**Advisory Committee for Geosciences Directorate (AC/GEO)**

**April 14-15, 2010**

#### National Science Foundation

**MEETING SUMMARY**

**Members Present:**

**Dr. Louise H. Kellogg, Chair,** Geology Dept., University of California-Davis, Davis, CA

**Dr. Robert Beardsley,** Dept. of Physical Oceanography, Woods Hole Oceanographic Institution, Woods Hole, MA**.**

**Dr. Margaret L. (Peggy) Delaney,** Ocean Sciences Dept., University of California-Santa Cruz, Santa Cruz, CA \*

**Dr. Donald J. DePaolo**, Dept. of Earth and Planetary Science, University of California-Berkeley, Berkeley, CA

**Dr. Douglas E Erwin,** National Museum of Natural History, Smithsonian Institution, Washington, DC

**Dr. Efi Foufoula-Georgiou,** Dept. of Civil Engineering, University of Minnesota Twin Cities, Minneapolis, MN

**Dr. Vanda Grubisic,** Dept. of Meteorology and Geophysics, University of Vienna, 1090 Vienna, Althanstraβe 14 (UZA ll)

**Dr. Claudia Mora**, Los Alamos Scientific Laboratory, Los Alamos, NM

**Dr. Norine E. Noonan,** Division of Academic Affairs**,** USF St. PetersburgBay 204C, St. Petersburg, FL

**Dr. Walter A. Robinson,** Dept. of Marine, Earth and Atmospheric Sciences, North Carolina State University, Raleigh, NC \*

**Dr. Andrew Rosenberg**, Senior Vice President for Science and Knowledge Conservation International, Arlington, VA

**Dr. John T. Snow**, National Weather Center, The University of Oklahoma, Norman, OK

**Dr. Orlando Taylor**, Dean of the Graduate School, Howard University, Washington, DC

**Dr. Lonnie G. Thompson**, Byrd Polar Research Center, the Ohio State University, Columbus, OH

**Dr. E. Bruce Watson**, Dept. of Earth & Environmental Sciences, Rensselaer Polytechnic Institute, Troy, NY

**Members Absent:**

**Dr. Claudia R. Benitez-Nelson,** Dept. of Geological Sciences University of South Carolina, Columbia, SC

**Dr. Joseph Francisco**, Dept of Chemistry, Purdue University, West Lafayette, IN

**Dr. Tamas Gombosi,** Dept.of Atmospheric, Ocean and Space Science, University of Michigan, Ann Arbor, MI

**Dr. Claudia Mora**, Los Alamos Scientific Laboratory, Los Alamos, NM

 **Dr. David Schimel**, Principal Investigator and CEO, NEON Inc.., Boulder

**Dr. Paul Shepson**, Purdue Climate Change Research Center, Lafayette, IN

**Mr. Craig Stang**, Lawrence Hall of Science, University of California, Berkeley, CA

**GEO Staff Present**

**Dr. Tim Killeen,** Assistant Director, Directorate for Geosciences (GEO)

**Dr. Margaret Cavanaugh**, Deputy Director, Directorate for Geosciences

**Dr. Robert Detrick, Division Director, Division of Earth Sciences**

**Dr. Clifford Jacobs,** Section Head, Division of Atmospheric and Geospace Sciences, (AGS)

**Dr. Jill Karsten,** Program Director, Education and Diversity Program

**Ms. Melissa Lane,** Executive Secretary, AC/GEO, Directorate for Geosciences

**Dr. Jarvis Moyers**, Division Director, Division of Atmospheric and Geospace Sciences)

**Dr. Julie Morris,** Division Director, Division of Ocean Sciences (OS)

**Mr. William Smith**, Staff Associate for Budget

**Pam Stephens**, Senior Advisor, GEO

\*On phone

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The Advisory Committee for the Geosciences Directorate (GEO) was held April 14-15, 2010 at the National Science Foundation in Arlington, Virginia.

# Wednesday, April 14 2010

## Welcome and Introductory Remarks

The meeting was called to order at 8:30 a.m. Dr. Louise Kellogg, Chair, AC-GEO, welcomed the group and introduced new members: Dr. Margaret L. Delaney and Dr. Walter A. Robinson, who were on the phone, and Dr. Donald J. De Paolo. Dr. Kellogg reported that there had been much activity at NSF over the last year because of new programs and the interest in climate change. They presented challenges as well as new opportunities. She announced that in addition to the subcommittee meetings arranged by division, there will be subcommittees organized by task forces in the following topic areas: Facilities; Education and Diversity; International Activities; and Data and Informatics. She asked each AC member to volunteer for participation in one topic area. The goal for these new subcommittees is crosscutting conversations.

 The Geovision document was completed and though it took a lot of effort, it was very helpful in developing a strategic vision. Other directorates are very impressed with the outcome and are considering writing a similar document.

