

NOAA's Office of Oceanic and Atmospheric Research

Roundtable: Future Direction of NOAA Research

On July 26, Dr. Robert Detrick, Assistant Administrator for Oceanic and Atmospheric Research (OAR) brought together a diverse group of high-level constituents to provide input on the future direction of NOAA's research enterprise. The discussion focused on the role of research and development in achieving NOAA's mission, research opportunities, and the importance of partnerships. Following is a summary of the major points discussed at the roundtable.

Opening Discussion

In his opening remarks, Dr. Detrick welcomed the group and noted he believes this is a watershed moment for NOAA Research. His goal is to ensure that OAR is the trusted world leader in observing, understanding and predicting the Earth system.

He highlighted several opportunities to shape the future direction of research in NOAA including the NOAA Science Advisory Board Research and Development Portfolio Review Task Force, revised NOAA 5-year Research and Development Plan, and the newly formed Assistant Administrators' Climate Board, which supports him in his role as NOAA Climate Goal Champion.

NOAA's science advisory board is reviewing NOAA's research and development portfolio – internal and extramural – as well as the organization and management of NOAA's research enterprise. Dr. Detrick noted that Roberta Balstad, Ph.D, and Peter Kareiva, Ph.D., who co-chair the SAB's Research and Development Portfolio Review Task Force, have held three meetings to date, and done a thorough job of collecting information and engaging with NOAA staff. At the Task Force's last meeting in mid-July OAR's Senior Research Council members had productive discussions with the taskforce. The Task Force is expected to provide preliminary results in November and their final report next spring. Their review will provide enough detail to inform budget prioritization and organizational change, if needed. Roundtable Participants stressed the importance of coupling the resultant report with current budget realities.

Next, Dr. Detrick discussed some changes in NOAA's climate science and services. He described his role as Champion for NOAA's Climate Goal – one of the four goals identified in the NOAA Next Generation Strategic Plan. He has convened a NOAA Assistant Administrator (AA) Climate Board, which functions within NOAA's existing organizational structure to

improve upon the development and delivery of the climate science information and services NOAA provides. They are focused on planning, budgeting and executing the strategy developed by NOAA's planning community. Recently, the AA Climate Board identified four initial focus areas consistent with the NOAA Climate Goal Strategy. OAR will lead the first focus area on water resources – both too little and too much – and will build on the National Integrated Drought Information System (NIDIS) model. The National Ocean Service (NOS) will lead the second focus area on coastal inundation. NOAA's Satellite and Information Service (NESDIS) will lead the third focus area on weather extremes. Finally, the National Marine Fisheries Service (NMFS) will lead the fourth focus area on Marine Ecosystems.

Participants recommend the focus groups be charged specifically with including the human and societal dimensions of climate change in their work moving forward. They also recommended that the focus area leads engage NOAA's stakeholders early in the process. Dr. Detrick confirmed the focus area leads have been instructed to engage stakeholders and to adopt the best practices learned from the NIDIS model.

Also, Dr. Detrick noted a leadership change at NOAA's Climate Program Office with Chet Koblinsky, Ph.D., retiring and Rick Rosen, Ph.D., serving as Acting Director while a search is conducted. He requested the roundtable participants' assistance in identifying outstanding climate scientists to lead NOAA's Climate Program Office.

Dr. Detrick noted that NOAA's Research Council, which he chairs, is developing the next NOAA 5-year Research and Development Plan. They are aligning the plan with the NOAA Next Generation Strategic Plan and other planning documents including the forthcoming SAB Research Portfolio Review Task Force report. Currently the writing teams are determining the high-level, overarching research questions around which the plan will center. He noted that input from several town halls held at scientific meetings late last year and early this year is being considered in that process. There will be multiple opportunities moving forward for the roundtable participants and others to provide additional input.

In response to participant questions, Dr. Detrick noted that NOAA's research is fundamentally mission-driven, which contrasts with some of the curiosity-driven research conducted and funded by the National Science Foundation. Participants weighed in on the balance of NOAA's research portfolio by noting that the distinction should not be made on the basis of applied versus basic research but rather should be research that furthers NOAA's ability to meet its mission requirements.

Dr. Detrick next discussed some of the challenges facing NOAA and its research enterprise. OAR is facing increasing pressure on its financial and human resources as the demand for new and more advanced products and services grows while the purchasing power of our federal dollars declines. This year brings more uncertainty than most with potential sequestration cuts along with other pressures to cut government spending. Budget uncertainties affect federal hiring as well. In this regard, Dr. Detrick noted that he appreciates the incredible contribution made by our Cooperative Institutes in hiring and nurturing bright young scientists.

Dr. Detrick stated that he sees four critical issues facing NOAA.

First, rapidly escalating satellite costs in an era of flat budgets leads to eroding support for other NOAA science and service areas.

