

**29th Meeting of the NOAA Science Advisory Board
Mystic, Connecticut
22-23 August 2007**

Presentations for this meeting will be posted on the SAB website at
<http://www.sab.noaa.gov/Meetings/meetings.html>

Meeting Attendees

SAB members in attendance: Dr. David Fluharty, Chair, and Wakefield Professor of Ocean and Fishery Sciences, School of Marine Affairs, University of Washington; Dr. Robert Ballard, President, Institute for Exploration, University of Rhode Island; Dr. William Ballhaus, President and CEO, The Aerospace Corporation; Dr. Raymond Ban, Executive Vice President, The Weather Channel, Mr. David Blaskovich, Program Director, Deep Computing, WW Government/Research Segment, IBM Corporation; Dr. Frank Kudrna, President and CEO, Kudrna & Associates, Ltd.; Dr. Len Pietrafesa, Associate Dean for External Affairs, North Carolina State University; Dr. James Neil Sanchirico, Associate Professor, Environmental Science and Policy, University of California at Davis, Dr. Carolyn Thoroughgood, Vice-Provost for Research, University of Delaware, Dr. Gerald Wheeler, Executive Director, National Science Teachers Association

NOAA senior management and Line Office representatives in attendance: Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.), Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator; Brigadier General John (Jack) J. Kelly, Jr., USAF (ret.), Deputy Undersecretary for Oceans and Atmosphere; Dr. Richard Spinrad, Assistant Administrator, Office of Oceanic and Atmospheric Research; Mr. Craig McLean, Deputy Assistant Administrator for Programs and Administration, Office of Oceanic and Atmospheric Research; Dr. Alexander MacDonald, Deputy Assistant Administrator for Laboratories and Cooperative Institutes and Director, Earth System Research Laboratory, Office of Oceanic and Atmospheric Research; Ms. Mary Kicza, Assistant Administrator, National Environmental Satellite, Data and Information Service; Dr. Steven Murawski, Director of Scientific Programs and Chief Science Advisor, representing the Assistant Administrator, National Marine Fisheries Service; Ms. Mary M. Glackin, Acting Assistant Administrator, National Weather Service; Dr. Paul Doremus, Acting Assistant Administrator, Office of Program Planning and Integration; Dr. Gary Matlock, Director, National Centers for Coastal Ocean Science, representing the Assistant Administrator, National Ocean Service; Rear Admiral Samuel P. DeBow, Jr., Director, Office of Marine and Aviation Operations

Staff for the Science Advisory Board in attendance: Dr. Cynthia J. Decker, Executive Director; Kristen Laursen; Mary Anne Whitcomb.

Wednesday, 22 August 2007

Opening Statement of the Chair and Self-Introductions by SAB Members- *David Fluharty – University of Washington and Chair, NOAA Science Advisory Board*

David Fluharty opened 29th meeting and introduced two new members: James Sanchirico and Raymond Ban. He thanked Carolyn Thoroughgood and Michael Keebaugh for agreeing to serve on the SAB for a second term.

Welcoming Remarks-*Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.) – Under Secretary of Commerce for Oceans and Atmosphere & NOAA Administrator*

VADM Lautenbacher provided information on NOAA updates and accomplishments since the last meeting. He stated that NOAA is committed to modernizing its oceanographic fleet. Three new vessels will enhance NOAA's at-sea operation in the northeast in the near term. The average age of ships during VADM Lautenbacher's tenure moved from 42 years to 27 years. If this trend on modernizing the fleet continues, the average age will be 20. A new High Performance Computing Partnership between NOAA and the Department of Energy (DOE) will focus on high-resolution climate change and hurricane research models. The Cray XT3 and XT4 machines at DOE Oak Ridge and Berkeley Laboratories will be used; these are the second fastest computers in the world. DOE, the National Science Foundation (NSF) and NOAA are developing a workshop on the concept of surge computing and associated requirements that should be convened in the near future

Budget trends—A chart provided showed that for FY 2008, the President's Budget request increased to \$3.8B. The House mark is \$4.0B and the Senate mark is \$4.2B. This is the closest agreement on budget totals NOAA has had and the first time that the House mark is above the President's budget request.

Legislative Update: NOAA has transmitted three pieces of legislation to Congress this spring: the National Offshore Aquaculture Act of 2007; the Coral Reef Ecosystem Conservation Amendments Act of 2007 and the Hydrographic Services Improvement Act. NOAA is also working on other legislation, including an organic act that it hopes to transmit to Congress before the end of the year. On August 9, 2007, the President signed the America COMPETES Act that gives NOAA blanket authority to conduct education activities. Unmanned vehicles are important for NOAA's future and in the FY 08 budget there is a line item with \$3M requested to support Unmanned Aerial Systems (UAS) and \$0.7M to the Coast Survey to support Autonomous Underwater Vehicles (UAV).

NOAA will be part of the U.S. delegation attending the Global Earth Observations Ministerial Summit in November in Cape Town. The U.S. delegation will highlight achievements in observations for drought, air quality and disasters

Working Group Updates

- Working Group to Examine Advisory Options for Improving Communications among NOAA's Partners (Partnerships Working Group, PWG) – David Fluharty presented this report on behalf of PWG Chair Mike Keebaugh. The PWG will hold its first meeting on 16 October.
- Fire Weather Research Review Working Group (FWRWG) – Cynthia Decker presented this report on behalf of FWRWG Chair John Snow. The FWRWG will have its first meeting on 1-2 October 2007 with subsequent meetings in January, April and June. A preliminary draft report will be presented to the SAB at the August 2008 meeting.
- Social Science Review Working Group (SSWG) – David Fluharty presented this report as a member of the SSWG. This working group will follow up on work that resulted from the report from the previous working group on Social Sciences. This group is chaired by Susan Hanna, Oregon State University, and will look at NOAA's efforts to implement recommendations from the previous SAB Report. It will also identify additional needs in social sciences, including an integrated ecosystem approach to management as well as climate and other issues. Two openings for members are still pending but its first meeting is scheduled for 4-5 October 2007.
- Extension Outreach and Education Working Group (EOEWG) - Frank Kudrna, Chair of the EOEWG, reported that the group is working on the draft report, has embraced the word “engagement” and found that there are great opportunities for NOAA in this area. The draft report will be presented at the November 2007 SAB meeting.