## The State of GEO

Dr. Timothy Killeen, Assistant Director, GEO said that the NSF budget is favorable because the Administration has a great interest in science and technology.

**The NSF FY 2011 budget** request totals $7.4B, which shows an increase to 8 percent. The increase came about because of a strong request from the Office of Science, Technology and Policy (OSTP). The President’s plan is to increase it to about 10.9 percent in 2016 which will show a doubling from 2009.

The theme for the FY2011 is “Innovation” and to keep NSF at its cutting edge. The American Recovery and Reinvestment Act (ARRA) provided $600M and allowed NSF to make 4500 awards. It also supports the development of the Alaska Region Research Vessel, “Sikuliaq”. The University in Alaska, Fairbanks, will manage the project.

Also included in the budget are: Graduate Research Fellowship Program, $158M; Faculty Early Career Development, $209M; Climate Change Education Program, $10M; and Advanced Technological Education, $64M. Interagency activities will support Networking and Information Technology and Research and Development and International Activities.

The GEO FY 2010 budget was at 10.2 percent over FY2009 including the agency-wide climate initiative. The President’s FY 2011 budget shows a 7.4 percent increase. The increase by divisions is: Atmospheric and Geospace Sciences (AGS), 8.1 percent; Earth Sciences (ES), 8.7 percent; and Ocean Sciences (OS), 8.3 percent. The budget will support the following programs and initiatives:

Science, Engineering, and Education for Sustainability (SEES), which is a cross-agency follow on to the 2010 Climate Research Activity, is a new initiative and is included in the 2011 budget. It will seek $35M. The emphasis will be on coastal areas subject to sea level rise and the Arctic, where warming temperatures and waning ice cover challenge the community.

SEES will generate the discoveries in climate and energy science needed to inform societal actions for environment. Economic sustainability will address science gaps and research; develop new models for research; and generate new understanding of the interplay of environment, energy, and environment. SEES portfolio is $765.5M in 2011. A “Dear Colleague” letter was sent to introduce SEES, which is a flagship initiative.

Dynamic Earthwill seek $29M over two years for new research programs emphasizing change and complexity in earth system processes. Some goals are to:

* Foster an interdisciplinary and multi-scale understanding of earth’s dynamic system ;
* Catalyze research in areas poised for a major advance and understanding;
* Improve observing networks and modeling capabilities to more realistically simulate complex earth systems and forecast disruptive events;
* Improve understanding of the resilience and sustainability of earth systems following disruptive events.

A solicitation will be developed for funding.

Infrastructure**--**We will continue to support the Ocean Observatories Initiative (OOI) and EarthScope. A solicitation for a National Astronomy and Ionospheric Center is in process. Operability expenses will be re-examined. OOI will be ramped up to include regional class research vessels. NSF’s 2011 budget request includes an increase of $11M to support the National Center for Atmospheric Research (NCAR)-Wyoming Supercomputer Center. Sikuliaq, formerly known as the Alaska Region Research Vessel (ARRV) will provide 800 sensors. There is a contract in place for fiber-optic cable to be connected to the shore line.

Dr. Julie Morris, Division Director, OS, said that future observatories will bring in biological and chemical sensors and will deliver data anywhere. This will demonstrate NSF’s work to the international community. Workshops will be conducted to maximize the interaction of ocean observatories.

Education and Diversity Themes**--**The 2011budget will request an increase in Graduate Research Fellowships and the ADVANCE program. The GEO-Ed program has received about 100 proposals. There is a new strategic planning effort for the Opportunities for Diversity in the Geosciences. Dr. Killeen showed a graph demonstrating the importance of diversity for the future of the Science, Technology, Engineering, and Mathematics (STEM) workforce. Minority populations will be at about 50 percent eventually, and the geosciences population is aging.

 Climate Research**--**There is a special emphasis placed on climate research in the current budget with several solicitations in process:

* Water: Sustainability and Climate; 311 proposals have been received. Deadline is 4/15/10.
* Ocean Acidification; 127 proposals have been received. Deadline is 4/26/10.
* Climate Change Education Partnership, Phase 1. Deadline is 5/24/10.
* Dimensions of Biodiversity. Deadline is 6/9/10.
* Decadal and Regional Climate Prediction Using Earth System Models. Deadline is 6/25/10.

There is a new interagency program to improve predictions of climate change consisting of NSF, USDA, and DOE.

Climate Research must be interdisciplinary and the approaches must be creative and high risk with problems that cannot becannot be undertaken in the core programs. The research support is shared across multiple directorates.

Other GEO events include a new Center for Dark Energy Biosphere Investigations (C-DEBI). GEO activities related to the earthquakes in Haiti and Chili approaches about $1M. NSF responded to the events in a very short time with equipment.

