with the focus on all parts of the process that NOAA and its partners can control.

Recommendation 2: Explain the specific sources, decisions, observations, and processes of the substantial improvement, or lack thereof, in precipitation prediction from the last 20 years. Ensure that the lessons learned from the observations, modeling, and predictions are highlighted and that two key concerns are addressed: What explains the substantial and historical improvement in scores between 2003 and 2011? And why has it decreased since then? The team felt better clarification of the answers to these questions would become a motivating component of the current Strategic Plan.

Recommendation 3: Explain the specific sources that will lead to substantial improvement in precipitation over the *next* 20 years. Elevate means to specifically advance the integration between subseasonal to seasonal and seasonal to decadal research and prediction efforts that integrate interdisciplinary observations from the root zone to the entire tropospheric column, including potentially the storm cycle lifetime and enhancing the action to bridge the gaps between short-term numerical weather prediction model forecasting and data-driven nowcasting.

Recommendation 4: Highlight clear and quantitative goals and connect those to the improvements distinguished in the prior recommendation. How can NOAA measure the amount of learning about sources of predictability as researchers integrate these precipitation data sets of varying sizes and strategies? Work to determine feasibility, including expense and difficulty and what success looks like. How do you measure the baseline to determine improvement? Take each key question and connect it to another NOAA initiative for help.

Recommendation 5: Determine how different NOAA line offices, NOAA cooperative institutes, academia, private sectors, state, and federal agencies can work together to achieve desired outcomes. This will require coordination among NOAA and their partners with respect to which responsibilities should be tackled within NOAA and which should be tackled outside.

Dr. Russell then moved on to the two Comments made on the Strategic Plan. The first comment was to highlight the integration of precipitation process sets, data sets, and seamless approaches as a way to understand the model and processes behind precipitation predictability, from weather to decadal scales, and establish traceability of error sources. The second comment was the need to clarify the focus of the plan to exclude or include precipitation prediction improvement over the oceans.

Discussion

Dr. Betsy Weatherhead asked what the geographic scope was of the Grand Challenge. Dr. Russell explained that the scope may initially be about the U.S. but that inevitably, having to look at data sets that affect the outside world will cause this to be a process that would have significant impact globally.

Dr. Weatherhead asked about the overlap the Grand Challenge has with the Earth Prediction Innovation Center (EPIC). Dr. Russell explained that EPIC is not involved in the observational systems, and while the Grand Challenge is ultimately a cross-NOAA effort, it involves everything from observations, to improved prediction, to delivery of better products, to better prediction, more than just one component.

Dr. Denise Reed asked about the recommendation to restructure the document into a linear science process rather than focusing on enhancement and sustainment of user engagement and making that the first objective. Dr. Russell agreed that user engagement is important but felt that to better address the issue of skill in precipitation, you need improved tools, observations, and greater understanding, not necessarily with outreach alone, which is why that was not made the main objective, though she agreed it's a critical component.

Dr. John Snow suggested that the Grand Challenge should include specific references to the United States Geological Survey (USGS), which has historically provided a lot of the precipitation data that NOAA uses, and they have had the same difficulty in maintaining its observing network. He also suggested utilizing the state-appointed climatologists, who specialize in precipitation measurements. Dr. Russell noted that there was a state climatologist on the review team.

Mr. Kreider asked why the tone was softened on the fifth recommendation about delineating the role of the community rather than using the same strong language as the others as he felt this was a rather important aspect. Dr. Russell said that since NOAA doesn't control those other entities that approaching them for help had to be handled carefully, and so, because this particular aspect was more out of their control than the other recommendations, softer language was used.

Dr. Mike Castellini asked about precipitation skill degradation as shown in the presentation and if they had found that European systems experienced the same decline in skill and, if so, what that might indicate. Dr. Russell explained that the European systems, while still facing challenges, are beating the U.S. as far as predictability skill goes, and though it was unclear why that might be, they do use different codes, initial conditions, nesting, emphases, and component parts.

Dr. Wayne Higgins interjected that while they had originally thought about structuring the Strategic Plan as suggested, it was ultimately structured with user engagement as a priority since the aim was to ensure stakeholders get what they need and want. But he understood the group's concerns and added that they will continue to wrestle with the organization of the objectives. He also referred back to the question of scope and adamantly stated it is about global precipitation.

Dr. Frank Schwing gave his support for the review and requested on behalf of the National Marine Fisheries Service (NMFS) that NOAA accept the review. He further gave support of the

Grand Challenge and felt there was overlap with the NOAA Climate Fisheries Initiative and added that he looked forward to opportunities to coordinate across the two efforts.

Dr. David Novak gave his support of the group bringing organizational focus and attention to this precipitation prediction problem similarly to how they once focused NOAA on tracking intensity issues of hurricanes and seeing the positive effects of that. He also mentioned that he was in favor of making this an end-to-end project, from observations, to modeling, to interpretation by forecasters, and finally communication.

Dr. Tom Hamill asked about time scales and their role in the three key activities chosen for the Strategic Plan. Dr. Russell felt time scales as far as short-scale phenomena versus long-term ones would depend on what metrics they were using for evaluation. A specific recommendation on time scales was not included because they felt it was up to NOAA to choose targets and relay them to the community so they can help, because, while time will be a factor, so too will budget.

Outcome

Mr. Kreider ended the conversation and suggested it was time for the SAB to decide if they could accept the report as is, ask for modifications, or reject it.

Dr. Reed brought her point up again about the emphasis on engagement, user needs, and communication rather than the strict scientific method mentioned in Recommendation 1 now that it had been raised by a few others. She suggested this needed to be more than just something to produce and to get on and do it, that while that is important, it needs to be reflected that this was a point of extensive discussion.

Mr. Kreider agreed with Dr. Reed and discussed their options with Dr. Decker and the SAB members. Ultimately, the SAB decided to accept the report as is with specific mention in the transmittal letter that the SAB believes the order of topics in the report should be at NOAA's discretion. Dr. Reed made a motion for approval and Dr. Weatherhead seconded the motion, which was then approved by unanimous vote.

Public Comment

There were no public comments.

Mr. Kreider thanked the Climate Working Group for their review and gave congratulations to NOAA for taking on this big challenge.

Adjourn

At 3:45 p.m., the public meeting of the Science Advisory Board was adjourned.