Update Discussion on the NOAA Response to the External Review of NOAA's Ecosystem Research and Science Enterprise-Steve Murawski-NOAA Research Council, National Marine Fisheries Science and Ecosystem Goal Team Lead

Summary:

Steve Murawski provided an update on the NOAA response to this report, which included seventeen recommendations. The final report will be presented at the November meeting.

One of keystone recommendations was to undertake integrated ecosystems assessments (IEAs). NOAA has undertaken a number of activities including the development of a working definition to meet NOAA and community needs. Dr. Murawski noted that the agency is now starting to see interest by coastal communities in these types of performance metrics and is working to drive toward a common set of evaluation processes. This follows a general DPSIR (Driver, Pressure, State, Impact, Response) framework for organizing information regarding the state of the environment. This model helps to show how management decisions on an identified problem can impact the environment and will ultimately allow re-evaluation of the management decision based on the new information. Two things that come up are the issues of scope and scale, e.g.

water quality overlaps with other agency missions. On the scale issue the agency is looking to organize the IEAs around large marine ecosystem(LME) scale but have statutory missions to specifically monitor smaller areas (e.g., sanctuaries, research reserves). A white paper has been provided to the SAB that addresses hierarchical scales. NOAA's priority is to begin the development of regional IEAs and to ensure interactions with the NOAA regional teams to leverage and acquire assets to manage this process. The External Ecosystem Task Team (eETT) report was a driver in creating these regional teams but not the only factor. However, the IEA is an obvious product that will need input and buy-in from regional teams. EPA has the similar issues of being a stove-piped agency and it is hard to engage their participation on a systematic level. They own a lot of water quality data that NOAA could use in IEAs but the data are not currently or easily available. Due to a budget decision by DOC and OMB in FY2009, EPA seems to be more engaged in participating with other agencies in these types of activities.

Additionally, the Sea Grant Program has started looking at regional research priorities and is working with stakeholders at state and local level. Sea Grant used the Ocean Research Priority Plan model and stepped it down to apply to regions but these efforts can also be rolled up to a national level. The priorities identified will drive the development of IEAs and will allow others to have an input on the NOAA products. As NOAA is developing ecosystem products, the agency will attempt to leverage both funds and resources with our obvious partners.

NOAA organization—OMB requested NOAA to review four coastal programs (Coastal Services Center, Ocean and Coastal Resource Management, National Centers for Coastal Ocean Science and Sea Grant) and identify any potential redundancies among the programs. Where is NOAA now and where does NOAA want to be? A number of models are being discussed in NOAA that range from closer integration to reorganization.

Discussion:

A member asked for more detail on the OMB request. Steve Murawski said that every agency has an OMB examiner and the examiner had a good understanding of coastal programs and asked to make sure that there were no redundancies among the Coastal Services Center, Ocean and Coastal Resource Management, National Centers for Coastal Ocean Science, and Sea Grant. NOAA is examining various parts of these programs to see if there are redundancies, or more likely gaps, and how to address them. Several options, from integrating programs to reorganization, are being developed and evaluated. NOAA is also looking at how the agency is incorporating user requirements into the system. The external feeling is that NOAA is doing things and not getting credit because the process is fragmented.

VADM Lautenbacher said OMB is looking to reduce funding but this is a way to show what is beneficial and worthwhile. He thanked Steve for working on this as it is very important and the work crosses Line Offices. Part of the issue is that ecosystem assessments are intermediate product lines and, as such, are difficult to sell. NOAA needs SAB help in advising on how to connect these into the budget,

A member said the information is in the report about how important this work is and why it is needed. One difference he sees is that the External Ecosystem Task Team thought it was going to take longer to get this moving but NOAA is getting ahead of constituencies. NOAA needs to make sure that Coastal States Organization and other broad spectrum of stakeholders know what you are doing and how they fit in. What are your plans in this line? Dr. Murawski said the Ecosystem Goal has had to sell the concept of ecosystem-based management to larger community. NOAA is trying to participate in external meetings and has had to balance between moving ahead and lagging behind. NOAA needs to consider how this will work in practice to understand the tradeoffs in ecosystem products.

A member commented that while NOAA has products coming out using existing data collected under "old" system, the first year products under the new system may be sub-par and considered a failure. At the same time, looking ahead, if the agency did IEAs, what data would be needed for these? This was a caution about how first generation products may be used.

A member asked about what NOAA was thinking about engaging Sea Grant and the academic community to collect data and answer questions. One way to think about this is to have a long term competitive process to develop a significant body of literature to address these issues. NOAA needs to show how much better decisions are with better information.

A member said one option with the money issue is perhaps to refocus some of the current priorities, for example, in the Sea Grant network. NOAA has programs that, with a little bit of redirection, could address these new priorities.

VADM Lautenbacher said NOAA has 2600 line items in the budget that are very discretely defined with are constituents for each of these line items. He agrees with reprogramming and redirecting but he wants people to realize that this is hard to do with the system NOAA has.

A member said the importance of this is that the ecosystem is bigger than NOAA and the agency needs to think in those terms. NOAA is providing an ecosystem vision and the invasive species problem is but one aspect of an ecosystem. On the interagency connection, the way to approach EPA on that question is defining the plug-in role they can play (e.g., providing water quality data) without requiring an ecosystem approach endorsement. If you take the DPSIR model to stakeholders, they need to see themselves, or how they fit, in this process.

Steve Murawski said that indicators are just that, the Ecosystem Goal Team is working on an end-to-end process and not just adding indicators. It is also working to engage stakeholders in the entire process.