There’s been an increase in solar activity of sunspots since last November and there is a discussion going on about holistic space science within GEO. We are looking forward to a possible Solar Initiative with a multi-directorate participation. Also NSF has partially funded a study of discovery of a 2 million year old boy in South Africa.

Other events include a partnership with the American Association of Petroleum Engineers to increase funding in the earth sciences over the next 5 years. It is the first collaboration between NSF and the energy industry. There is an NSF Symposium on Interactions between Humans and Environment for grantees from the Dynamics of Coupled Natural and Human Systems program. GEO is participating in the Open Government Directive which is to develop a strategic plan for the directive. Its goal is to make available high value data from all parts of the government. Dr. Killeen was elected chair of the International Group of Funding Agencies in January 2010. A communications workshop in May will be sponsored by GEO and the Office of Legislative and Public Affairs (OLPA).

Dr. Killeen said he is hoping that success rates continue to be favorable. He would like to see it at 30-40 percent. He ended his presentation by thanking the AC-GEO for their participation during the last 2 years.

## Update on Dynamic Earth

Frontiers in Earth Systems Dynamics (FESD)

 Dr. Robert Detrick, ES, said that the initiative involves AGS, OS, and ES. Understanding earth dynamic systems is important. Strides have been made in understanding individual components of the earth system. Modern facilities and observing networks are providing data and advances in high computing. Interdisciplinary research is necessary now. Progress requires teams of investigators for large complex projects beyond the scope of those typically funded by core programs and we need to train the next generations of scientists.

**Established goals**

* Foster interdisciplinary and multi-scale understanding of earth dynamic systems;
* Catalyze research in areas posed for major advance in understanding;
* Improve modeling capabilities that couple across temporal and spatial scales and better forecast disruptive events;
* Improve understanding of the resilience of earth systems.

**Program characteristics**

* GEO wide program that includes AGS, ES and OS;
* Complements science funded through GEO core programs;
* Provides support for midsized activities that fall between core program and Science and Technology Centers/Major Research and Equipment and Facilities (STC/MREFC) scales.
* Capitalizes on major facility investments NSF is making to promote interdisciplinary study of interactive dynamics within the earth system over a wide range of space and time scales;
* Budget calls for $28 M per competition. There will be 3 competitions: FY2011, FY2013, and FY 2015.

A team established in early March will select 4-5 themes for 2011. Input will be provided by Program Directors and management throughout GEO. A solicitation will be released July 1, 2010 and pre-proposals will be due 10/1/, 2010. A Panel review will select invited full proposals for March 2011. There will be a mail and panel review of full proposals.

**Elements and Criteria**

* Type I-- Frontier research projects that bring together interdisciplinary teams on a focused research question and provide sustained higher levels of support;
* Type II-- Collaborative institutes of synthesis centers that promote interdisciplinary research and education at the community level and facilitate integration and validation of dynamic models with field and lab data.

A total of 6-8 are likely to be funded: award size $3-$5M, duration up to 5 years.

**Themes**

* Fundamental research on geo hazards;
* Research question approach focused on a few “big” interdisciplinary scientific questions at the Frontiers of Research in Earth Dynamics;
* No topical themes, but with explicit criteria (cross-disciplinary, multi-scale, and why poised for advance).

Dr. Detrick would like input from the AC-GEO on this topic.

**Criteria for Evaluation of Proposals**

* Must involve high risk/high return research (pushing NSF to devote more resources);
* Proposals that come into core programs that are identified as high risk and then become funded through this dynamic earth program;
* Poised for major advance in understanding;
* Requires a multidisciplinary approach beyond single core;
* Requires coupling across temporal or spatial scales;
* Must demonstrate that a team approach with a higher level of sustained support is not feasible through core programs;
* Must integrate synergy among disciplinary components;
* Must include a management plan.

**Discussion**

* Criteria seem like a high hurdle for a short time. How prepared is the community to do this? Some technology centers that were proposed may qualify and the cross divisional approach is important. There will be a learning curve and in time, new themes may emerge.
* How can you encourage new investigators? These proposals will be strongly collaborative and do not preclude young investigators getting together with more seasoned investigators since there is a team approach.
* What will panel look like since it must be interdisciplinary? Why wouldn’t these projects be submitted to the Continental Dynamics program? Also, there is a concern that a workshop has not yet been held. The high risk/high return terminology is demanding. Dr. Killeen said high risk/high return is not our language and he prefers transformational. It may be necessary to have more than one panel meeting to meet the requirements of interdisciplinary projects. There is one program at NSF that has held 20 panels.
* What about climate change projects? This initiative does not include climate change because that is covered by another initiative.
* An AC member suggested that the National Research Council could help to guide the program by including relevant information in their reports.
* The AC requested that the language in the proposals would connect with the social sciences and was told that social sciences will be included.