Second, OAR is vulnerable also to cuts in reimbursable research support by other NOAA line offices. These cuts are threatening OAR capabilities in weather-related research and vital programs such as the Hurricane Forecast Improvement Program (HFIP). One of NOAA's challenges in this regard is determining where to draw the line between research product and operation service, and which line office pays. Traditionally this tricky handoff has been handled by relying on the good relationship between OAR and the National Weather Service. Resolving this issue is critical to the future of OAR.

Third, flat and declining budgets are challenging NOAA's ability to maintain and upgrade our climate observation systems. Reductions in ship time have seriously impacted the ability to perform ship observations and maintain ocean observation platforms. Climate observations must be maintained for the continuity and integrity of essential observation, monitoring, research and modeling functions, including new capabilities in Earth system modeling.

Fourth, NOAA's internal business process – workforce management, financial services, facilities maintenance – must be strengthened. Dr. Detrick noted a worrisome trend at OAR's labs – the graying workforce demographic that results from reducing costs through attrition. He pointed out the important role the Cooperative Institutes play in nurturing young scientists, but noted the challenges of transitioning them to federal positions.

Following the opening discussion, Dr. Detrick turned the floor over to the participants to solicit their thoughts on four questions provided for their consideration:

- What core R&D activities does NOAA need to sustain to achieve its mission?
- What are the research areas within NOAA's research enterprise that are poised for major advances, or that represent unique opportunities?
- What NOAA services would you most like to see enhanced or improved?
- What potential strategic partnerships should NOAA investigate in order to advance NOAA science, service and stewardship?

Constituent Observations

Participants identified current and future areas where NOAA could focus resources and efforts to sustain and strengthen NOAA's research and development enterprise.

Four areas of common interests emerged: sustained, long-term earth observing capabilities, improved modeling capabilities, enhanced communication, and strong partnerships. Across all these areas participants urged NOAA to focus on that which is essential to NOAA and coordinate with other federal agencies, academia and the private sector to leverage resources in light of constrained budget realities. They also noted that NOAA's dedicated research budget is disproportionately small relative to other agencies.

In addition to the areas above, participants also recommended:

- NOAA determine its investment strategy for high-risk research and its tolerance for failure. This strategy will help NOAA advance beyond incremental improvements.
- OAR pursue a definition of its role within NOAA, given the unique opportunities to evaluate research and development in NOAA, which Dr. Detrick identified during the opening discussion.
- NOAA develop a recapitalization plan for research infrastructure, noting that there is a risk for permanent loss in some instances.
- NOAA pursue resource management decisions based on peer-reviewed science rather than allow the regulatory process to drive research.

Earth Observations

Participants expressed concern about the sustainability of NOAA's long-term Earth observing capabilities in light of the current budget environment and encouraged NOAA to prioritize maintenance of the observational record, which is critical to scientific research as well as private industry.

Participants identified some specific observations and data as priorities including:

- Integrated Ocean Observing System
- Deep ocean observations
- Satellite observation systems
- 20th century reanalysis data
- baseline monitoring
- marine sound, not only seismic but the pounding of waves on pilings

Recognizing the fiscal realities facing NOAA, participants advocated strongly for in-depth, quantitative observing system analyses, and a systems-engineering approach to observation network design and operation. Participants encouraged NOAA to include stakeholders in this process, and to use observing system simulation experiments (OSSEs).

Participants encouraged NOAA to ensure the continuity of data by maintaining its data collection systems, enhancing its global and regional coverage, improving the spatial resolution of its observing networks, and operating and maintaining its data archives which allow for near real-time access. Regarding data management, participants recommended NOAA consider its role and think about pursuing discussions under the Google-NOAA Cooperative Research And Development Agreement (CRADA).

Earth System Modeling

Participants encouraged fundamental research to improve NOAA's Earth system modeling capabilities including weather prediction, ecosystem forecasting, sea level rise, water resources, and climate projections.

Participants advocated for:

- Seamless system modeling for weather and climate on the hours to decades scale, including cloud resolving global models
- Enhanced spatial and temporal resolution for predicting extreme weather events (e.g. tornadoes, coastal storm surges, etc.)

- Characterizing and modeling decadal variability
- Improved spatial resolution of global climate modeling
- NCEP and NCAR reanalysis (1998 - present)
- Improved understanding of the thermodynamic boundary-layer
- Modeling of ramp events for wind and solar energy
- Improved prediction of impacts (e.g. inland flooding), and development of appropriate mechanisms for communicating the impacts effectively and efficiently, in graphical form.

Some participants also recommended NOAA support research to understand paleoclimate variability and extremes. There was some discussion as to whether this was best suited to NOAA or other agencies including U.S. Geologic Survey, NASA, and/or the National Science Foundation. It was noted that on interdisciplinary areas such as climate, NOAA needs to better integrate and communicate across Federal stovepipes.