VADM Lautenbacher said it is a complex problem. NOAA does not “own” the ecosystem. NOAA has tried to influence its own organizations to work together, but how do influence federal government, academia, and the world? There are a number of governmental committees NOAA leads or has its people on these committees. Externally there are environmental NGOs and organizations NOAA talks to every quarter. Globally, this is part of GEO and GEOSS. NOAA has a conceptual idea on how the agency can influence all of it. Your ideas are welcomed.

This is a complex problem and the question needs to be asked of what one is trying to do. problem with biological models is that there is no current capability to look at complex problems and identifying what pieces we can abstract and deal with in a scientific way. In general, scientists don’t deal very well with multidisciplinary problems.

Dr. Murawski said ecosystem modeling is where weather modeling was in the 1950s--not spatially explicit, and NOAA knows the agency needs nonlinear systems. That is one of things NOAA is doing with near-term priorities in GEOSS. The first step in this process is to remove the focus from primarily hydrodynamic models and begin imbedding biological and socio economic data into the models used in forecasting.

A member said the Great Lakes had an environmental awakening when a major oil company applied for a permit to discharge and no one could answer what the potential impact was to the ecosystem. This is the kind of question that IEAs should be able to address.

Additional Updates: New SAB Charter and Federal Advisory Committee Interactions

- Cynthia Decker noted that the Science Advisory Board is now operating under a new charter which extends the Board for another two years. Some changes: the NOAA Administrator now appoints members of working groups; current Science Advisory Board members can suggest new SAB members, and members can continue to serve after their term expires for up to one year, with approval of the NOAA Administrator. The new charter will be posted on the SAB website.
- David Fluharty said he is working on interactions with other NOAA federal advisory committees. He wants to be able to understand what other NOAA committees are doing so that the SAB can provide better advice to the Administrator.

Nekton Studies Around Bear Seamount-*John Galbraith – NOAA Northeast Fisheries Science Center*

Summary:

Steve Murawski introduced John Galbraith who works in the NE Fisheries Science Center (NEFSC). NMFS is interested in exploring the New England seamounts because they have regulatory authority in the exclusive economic zone (EEZ). NEFSC has been

studying Bear Seamount since 1999 with funding from NMFS and OAR's Ocean Exploration program.

Nearly 50% of the EEZ in the Northeast is below 200 meters. Deep oceans below 1000 meters are the most poorly sampled and the sea life in these areas is not well known. The hypotheses are that the seamounts are biodiversity hotspots, deep sea focal points, and enhanced biomass productivity areas. Another interest is the potential for any deep sea fisheries.

Six cruises were conducted between 2000 and 2005 using mid-water and bottom trawling to get as many depth zones as possible. The researchers have collected a lot of specimens for museums and research collections. In addition, they have many photos of specimens to provide "ground truth" to identify specimens when alive (i.e. in-situ observation). They have also taken tissue samples important for systematic and genetic studies. In some cases they have shipboard videos of live animals. A new species of dragonfish was identified on Bear Seamount. New records and geographic records identified. Seventeen species were found on Bear Sea Mount whose next closest location is 1000 miles away. NEFSC also found that there are commercially exploited species on Bear Sea Mount but they may not be present in commercially-fishable quantities.

Steve Murawski said these places have never been visited before, and new species are being discovered, all in a context of a worldwide fishery being developed outside the EEZ.

Discussion:

A member asked how they can trawl and capture things so fragile. The response was that the scientists need to be lucky and persistent and sift through a lot of material to get the good specimens.

A member asked what constitutes a neighborhood for species. The response was that this is the question that NMFS is trying to answer. Seamounts create their own oceanography and provide unique habitats for species.

The members discussed how this information could be disseminated to the public. Suggestions included disseminating information using the Weather Channel, "YouTube" or through teachers.

Establishing the Outer Limits of the U.S. Extended Continental Shelf (ECS)-*John McDonough - NOAA Office of Ocean Exploration*

Summary:

The purpose of the briefing was to provide the SAB background on the UN Convention on the Law of the Sea (UNCLOS), describe the work that has been done to date to define the U.S. > ECS, describe the interagency approach for planning future ECS activities, and provide an overview of proposed FY 2008 activities by NOAA.

The Law of the Sea, drafted in 1982 and entered into force in 1994, provides a comprehensive regime of law governing world's oceans and resources and establishes detailed guidelines and rules for delineation of maritime boundaries – including guidelines for coastal states to follow for redefining their “Exclusive Economic Zones” beyond 200 nautical miles

The U.S. is not yet a party to UNCLOS and does not have a dedicated program for defining the ECS.

Article 76 provides for the potential extension of a coastal state's EEZ beyond 200nm to include seabed and subsoil to the edge of the continental margin. Such an extension will establish a coastal state's sovereign rights over the area's mineral resources, as well as sessile living marine resources.

Article 76 provides specific juridical and geophysical criteria for extending the continental shelf based on distance from shore, distance from the foot of the continental slope, water depth, and sediment thickness. Coastal states may use a combination of these criteria to define the maximum extent of their continental shelf. Therefore, data that describe the depth, shape, and consistency of the seabed and sub-sea floor are critical.

Although there is no formal U.S. ECS program, federal agencies have been collaborating on this effort over the past several years. In fact, much of the required bathymetric data collection has been accomplished, except for the Arctic Ocean. In addition, an analysis of the Nation's metadata on seismic information has been completed, setting the stage for identifying priority areas for collecting geophysical data. Finally, a U.S. interagency ECS Task Force has been formed to plan and prepare for a rigorous program to gather the remaining information and prepare the materials that could be used to submit and ECS claim if the U.S. ratifies the UN Law of the Sea.

The U.S. ECS task force includes many federal agencies, commissions and the Executive Office of the President, and is in the process of developing a Strategic Plan to guide the effort, as well as to prepare a detailed operating plan for the 10-year life of the project.