## Preparation for Meeting with Dr. Arden Bement, Director, NSF

Dr. Kellogg asked AC-GEO members for input for the discussion with Dr. Bement. Topics raised were:

* The role of GEO within SEES. How is SEES relating to social science?
* Connecting infrastructure in a larger way;
* Interagency partnerships;
* Diversity building;
* Integrating social scientists with physical scientists and the lack of community response;
* How can we get the study of earth sciences to be a respected science in high school? Is a partnership with the Dept. of Education possible?
* How can we promote and sustain careers of beginning investigators in order to ensure the next generation of scientists?

## Division Subcommittee Meetings

The AC-GEO broke into subcommittee meetings on AGS, ES and OS. The full AC-GEO meeting resumed at 1:30 p.m.

## Meeting with Drs. Arden Bement and Cora Marrett

Drs. Bement and Marrett met with the AC-GEO. Introductions were made. Dr. Bement noted that the Administration considers investment in science and technology for innovation a top priority. NSF’s budget request is for $7.4 B. NSF will reach the end of its doubling path in FY 2016.

The key word for the SEES priority is sustainability. We can’t have sustainable energy without a sustainable environment and both need a sustainable economy. The huge increase in the global change program is an indication of how important climate change and adaptation to climate change is to the government. Because of the human factor involved, it is expected that the Directorate for Social and Behavioral Sciences (SBE) will have a big role in the priority.

There are continuing investments in the OOI which was helped significantly by the ARRA act. About $10M has been set aside for climate change education and for developing the next generation of scientists and engineers. To facilitate climate change research, NSF is supporting the Wyoming project operated by the National Center for Atmospheric Research (NCAR). Its primary purpose is for climate change modeling. The National Ecological Observatory Network (NEON) will provide many challenges because of the large amount of data that it is generating. Upgrades in cyberinfrastructure, a collider, and Atlas detectors are in process. Also underway are the Human Submersible upgrade of Alvin and the construction of Sequiaq, which is expected to be completed in 3 years.

**Discussion**

* Since SEES has such a wide portfolio, how will the programs relate to each other? Dr. Bement responded that there will be interrelationships of energy, environment, and economy.
* The strategy at NSF to enhance an interdisciplinary approach between physical and social science seems to be working but how can we encourage the community as well? Dr. Bement said we must develop a cordial relationship with social scientists. New people in the social sciences welcome relevancy and they recognize global problems. But the problem is to get them to connect without jeopardizing their tenure. Dr. Bement said to fully define their role in the program, give them understanding of the grand challenges and stress their importance in building strong instrumentation for diagnostics.
* Since Dr. Bement will be leaving NSF soon, he was asked what advice he would give to his successor. He said the new director should have a deep commitment to NSF and be accessible.
* The importance of geosciences to national scale is still missing; earth and environmental sciences are not required in secondary school. How can GEO get involved to promote these studies? Dr. Bement said that the focus should be on inquiry-based learning. Teachers get a very poor science education, and generally are under prepared. NSF’s K-12 programs bring science into the curriculum but there needs to be in-service programs for the teachers. The science community could help by coming into the classroom on occasion and including the visits in their proposals. Dr. Marrett said that there is a working group looking into the science curriculum.
* The talk on broader participation continues but there is still a significant drop off of women. Perhaps mentoring could be set in place to encourage women and minorities. The census reflects that those who are now a minority will become the majority so we need to get them into the workforce. Dr. Bement said that ADVANCE was set up to bring women into the sciences; however we also have to engage the professional societies and the faculties for mentoring.
* GEO has had major accomplishments in facilities such as EarthScope, etc. Are there lessons learned from the past that will help us going forward to improve observational facilities? Dr. Bement said NSF is now very careful in the design process so that facilities not only meet high standards but are educational. Also, a lot more attention is paid to operation and maintenance costs, keeping them in balance with research costs.
* What has NSF done to promote work outside the laboratory in order to demonstrate to students that a STEM education can result in many opportunities? Dr. Bement said providing the workforce for the 21st century also includes promoting workforce for STEM educations. He agrees that it is a topic that needs further discussion.
* Where is the next frontier between sensors and engineering? Geosciences engineering is a growing field. Every department in civil engineering has a geosciences component. Earth sciences departments engage both physicists and engineers now. Mitigating our carbon footprint will require many engineers. .
* Since geosciences are global, what are your thoughts on new international initiatives? Dr. Bement noted that in other parts of the world, the frontier might look different from ours. Communication with broadband is fast and everything is virtual so science continues 24/7 through collaborative activities; therefore we have to provide students interactive experiences.

Dr. Killeen thanked Dr. Bement for his service to NSF and to GEO and presented him with a framed photo of Sequiliaq since he was instrumental in getting this ship built.