Participants also noted that NOAA might not be putting the right amount of emphasis on hazards work, mentioning that the tsunami was the biggest natural disaster to date, but the budget does not reflect that history. While coastal community dynamics help determine vulnerability, the threats are physical.

Participants suggested NOAA may want to examine the progress made by the international community in applying the Global Earth Observing System of Systems, and use the lessons learned to strengthen the U.S. Group on Earth Observations program.

The importance of the continuous, objective data provided by NOAA's observing systems for industry was highlighted repeatedly.

Enhanced Communication

Participants discussed the need to improve how NOAA communicates on several levels.

First, the participants recommended NOAA incorporate social science and stakeholder engagement into the research and development process. As an area of research that is poised for advance, participants called for social science to be embedded throughout the organization. In addition, participants posited that with modest increases in emphasis the NOAA research programs that focus on human dimensions (e.g. Regional Integrated Sciences and Assessments, Sectoral Applications Research Program, Sea Grant College Program, etc.) could demonstrate

disproportionately high impacts. Participants noted the need for NOAA to engage stakeholders to determine the information they need for informed decision making, and to educate stakeholders on how to effectively use the data and information NOAA makes available.

Fourth, participants recommended improving how NOAA communicates the value of its research and development to the Nation, including Congress. While cautioning NOAA to take care in attributing people's actions to research and not draw overly broad conclusions that cannot be supported by data, participants encouraged NOAA to consider communicating its value by focusing on what the world might look like in the absence of NOAA. How would the Nation's people, places and economy be impacted? Along these lines, people need to think about the impact of research budgets on the future success of NOAA

Strong Partnerships

Participants agreed that NOAA's partnerships with academia and industry strengthen NOAA's science and its service delivery.

Participants repeatedly stressed the importance of defining how partnerships will be established and maintained as well as the need to determine what should be NOAA's role and what is best undertaken by NOAA's partners in other federal agencies, academia and the private sector. Some examples that were given as best done by government were long-term monitoring, assessments, and mandated work such as tsunami warnings. Participants noted that there may be a role for the White House Office of Science and Technology Policy in helping draw this line.

Participants underscored the importance of understanding, long-term, what NOAA views as its roles and what it expects to partner with others to accomplish. It was noted that while OAR is developing its research plan, it would be good to identify areas where the extramural community will be needed.

Regarding NOAA's academic partnerships, participants recommended that NOAA leverage expertise in universities with sustained external grants programs, sustain NOAA Cooperative Institutes program to maintain the relationships between the NOAA and university researchers, and develop partnerships relating NOAA science to decision support for national security, agriculture, global commerce and other sectors.

Participants also encouraged exploring partnership gaps. One opportunity that was identified was the role NOAA could play in bridging the gap between climate adaptation practitioners and disaster management community. The gap between them being one of time scales rather than interests.

Participants recommended exploring research partnerships and data sharing agreements with private industry as well. Industry representatives noted a willingness to partner with NOAA in research projects and to share data, assuming proprietary information could be protected. They acknowledged the challenges of ensuring objectivity when accepting research dollars from industry but were optimistic firewalls could be created to foster such collaborations and that the peer-review process would help retain credibility.

Participants noted that sustaining NOAA's observing system capabilities cannot be done without collaboration with academia and the private sector. In instances where NOAA can no longer afford to operate systems to get data, participants recommended NOAA look at public-private partnerships. They noted that the OSSEs recommended in the discussions of observing system capabilities can serve as a basis for discussions with industry.

Participants noted that sustaining NOAA's partnerships should be a priority during tight fiscal times. They encouraged NOAA to be transparent in its decision making regarding partnerships, and to communicate the value the partnerships add to NOAA's research enterprise.

Conclusion

Participants noted that NOAA faces some big challenges.

Throughout the discussions the need for sustained, long-term earth observing capabilities was stressed repeatedly. Participants also noted the many ways in which improved modeling capabilities could strengthen not only the services NOAA provides to the nation but those provided by private industry as well. Educating users about how to access and interpret NOAA data and information, communicating the value of the research enterprise to NOAA's science, services and stewardship, and incorporating the social sciences across NOAA's research and operational entities were identified as priorities. Finally, participants encouraged NOAA to leverage strong partnerships – determining what should be NOAA's role and what is best undertaken in partnership with other federal agencies, academia and the private sector.

Participants encouraged NOAA to focus on sustaining its core capabilities, innovating, and integrating across NOAA, the federal government and with partners to leverage resources.

Participants who completed surveys on the value of this roundtable generally gave it high marks for bringing together a mix of interests. The general consensus from survey respondents was that NOAA should hold more discussions like this so that partners and customers can exchange ideas, discuss needs and learn more about NOAA's priorities and plans on a given topic.