The FY08 President's Budget request for NOAA has identified \$8M for this purpose and through the U.S. ECS Task Force NOAA worked with other Federal agencies to prepare a spend plan that provides for the investment of funds in agencies and institutions with the tools and expertise to accomplish the work required. A detailed implementation plan based on the spend plan is in development to ensure that the funding can be invested quickly and efficiently once received.

This is a long-term initiative and further evaluation of geophysical data is critical and may lead to the collection of more bathymetric and seismic survey data. There are opportunities to leverage expeditions to collect additional, complementary data sets that further describe the resource potential in the ECS area. Furthermore, data sets collected

to date provide an opportunity to help focus and target other NOAA activities. Finally, partnerships with other agencies will be critical to the overall success of this effort.

For more information on Law of the Sea go to <http://www.un.org/depts/los/index.htm>

Discussion:

A member asked how many nations put in a claim for extension of jurisdiction. The response was that there are three now but the U.S. expects more over next two years. Nations who ratify have up to 10 years to establish claims. It is critical to note that the U.S. cannot submit a claim, nor comment on the claims of other coastal states unless the U.S. becomes a party to the UN Law of the Sea. The issue is becoming critical, especially in areas like the Arctic where other coastal states are in the process of developing claims that may include areas of U.S. interest that could be claimed for the U.S.

A member asked if you need to have information on resources and the answer was no. However, collecting information to establish the ECS without gathering more detailed information on the resource base would be counter-productive, given that the U.S. would need to begin managing these resources once a successful claim is established.

A member asked how much more time/money would it take to establish claims in Arctic? The answer was 4 to 5 years at least without seismic data. Researchers are not sure what part of the \$50m estimate would be for the Arctic. The Russians' recent venture to the North Pole and their claim that the seabed represents a natural prolongation of their continental shelf should serve as a catalyst for further U.S. action. A hearing on this topic is scheduled in the Senate on September 22.

Ocean Exploration and Research: Merger of the OE and NURP Programs-*Steve Hammond – Acting Director, NOAA Ocean Exploration Program; Karen Kohanowich – Acting Director, NOAA National Undersea Research Program(NURP)*

Summary:

The purpose of the briefing is to provide an update on the status of the merger of the two programs and to invite comments.

The goal is to integrate ocean exploration and research and incorporate a new, vigorous advanced ocean technology and usage program, using Ocean Exploration and NURP as building blocks. There will be exploration, advanced technology development, research and education carried out under the new program. Education and Outreach funding is currently set at 10% of total funding and that will be continued. The new program will be called Ocean Exploration and Research.

The objectives of the merger are to 1) develop capabilities for transitioning discoveries into understanding, applications and operations; 2) develop a leading national advanced undersea technology development/use program to identify NOAA undersea technology needs, leverage solutions and ensure essential undersea capabilities and equipment; and

3) maximize effectiveness through long-term relationships with partners. The merger process began in March 2005 with a target for line-item merger by October 1, 2008.

The new program plans to use competitive cooperative institute (CI) programs for advanced technology development and utilization and a telepresence program to support the Ocean Exploration. Some challenges include concurrent implementation of a new OE exploration paradigm with funding uncertainties for both programs.

Ocean Exploration is in both time and space. Development of advanced technology increases the pace and effectiveness of exploration and undersea research. Focused undersea research is on NOAA relevant issues and issues that arise from the exploration.

Four themes are being discussed: Continental shelf ecosystem frontiers, extreme and unique environments, new marine resources, ocean dynamics: episodic to long-term

Extramural Partnerships plans include the use of the Cooperative Institute (CI) mechanism, competitive grants, and Institutional grants/cooperative agreements.

Discussion:

A member asked if, with the focus on time series, will OE support more marine mammal expeditions in the future. The response was yes, and focusing on time series is key to understanding many aspects of the ocean. NOAA needs to link with seafloor observatories and decide how to do it without long-term funding support. Data mining on whaling in the 19th century was supported by Ocean Exploration.

A member asked how you arrived at 10% figure for education and outreach. They looked at the NASA model. This funding target is easier to do with new programs.

A member asked if people are anticipating the CI competition. Existing NURP centers know this is coming and it will be an open competition but no announcement has been made.

Rick Spinrad said the America COMPETES Act gives NOAA authority for advanced marine technology development and the agency is trying to position itself to have a program for advanced marine technology development.

VADM Lautenbacher said the OE/NURP merger is not necessarily approved by the community but the agency is moving forward with it. The program needs to be stabilized and brought into a larger context. This will not be easy since the NURP Centers are used to operating independently but they must be brought together in a larger program that supports a continuum of ocean technology development. NOAA appreciates your thoughts on this.

A member said that it seems outreach and education sustains the enthusiasm for this program. Steve Hammond said telepresence will result in a "sea change" in outreach and education and the ability of scientists to participate in this exploration.

Public Comment Period

Ann Bucklin from the University of Connecticut, Marine Sciences Program, at Avery Point Center addressed the Board. Her message was to please engage universities and she liked the comment that Sea Grant did regionalization right. Sea Grant learned the lesson that universities can connect you with end users, customers, and can do economic valuation. “You call us customers; universities think we are partners.” She stated that she runs a Sea Grant and NURP center at University of Connecticut and offered the Board the opportunity to tour the facilities. VADM Lautenbacher thanked her and responded that NOAA is doing better at integrating Sea Grant activities throughout the agency.

Mike Sissenwine, from Woods Hole Oceanographic Institution provided comments. He has an appreciation of NOAA as a former employee and he often draws on lessons from NOAA. He commented about systemic issues that are making it harder for NOAA to address ecosystem issues. One problem area is common understanding of terminology and concepts. This is an area where NOAA needs to follow up with strategies and documentation. Another concern is that there isn’t enough emphasis on building a suite of operational decision support tools. The third point he made is turf protection. NOAA, as an organization, is hard to describe to the outside world. People are interested in what NOAA is doing and want to know whom to call. NOAA classifies things in different ways within the agency. This creates an ongoing problem of turf and competition which is detrimental. The Goal Team approach is a way to address this but has transaction costs. This approach doesn’t address how NOAA can partner with outside communities—individuals in NOAA don’t share partnerships and systemically this doesn’t help NOAA.