## Briefing on GEO Responses to Earthquakes in Chile and Haiti,

Haiti Earthquake

Dr. J. Whitcomb, ES, reported that prior to the earthquake, a group of NSF scientists had identified the fault and predicted a 7 plus earthquake in Haiti. When the earthquake occurred, the group immediately asked for a Rapid Response Award and returned to Haiti to assist in the recovery. They realized that much of the slip had occurred after the initial quake. In addition to the awards that NSF funded, there was a Haiti Reconstruction Workshop. With funding from NSF, the United States Geological Survey (USGS), a report was generated on the US Agency for International Development (USAID) web site. A group from Purdue University mapped the faults after the earthquake. Other proposals are currently being reviewed. NSF funded the ship, Endeavor, to study the fault on the ocean floor. Most of the delta had disappeared as the result of tsunamis.

Chile Earthquake

The earthquake in Chile measured 8.8.NSF had funded several GPS’s that were in place at the time. There were many Rapid Response proposals submitted involving strong motion instruments, tsunami mapping, coastal uplift, multi-beam sonar bathymetry, and GPS and seismic investigations. Among the instruments deployed are 20 GPS instruments to Chile, 5 GPS’s to Argentina, and 60 seismic instruments to Chile. The research vessel, Melville, was deployed to the area. In only 12 days, 58 portable broadband seismic instruments were set in place along with a special short term deployment of 6 accelerometers to investigate site response and possible relationship to building damage.

Baja Earthquake

The Baja Earthquake, April 4, 2010 was a 7.2 magnitude. NSF had previously performed two “ShakeOuts” (simulations of disaster response); one in 2008 and one in 2009 in areas where millions of people would be directly affected by earthquakes. The simulations showed what could be done to reduce loss. Responses to earthquakes are social, economic and behavioral and since we can predict where they will happen, people should be informed so they can prepare. This would help save lives by improving response time.

**Discussion**

* An AC member asked what NSF’s capacity is to respond since there are so many earthquakes. About $1 M has already been spent for instruments but they then ran into a resource limitation because the Industrial Research and Development in Technology (IRIS) program had already used their equipment. There still was capacity in the EarthScope pool so those were sent. Seismic equipment is almost all committed at this time. The military and the Argentine and Chilean Embassies were helpful as were the Office of International Science and Education (OISE) and the USAID.
* What is the follow up with all the data that is being collected? It will be analyzed over time.
* How fast is your response time? We can approve the Rapid Response Grants almost immediately. They were turned around in one day for the Haiti Earthquake. Haiti received 5awards; Chili received 10; and Baja received 4.

## Presentation on Advanced Modular Incoherent Scatter Radar (AMISR)

Dr. R. Behnke, AGS, provided an update on AMISR. He posed the following questions: Why are Incoherent Scatter Radars (ISRs) so big? What do they look like and why? What do they measure? The theory was to build big radarto get a picture of all different parameters at different heights. We need to know this because there are complex systems that require a lot of parameters to understand how they work. The Sun/Earth system is a tightly coupled extremely complex system subject to cross scale coupling and non linear dynamics.

Many radar facilities have been built since 1958, in Europe as well as in the US. A workshop was conducted prior to building AMISR at the Polar Cap. Three design studies were funded by NSF and an early Polar Cap observatory was built. The observatory proposal was well received. It was presented to Congress but the Senate opposed. There was a dispute over salmon fishing rights of Canada and Alaska. In order to avoid conflict, a portable facility was built in Resolute Bay. NSF/AGS set aside $44M for construction of a portable ISR for 4 years.

AMISR is very innovative because it is the first incoherent scatter radar built by NSF: the first built for basic research; enables remote access and low dutycycle observations; and is modular and portable. It is also used as a rocket range for NASA sounding rockets. In a fraction of a second it can measure a whole region. There is a 2 week summer school operating remotely to teach students how to operate it.

Future plans include finding CubeSats, and AMISR will pick up the signals. We were awarded $20M from the Canadian government to construct another facility for further study. We are also thinking of moving the one in Poker Flat to Argentina.

**Discussion**

* Dr. Killeen said this is an example of mid-sized infrastructure. The funding was built into the regular program over a period of time. We hope to continue building budgets into the divisions to fund mid size infrastructure. Dr. Behnke said there was a workshop to put one in McMurdo and moving it to the Antarctic is in the offing. We may also join with the Office of Polar Programs (OPP) to build one there. The cost of building one is about $15M and to move it costs about $1 M.
* What is the long term future of this? Dr. Behnke said it would be prudent to replace some of the old radar dishes with the new technology because it would lower the operational and maintenance cost because it doesn’t take much manpower.

Dr. Killeen asked the group for suggestions for presentations on other facilities at future meetings.