VADM Lautenbacher that the comments are correct on the organization. It is not easy to make everything fit into one classification system. His hope is that when the issues to be solved are clarified, the agency will be able to adjust the structure to fit the function. Without a NOAA organic act, the agency doesn’t have the authority to change things. Until the individual parts of NOAA support that, it can’t be done. The more the academic community can provide comments, the more likely those changes can be made.

Thursday, 23 August 2007

Official Call to Order and Review of Meeting Format-Cynthia Decker – Executive Director, NOAA Science Advisory Board

Cynthia welcomed everyone to the second day and went over the agenda.

A member made a motion that the SAB commend and thank BGEN Jack Kelly for his support and sage advice to the Board.

A member said it is sad when you realize that just as one is getting to know someone that they step down. Another member said she appreciated Jack’s candor and enjoyed working with him. A comment was made that Jack was a prime mover in seeking advice

from the SAB and requiring the agency to bring things to the Board. A member appreciated Jack's candor. Another member recognized Jack's tracking of SAB recommendations. The motion was seconded and unanimously approved

Report on the Results from the Ocean Exploration Advisory Working Group Workshop on Planning for the Maiden Voyage of the *Okeanos Explorer* Dr. Robert Ballard – President, Institute for Exploration; University of Rhode Island

Summary:

Dr. Ballard provided some background for the SAB on the workshop. The SAB created the Ocean Exploration Advisory Working Group as a standing committee with a goal of giving periodic reports to the SAB and a key area is bringing the *Okeanos Explorer* vessel on line. The NOAA Ocean Exploration Program provides support and advice to the Advisory Working Group. The group conducted a major workshop on May 9-10, 2007, at National Geographic and has a second workshop planned in the fall on technology.

In 2000, a panel appointed by the President made recommendations to the President on how ocean exploration should be conducted including the need for a signature mission—multiyear interdisciplinary voyage of discovery. Only NOAA has risen to this challenge. The Navy recently made an offer and the OEAWG will brief the SAB on this at a later time. The Working Group will help the Ocean Exploration program to identify general priorities, relevant technologies and conduct periodic program reviews.

The present model of how Ocean Exploration is working is more of the traditional “Request for Proposals” model. But the *Okeanos Explorer* model will require a different approach. Ocean Exploration has been using other platforms but with a dedicated ship of discovery, the Program can decide where it needs to go without having to accommodate itself to the schedules of other groups.

The OEAWG envisions a program that maintains the proposal-responsive system but integrates this with a newly rediscovered paradigm for Ocean Exploration: a dedicated ship of discovery carrying out a systematic interdisciplinary program of exploration linked through telepresence to the scientific community, the media and the general public. Under this paradigm, Ocean Exploration makes the discovery, characterizes it, hands it off to others and moves on.

The objective of the May workshop was to involve the community in the evolution of this new paradigm, and seek advice on highest priority targets for first year of operations for the *Okeanos Explorer*. The program received over 100 proposals

During the workshop, there were breakout sessions by regions, focusing on the Pacific basin. The Pacific basin is where most of the U.S. EEZ can be found—50% of the U.S. lies underwater and most of this is in the Pacific basin. The group presented their deliberations and there was a tendency to want to focus on “sure bets”. The compromise

was to mix “sure-bet” targets with carefully planned ship transits—letting transits be the model for pure exploration.

A number of technological issues were raised and will be discussed at workshop in Monterey Bay Aquarium and Research Institute on October 13. The biggest struggle in the May workshop was how the new process would be implemented. Issues included: “Doctors on call” (their reward system, data ownership issues), paramedics, triggers for a more detailed survey, and trade-offs between systematic transit and detailed survey work. Many researchers don’t believe that they can be effectively in charge while on land.

One concern is how this program will fit into NOAA and ecosystem and NOAA mission, Dr. Ballard gave the example of a NASA mission and suggested that NOAA be closer to it.

Discussion:

A member asked about the latency time in the telepresence transmissions. The answer is that latency is one second; they are not running into major time delays.

A member asked about the Working Group process and October workshop. Dr. Ballard said that they are working on a response by the Ocean Exploration program to the first workshop but not ready yet to present the results to the SAB. The Working Group’s goal is they will respond back to the Ocean Exploration program on their reading of the workshop. After this occurs, a final document will be prepared on what took place at the May workshop. The question is whether the Working Group holds the first report and waits until the technology workshop takes place. The Working Group hopes that before year end they will provide advice to SAB on both workshops. The Working Group will then ask about their next task after the *Okeanos*; they haven’t looked at the rest of the Ocean Exploration program.

David Fluharty said it would great if there was a report to the SAB in November in draft with understanding that the technology workshop may not be included. Technology will be focused on funding recommendations for technology for program but it is unlikely NOAA can respond for several reasons—the ship is not finished and the funding is uncertain.

A member said that the Ocean Exploration Advisory Working Group needs to coordinate with Extension, Outreach and Education Working Group and Bob Ballard said he would love to meet to talk about that.

The Ocean Studies Board of the National Research Council will be looking at technology and, as there is a connection to this task, this might be a good opportunity for collaboration. Ocean Exploration is slowly winning over the oceanic community. At some point the National Science Foundation will have to react. The Navy has offered to contribute one of their ships to go where *Okeanos* can’t go, i.e., high latitude work. They are offering to fund four months a year. With Navy and NOAA supporting ocean exploration, there is a sense that it is only a matter of time until NSF will provide support.

Action: The SAB Ocean Exploration Advisory Working Group will present to the SAB for action the final report and recommendations from the *Okeanos Explorer* Maiden Voyage workshop at the November 2007 meeting.

Action: The SAB Ocean Exploration Advisory Working Group will present to the SAB for action the report on the *Okeanos Explorer* Technology Workshop at the Mar 2008 meeting.