## Discussion of Establishing Topical Subcommittees: Facilities, Education and Diversity, International Activities, and Data and Informatics

Dr. Kellogg asked the AC-GEO for their thoughts on the establishment of topical committees and described the goals of each group. Dr. Killeen has established teams on each of the subjects and asked that the discussions be conducted in the context of the GEO vision document. The charge to the themes is on the informational website. The structure is for two co-chairs from the Divisions which should also include IPAs in each group.

Facilities-- The group will be chaired by Dr. Don DePaolo. They will consider the future of MREFCs since the costs could go up to $4M. The group is asked to deliver a facilities plan for September 2010 to include input, strategy, and budget advice. Also to be considered is the need for midsize infrastructures.

Education and Diversity-- The group will be chaired by Dr. Orlando Taylor. The NSF staff will include Dr. Jill Karsten and Lina Petina. We are looking for an aggressive plan of action and strategic advice.

International Activities --The group will be chaired by Dr. Norine Noonan. The charge is to look at scientist to scientist interaction and focused science programs. NSF staff will include Jamie Allen and Pam Stephens.

Data and Informatics--The group will be chaired by Dr. Bruce Wilson. NSF staff will include Cliff Jacobs, Kyle Baker and Jason Day. ES has expressed interest in holding a high level workshop, since there have been huge data challenges generated by the Cyberinfrastructure priority. There has already been a conference on high level computing. A goal is to have a strategic plan for October 2010.

**Discussion**

* Dr. Killeen noted that GEO has much experience with deep oceans, IRIS, and data. OOI has a very aggressive cyberinfrastructure component. How do we build a larger federation on data integration and link to others or do we want more compartmentalized data?
* Dr. Noonan said that Data and Informatics are s inextricably connected to Facilities and that raises the issue of data and interoperability. The two subcommittees are intertwined.
* Dr. Snow raised a question about security and the preservation of essential data. That should be part of the charge to the Data and Informatics committee.

With no further discussion, the meeting adjourned at 5:15 p.m.

# Thursday, April 15, 2010

Dr. Kellogg called the meeting to order at 8:30 a.m. She introduced Dr. Margaret Cavanaugh, Deputy Assistant Director, GEO.

## Update on NSF Strategic Plan

Dr. Cavanaugh said the Plan is in process now and she would like input from the AC-GEO by early May. The Strategic Plan Working Group consists of deputies from each directorate and is required by GPRA legislation. Each Directorate is to provide a 5-year plan every 3 years and include the mission, strategic goals, performance goals, external risk factors strategies, and means of evaluation. The final plan is then submitted to the Office of Management and Budget (OMB).

The mission statement is to promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense. The vision, as stated in the old plan, was to advance discovery, innovation and education beyond the frontiers of current knowledge and to empower future generations in science and education. The current strategic goals are learning, research infrastructure, discovery and stewardship.

The vision statement of the new plan is to promote a nation that capitalizes on advances in science and engineering and provides global leadership in science and engineering. The proposed new goals are:

* Transform the frontiersby coupling research, education , and infrastructure;
* Innovation for society which points to the tight linkage between NSF programs and societal challenges and highlights the role that new knowledge and creativity play in economic prosperity and society’s general welfare;
* Perform as a model organization, which is parallel to stewardship, and emphasizes the importance of NSF as an exemplar of an agency that expects to attain excellence in all operational aspects.

The framework shows examples and emphasizes what kind of short-term, mid- term and long-term goals there are. It also discusses making investments for new fields of science and preparing and engaging a STEM workforce. It stresses the importance of Committees of Visitors (COVs), shows Sample Indicators of Progress and includes data from administrative systems on the merit review process. The plan also includes a section on strategies and means.

Dr. Cavanaugh asked for input from the AC as soon as possible since there will be a meeting about the plan in May. The plan will then be revised based on OMB comments and the National Science Board’s (NSB) approval, with the final plan due in July.

**Discussion**

* People and diversity are not mentioned strongly in the new version and this will probably invite criticism. Dr. Cavanaugh commented that this is an important point.
* It is important not to make promises about innovation that can’t be kept.
* Education is not well covered in the current plan.
* Performing as a model organization seems out of place and was possibly included to pacify OMB.
* It speaks to the value of NSF and its people and to the nation.
* Dr. Killeen said a comment was made by someone on the committee that prefatory material was not very motivational and suggests that the AC look at that. He also thinks that the plan needs some editing since the document seems to cover what we do, rather than why we do it.

Dr. Cavanaugh requested that the AC respond with comments either as individuals with suggestions as soon as possible.

## Topical Subcommittee Meetings

The AC-GEO broke into topical subcommittee meetings on International Activities; Education and Diversity; Facilities; and Data and Informatics.