Report on the NOAA Response to the National Research Council Decadal Survey-
Mary Kicza, Assistant Administrator, NOAA National Environmental Satellite, Data, and Information Service

(A reporter from Science Magazine was participating by phone in this discussion)

Summary:

The purpose of the briefing was to provide information on the NOAA response to recommendations in the National Academies of Science (NAS) Decadal Survey of Earth Sciences and Applications from Space.

The NAS Survey was a response to a NOAA and NSA request for the science community to provide advice and guidance for: 1) a prioritized list of important Earth science measurements; 2) identification of potential new space-based capabilities to support national needs in the 2006-2015 timeframe and beyond; and 3) NOAA's role in making observing system investments.

This survey was conducted in two phases. The main decadal survey reported out in January 2007. This report is available on the web (436 pages in PDF format): <http://www.nap.edu/catalog/11820.html>. A supplemental panel was established in March 2007 to address the impacts of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) restructuring on climate sciences. Recommendations are due to NOAA in January 2008.

Key issues highlighted in the Decadal Survey included: maintaining the U.S. Government's leadership in Earth observing systems and applications and addressing new space based systems for NOAA to transition to operations. Other issues were: defining NOAA's role in Earth science research, operations and applications relative to that of NASA and other agencies of the U.S. government and partnering with NASA for future operational systems.

Guiding principles for NOAA in developing response to the Decadal Survey included: 1) developing the response in the context of all observing systems; 2) maintaining consistency with parallel activities including the NOAA NASA research to operations report to Congress; 3) examining options to re-manifest NPOESS climate sensors and associated climate science report; 4) analysis of alternatives for GOESR capabilities and 5) use of the ocean surface vector winds continuity concept studies.

The desired outcome of the briefing is to inform the SAB of the status of this project and factor SAB comments into the ongoing response to the Decadal Survey.

Discussion:

A member asked what the budget implications are and how they are incorporated. Ms. Kicza responded that funding for the re-manifesting climate sensors is a significant investment and would need to be approved by the Administration.

A member asked if these investments are components of GEOSS. The response was yes, for each NOAA measurement they are outlining international implications in the context of GEOSS.

A member said that in the past there was an overemphasis on the platform and an underestimate of how the data would be used. Can you tell us of the climate information service? Tom Karl, Director of NOAA's National Climatic Data Center, said they are working with NASA, which develops data records for specific missions. The agencies are developing plans to integrate across missions and to develop long term climate records. In terms of a climate information system, this is a key deficiency.

BGEN Kelly said the decadal study is important and the community needs to know how NASA will use it. They will assume U.S. climate, weather and ocean science community consensus and if there is not consensus, NOAA has a big problem. The climate community has not traditionally coordinated its priorities so this is a big step. The study assumes that the U.S. can buy spacecraft and sensors for the cost they laid out in the study and it is not clear that is true. There is uncertainty about whether the U.S. has the capability to build and fly these instruments in a cost-effective manner. This is a national issue and it isn't clear the country wants to tackle it. NOAA does not have the resources to do it alone. The Office of Science and Technology Policy (OSTP) is engaged with the Office of Management and Budget (OMB) on this question.

NOAA has a problem with contractors not delivering within the original cost proposed. It is important that the agency generates clear requirements and that the technology is available to do what is requested.

A member said that the changes in risk must be calculated before making major investments such as satellites. The whole system incentivizes optimism. Another member agreed that the risk assessment is a key step.

A member asked if NOAA has any way to know if there is no consensus on this issue. BGEN Kelly said he is not sure about the consensus on the ocean side; but he thinks there is more consensus on atmosphere and climate side. Steve Murawski said the concern about lack of consensus in ocean community is not unfounded.

A member asked if you look at prioritized list versus resources, can a list be parsed by what has a compelling urgency. Mary Kicza responded that this was done from the perspective of evaluating and prioritizing NOAA requirements.

A member said space is becoming a utility that will not allow a gap—for example, the Global Positioning System. BGEN Kelly said the Department of Defense has an overwhelming priority on maintaining today's capabilities as these are seen as a utility.

A member asked about the lack of consensus in the ocean community. Steve Murawski said that there are satellites and sensors functioning beyond their predicted life cycle, the data are still being used and have become vital so there is a need to identify replacements. The continuity of operations is at risk and there are very few opportunities to get replacement data unless the U.S. buys the data from other nations. Also at issue is the balance of in-situ observations versus remote sensing.

An observer noted that there has been a crisis created by Nunn-McCurdy recertification regarding the climate sensors on the NPOESS satellites. The risk of gaps in data as a result of this is a great concern. What is NESDIS' assessment of this dilemma and what is being done about it? Mary Kicza responded that one month after the Nunn-McCurdy recertification, OSTP began a discussion on data gaps, and options to mitigate them and engaged the community in evaluating those alternatives. NOAA is working with OSTP to specifically to address those gaps.

Another individual commented that the Decadal Survey said a national approach is needed but is there really an established framework for moving products from research to applications? Mary Kicza stated that OSTP is working on a national policy, including national needs and an interagency investment strategy.

Report on the Results of the SAB Climate Working Group's (CWG) Climate Observations and Analysis (COA) Program Review at the National Climatic Data Center (NCDC)-Kevin Trenberth – Climate Analysis Section, National Center for Atmospheric Research and Chair, COA Review

Summary:

The Review was held April 11-13 at the National Climatic Data Center (NCDC). The purpose of this briefing is to advise the SAB on the findings of the COA review and to request the SAB to review and accept the report, transmit the report to NOAA and follow up on some issues, especially those that extend beyond COA and the climate program.

This is the first full external review of a major part of a NOAA mission goal and examines the strategy, priorities, implementation etc and makes suggestions for change, not recommendations.

There were a series of eight panels that addressed specific topics.

The findings included that there is a great deal of excellent work going on and that COA is providing many valuable climate observational products and services to the nation. In particular, the essential work of collecting observations, creating records, and assuring their quality and documenting and making them accessible to climate research, applications research and decision-making communities.