## Division Subcommittee Reports

**Division of Ocean Sciences (OS**)

Dr. Robert Beardsley, Chair, reported that proposals in response to the solicitation, Frontiers in Early Systems Dynamics (FEDS), are due on August 16. The subcommittee asked for a review of last year’s activities in fulfilling the requirement for broadening participation and diversification. They considered four specific plans to improve the transition of underrepresented minorities and women from graduate students to post docs. The following action items were proposed: increase support for NSF graduate fellowships in OS; provide travel awards to facilitate post doc fellowships; award post doctoral fellowships; and provide early career research facilitation awards. The subcommittee fully supports proceeding with the above items.

Grant amounts have been very limited in GEO for post doc fellows in the past and this will not help to provide broader participation and diversification. The graduate fellowships are very competitive, particularly small grants. Dr. Morris said graduate fellowships are more likely to go to students at larger universities. They are limited to first year students and those students who are more knowledgeable about the grant process are the ones that usually receive them. The structure of the process may limit other students so we should consider restructuring the whole process.

**Division of Earth Sciences (ES)**

Dr Claudia Mora, Chair, said the group was provided with an overview of the budget which has been increased. They discussed the upcoming Dynamic Earth Initiative and found that there is still some confusion as to what dynamic earth means and a concern that responses may be too great for the staff to work with. Since the budget has increased, the program managers are handling a larger workload. Dr. Mora suggested training new staff to alleviate the strain on the existing staff and suggested bringing in more rotators. Areas that were underfunded are now better off.

**Division of Atmospheric and Geospace Sciences (AGS)**

Dr. Vanda Grubisic, Chair, announced that Dr. Michael Morgan is the new director of AGS. A report was given on the NCAR supercomputer. It is proceeding as planned with an increase in the award to $58 M. This will have implications on the Division’s budget. There was an update on the Advanced Technology Super Telescope on Maui. A clear plan has been laid out with completion expected in FY 2017. An update was also provided on the Climate Research Investment (CRI) initiative.

There was a discussion on the Dynamic Earth initiative. It was decided that the community will need guidance on its scope and a suggestion was made that the solicitation specify the type of topics being sought. Concern was expressed for the additional workload on staff and the difficulty in obtaining reviewers. A COV of Lower Atmospheric Research was conducted but the report was not ready in time for the meeting.

Dr. Kellogg commented on the heavy workload across NSF. Dr. Killeen said there is a limited number of staff that is mandated. ES has filled their vacancies but shortage is a critical problem. Dr. Bement has asked for 10 percent increase in staff but this often gets cut back in the President’s budget.

**Discussion**

* Dr. Detrick, ES, said there are 8 positions that will turn over during the next year but they are not vacancies, just replacements. He noted that the applicant pool is small and although they try hard to publicize openings, it doesn’t seem to engender more candidates. He asked for suggestions from the AC-GEO.
* Dr. Cavanaugh suggests this must be a particularly hard time to recruit because universities are downsizing their staff due to the economy and there may not be a position available after one’s term at NSF is completed.
* A suggestion was made to look for senior faculty who may be ready to make a change

## Topical Subcommittee Reports

**International Activities Subcommittee**

Dr. Noonan said her subcommittee met with an internal GEO team which was led by Jamie Allen and Pam Stephens. International science and geosciences is an enabling strategy to achieve GEO goals as well as NSF goals but some guidelines are needed. A list of GEO’s international activities was made last year but we need to know how they are supported with funds and staff. A draft strategic plan framework was prepared that will be sent to the AC-GEO chair. The GEO internal group will meet with OISE. Also discussed was how GEO could assist NSF in non-US led research as in small countries.

It appears that there is not a strong emphasis on international science and engineering in areas such as food and water and the strategic plan ought to include that since that is what guides NSF’s investments. The AC agreed to keep in contact with the GEO group. A suggestion was made to overlap the AC-GEO and the Advisory Committee on International Science and Engineering (AC-ISE) next fall.

**Discussion**

* Dr. Cavanaugh suggested that the committee members look at the strategic plan keeping in mind their discussion about the lack of research on food and water related to international science and engineering.
* We have to be proactive and involve as many students as possible in overseas experience since we are in a global economy and have to be careful about how we present ourselves to the rest of the world,. We need to think of safeguards when we work bilaterally, particularly with innovation (products to market, etc.) Dr. Noonan responded that there are talks in process about export control.

**Facilities Subcommittee**

Dr. Don DePaolo, Chair, said that OS and ES provided information on mid- scale projects that are underway. The following questions were raised.

* Funding**--** Should there be a separate program or just money set aside by each division?
* Strategy-- What should be the process for generating proposals?
* Evaluation--What are the criteria?
* Prioritization**--** What is the process for reviewing and prioritizing proposals?

Other questions raised by the group were: Is it more important to fund MREFCs or midsize projects? What can ensure that facilities are planned and used well? How can GEO facilitate and coordinate infrastructure planning across the Directorate? Would it be useful to better define the role of NSF compared to other agencies? What types of facilities need to be coordinated with other agencies?