The main issues identified in the report were that there is a need for a shared vision that: provides a coherent, integrated structure for COA activities and services, in essence, a strategic plan; improves the functioning of the NOAA internal process that integrates program planning, budget formulation and execution (PPBES), and processes used to determine priorities when requested and appropriated budgets differ; advances the approach to engaging partners from the external communities in COA and climate efforts and furthers the integration of the many efforts under COA with one another and other activities under the Climate Goal

There is a need for a broadly understood and transparent priority setting process that engages partners in and outside of NOAA. The report recommended a fixed fraction for extramural funding, especially if overall funds are cut (or otherwise the extramural funding tends to absorb most of the cut).

Discussion:

Chet Koblinsky, Director of the Climate Program Office, thanked Dr. Trenberth and the team for doing the review. Climate observations are half the resources for climate in NOAA. A lot of issues raised are not new and not unexpected by the Climate Program Office, particularly the theme of integration of activities. He applauds the suggestion to review other programs in the goal. The findings of the review team will be valuable, including the external view of strategy. He applauds the suggestion to review other programs in the goal and has already discussed a review of research modeling efforts next spring.

A member pointed out the program reviews are good but matrix management and the role of Congress in the NOAA budget make it hard to act on the advice of these reviews, particularly when they might recommend terminating or downsizing programs. Given these constraints, how can NOAA start something like a climate services program with no new funds? Dr. Trenberth responded that NOAA needs to predict climate changes in a way that allows the country to adapt. The member agreed that NOAA needs to package the programs to sell the need for climate services.

Mary Glackin said NOAA needs to do an inventory of all the climate services the agency has. NOAA would then be in a better position to assess demand and explore the possibility of new services. The agency had this experience with the National Integrated Drought Information System (NIDIS). NOAA needs to get down to products on a regional scale and then move quickly to capture the interest of Congress.

Nancy Pelosi has established a committee for what should be done on Climate Change. Tom Karl said there was a national assessment process to engage stakeholders but that has been moribund in last seven years.

A member said there is an opportunity for full engagement of the community and it may be a desired outcome. If NOAA envisions a climate service this is beyond the public sector; the agency can learn what was done on the weather side and begin to build that into the planning process.

A suggestion was made that NOAA should not use words “external” or “outside”, but instead use the word “partnering”, as it sends a better message.

Mary Glackin noted society has needs for climate information and these will grow. It needs an enterprise to meet that need; it won't be all met by public sector. If the U.S. recognizes this, the answer is not going to be NOAA or the agencies but will involve all sectors of society.

A member said climate information is one of the most critical issues the nation is facing. When the Weather Channel talks to users, the fact that data and information come from NOAA is not understood. There should be a communication on awareness and understanding. Communication of that message is an opportunity for fundamental education.

Tom Karl has been asked what the “official observations” are and NOAA can engage the private sector on defining what is useful for climate. This could be one area NOAA could engage its partners.

A member asked if there is agreement that NOAA needs to do a climate service, how should that be done? BGEN Kelly said the federal government does nothing quickly. But NOAA senior leadership has agreed to look at options to create Climate Service. NOAA is looking at what that means. Nothing will happen until there is a new Administration, but NOAA will be prepared to address that issue when the Administration is in place. Kevin Trenberth agreed that the new Administration should be regarded as an opportunity.

A member said this is an action item for the SAB that an advocacy team should plan to brief the new administration on the need for a Climate Service.

BGEN Kelly said if there is something wrong with the PPBES, NOAA needs more detail to fix it. Rick Spinrad noted that the PPBES process has impacts across all NOAA programs, not just climate.

A motion was made to accept the report and seconded. The overarching issues would be included in the report. A suggestion made to change wording of “external” or “outside” to partners or community. [However, later these were not found in the report, only in the presentation (which was altered to remove them)]

Action: The SAB accepted the report on the review of the NOAA Climate Observations and Analysis Program, subject to minor edits with respect to language characterizing non-NOAA partners, and will transmit the report to NOAA.

Action: NOAA will provide a response to the SAB on the review of the NOAA Climate Observations and Analysis Program.

Action: The SAB endorsed continuing reviews by the Climate Working Group of programs under the NOAA Climate Goal

Action: The SAB endorsed a proposal from the Climate Working Group for a retreat to include the members of the CWG and representatives from the NOAA Climate Goal to address the framework required for a national climate service.

Update Discussion on the NOAA Response to the Hurricane Intensity Research Working Group (HIRWG) Reports-*Greg Mandt – NOAA Research Council and NOAA National Weather Service; Frank Marks – Hurricane Project Lead and NOAA Office of Oceanic and Atmospheric Research*

Summary:

Greg Mandt stated that NOAA is on track to submit the final response to the SAB in November. On implementation, before hurricane season started the Hurricane Weather Research and Forecast model (HWRF) was implemented operationally and the NWS is using it along with the Geophysical Fluid Dynamics Laboratory (GFDL) model. It is showing very well on tracking Hurricane Dean. The HWRF model was able to forecast the intensification of Hurricane Dean to Category 5. This shows that dynamic modeling capability has improved to where NOAA starts to improve intensity forecasting. NOAA doubled the funding for the developmental test bed this year to sponsor operational models to research community to facilitate more rapid improvement on this model. In the FY 2008 President's Budget an additional \$10M was requested for operations and maintenance as well as increasing the hurricane research capacity by \$2M. In FY 2009, the agency is requesting additional funds to address hurricane improvement needs. The various external reviews as well as internal analysis show \$50-70M per year is needed over 10 years to make significant improvements in Hurricane Intensity forecasting. Several authorization bills were introduced in Congress to implement National Science Board recommendations for a national hurricane research plan. One concern with this Congressional interest is that many people/organizations come forward with differing approaches for addressing the problem in order to garner resources for themselves. NOAA worked with the National Academy of Sciences/Board on Atmospheric Sciences and Climate to work with the community in order to speak with one voice to Congress in order to increase the probability of increased funding for the community as a whole. To support this larger community approach, NOAA has begun a unified planning approach to make improvements in hurricane forecasting. This effort is unifying the many NOAA components working the issue and serves as a vehicle to work with the larger community. Frank Marks and Ahsha Tribble are leading that effort.

Frank Marks provided an overview of the hurricane forecast improvement project (HFIP). This project responds to input from stakeholders and recent National Science Board (NSB), Office of the Federal Coordinator for Meteorology (OFCM), and the Hurricane Intensity Research Working Group (HIRWG) reports calling for accelerated improvements in hurricane forecasts. They found the PPBES process invaluable and they are working with the programs and goal teams that feed into PPBES to develop the project plan. Frank provided some details of the project to date and indicated that the SAB would get a much fuller presentation at the November 2007 meeting.

They have laid out ambitious goals and by November will identify the NOAA strategy and requirements to meet the goals, and specify a process by which others can contribute through financial mechanisms such as grants.

Discussion:

A member asked if HWRF is now operational and if that output is seen by forecasting personnel in Miami. The response was that HWRF is used on a 9Km scale. Is there an evaluation mechanism? They have been looking at all outputs since May 15 since it became operational. The track statistics are made available on website.

A member asked if the HWRF developmental test bed center is available to community and supported? The answer is that it is expanded and they are working with capacity to support it. They will be hiring a contractor for HWRF support and to develop the training material to get people up-to-speed.

A member of the public pointed out that there are several issues with the HWRF model and the need to get down to 4KM resolution. NOAA responded that even at 4KM you do not have what is really needed (a comment was added that the need is 1KM and that is what the Hurricane Forecast Improvement Project (HFIP) plan is going to try to get support to accomplish). They are developing a plan to port it to a Department of Energy (DOE) supercomputer at 1KM to demonstrate the capability with a strategy to move such a model into operations in 5-10 years. They said the work with DOE is something that can have a big effect in a relatively short timeframe.

A member asked what they were thinking of hurricanes post-landfall. The response was that this is not envisioned as a main thrust of the HFIP plan. As recommended by the HIRWG report the Project plan is focused on improving the Hurricane Forecast System to provide better guidance to the forecasters. The impacts near landfall are an area where the NSB report and partners should take the lead.

Data Archiving and Access Requirements Working Group (DAARWG)-Ferris Webster – University of Delaware, and Chair, DAARWG

Summary:

Dr. Webster reminded the SAB of the DAARWG Terms of Reference and indicated that the group addressed two NOAA archive issues: 1) Multiple versions of data sets- a policy on retention of multiple versions is needed. If data sets are minimized, costs of

storage and data stewardship can be reduced. The conclusion is that NOAA should develop a retention policy. A useful first step would be a workshop involving users and NOAA data people and 2) The Comprehensive Large Array-data Stewardship System (CLASS) and the NOAA archive- the definition of what CLASS is seems to have changed over time from being a stewardship system to becoming the storage element of a NOAA archive. NOAA will benefit by clarifying the roles, responsibilities, and requirements of the participating elements of the archive in which CLASS will be a major element.

The DAARWG proposes that the SAB: 1) Recommend that NOAA develop a retention policy for multiple versions of datasets and 2) Recommend that NOAA define its archive requirements. This process would be aided by creating a NOAA archive architecture group.

Discussion:

A member of the public had comments on labeling versions of datasets. There is a need to have a flag on data sets that have an explanation so you can reconstruct data sets.

Mary Kicza noted that there is mistrust in the NOAA community of the CLASS system. What does the DAARWG think is the basis for this and does it contribute to the confusion? Dr. Webster answered that sometimes NOAA has not followed through in data archiving. Some NOAA programs elements are afraid their data would not be properly handled in CLASS. Their concerns are that security and data retention might be compromised. Some of this mistrust could be because CLASS was started for satellite data and not other data sets. Dr. Webster believes that these concerns would be lessened if there were a document that defines the policy and purpose of CLASS.

Tom Karl was asked how he addresses this in workshops. He answered that this has not been fully addressed in the National Climatic Data Center specific workshops but they have another chance to address it in a November workshop.

Mary Kicza said she appreciated the clarity of recommendations from the group so far. The group will be working on coping with data stewardship including unified protocols, and the role of data centers and centers of data.

A member asked about an online wiki data center. Tom Karl said he has no comments one way or another; this would need to be looked at.

A motion was made, seconded, and approved that the recommendations be accepted and transmitted to NOAA.

Action: The SAB accepted the recommendations from the SAB Data Archive and Access Requirements Working Group as presented and will transmit them to NOAA.

Action: NOAA will provide a response to the recommendations from the SAB Data Archive and Access Requirements Working Group.

Meeting Conclusion

The actions of the meeting were reviewed. The actions were approved by the SAB and the meeting was adjourned.

Actions

Action 1: The SAB Ocean Exploration Advisory Working Group will present to the SAB for action the final report and recommendations from the *Okeanos Explorer* Maiden Voyage workshop at the November 2007 meeting.

Action 2: The SAB Ocean Exploration Advisory Working Group will present to the SAB for action the report on the *Okeanos Explorer* Technology Workshop at the March 2008 meeting.

Action 3: The SAB accepted the report on the review of the NOAA Climate Observations and Analysis Program, subject to minor edits with respect to language characterizing non-NOAA partners, and will transmit the report to NOAA.

Action 4: NOAA will provide a response to the SAB on the review of the NOAA Climate Observations and Analysis Program.

Action 5: The SAB endorsed continuing reviews by the Climate Working Group of programs under the NOAA Climate Goal

Action 6: The SAB endorsed a proposal from the Climate Working Group for a retreat to include the members of the CWG and representatives from the NOAA Climate Goal to address the framework required for a national climate service.

Action 7: The SAB accepted the recommendations from the SAB Data Archive and Access Requirements Working Group as presented and will transmit them to NOAA.

Action 8: NOAA will provide a response to the recommendations from the SAB Data Archive and Access Requirements Working Group.