There was also a discussion on the MREFC process and a timescale for development. Since the development takes a long time (up to 20 years), is there a more efficient way? Operation and maintenance costs need to be carefully considered. There is a guide to ES multiuser facilities available online that could generate some excellent ideas. Finally, the subcommittee will provide feedback to the GEO team when their report is developed.

**Discussion**

* We should think about a connection between Facilities and Education and Diversity in relation to community colleges with higher minority populations. Dr. Detrick said that recent solicitations have monetary incentives for facilities that include a diversity plan. It is not required but is encouraged.

**Data and Informatics Subcommittee**

Dr. Bruce Watson, Chair, said that the group listed objectives that were discussed in the meeting:

* Evaluate the scope of the problem across the Directorate (gather information through outreach).
* Look for common ground among divisions.
* Look at models elsewhere such as the National Institute for Statistics and Technology (NIST), the National Atmospheric and Aeronautic Administration (NOAA), and USGS.
* Evaluate Facilitiesand Data (sensors, model output, objects and legacy data) to determine what makes a database different from a ship and to find out who owns a database.
* Set priorities as key.
* Understand cultural differences across divisions.
* Discuss how much GEO should invest as proportion of available funds.
* GEO should consider linking more actively with the Office of Cyberinfrastructure (OCI).
* Compare notes with the Directorate for Biological Sciences (BIO).
* Invite selected experts to the workshop in October.

GEO has a long record of funding and maintaining a large number of databases but is there a way to consolidate and economize? There is a problem because the overall NSF policy is not known; however GEO has always been a leader in informatics and infrastructure. Linking with the other subcommittees on Facilities, and International Activities is important since they are all connected.

**Discussion**

* The four topical areas and their working groups should meet together because they are so interconnected. Interoperability and data sharing issues may impede international activities. A suggestion was made to convene the co-chairs. We will put that suggestion that the teams meet regularly on the AC-GEO agenda..
* Long term sustaining data would be very expensive so Dr. Killeen suggested that data and informatics be part of our near term budget planning.
* We are losing data daily because there was not a plan but SEES gives us an opportunity to include this.
* We need a policy to preserve data but how do we select what we keep? Dr. Killeen suggests getting a briefing on the subject from someone, possibly at NCAR.
* Saving the data alone is not sufficient .because the metadata has to be saved also. We also need tools for visualizing.

**Education and Diversity Subcommittee**

Dr. Taylor, Chair, reported that the group was shown a current education and diversity strategic plan prepared by GEO and that it included a lot of activity in all the divisions. The point was made that there is a lot of empirical evidence that needs to be transformed into best practices. It was suggested that we convene a working group on geosciences education and a second one on diversity. The Directorate for Education and Human Resources made a presentation and proposed some changes to their programs. There was also a discussion on how to communicate what we know to the community. We should include this information at PI meetings for geosciences research programs and convene chairs of meetings so that they can brief reviewers and program officers. NSF needs to do more marketing of its education and diversity programs at the university level.

There are some funding requirements for a diversity plan that GEO might consider using as a model in the future. The Division of Chemistry has such a plan. We should look for a way of identifying and rewarding champions of education and diversity by developing a model, and creating a strategy. It is time to observe what GEO and the Education and Diversity Program has accomplished.

**Discussion**

* An AC member asked Dr. Taylor whether geosciences programs are included at community colleges. He responded that they don’t seem to have much of a presence there and there is a disconnect since there are so many minority students attending community colleges.
* Dr. Killeen asked who should be in the GEO education working group and the diversity working group. Dr. Taylor said that some should come from the AC-GEO, some from the community and others not necessarily in the field.
* .An AC member said that the geosciences have not have much luck in getting people involved and suggested looking at professional societies for members of the working group.
* Dr. Karsten said there is interest in the state level to create an integrated science course in school, but to do that they would have to redesign the K-12 curriculum. We need to continue to stress the importance of geosciences.

## Action Items, Meeting Evaluation, Wrap Up

Dr. Kellogg asked for a motion to approve last fall’s AC-GEO meeting notes. The motion was made and passed. The next meeting of the AC-GEO will be held October 6-7, 2010. Dr. Kellogg thanked Drs. Killeen and Cavanaugh and NSF staff, including the division directors for their assistance. With no further discussion, the meeting was adjourned at 2 p.m.

ACTION ITEMS

* Committee chairs need to distribute materials that were discussed in the topical subcommittees.
* The AC-GEO must respond to Dr. Cavanaugh’s request for input to NSF’s Strategic Plan. Responses should be sent to Dr. Kellogg who will tabulate them and submit them.
* The AC-GEO is requested to provide suggestions for publicizing staff openings in ES and suggestions for themes for the Frontiers in Earth Systems Dynamics to Dr.Detrick.
* Provide suggestions for presentations on major facilities at future meetings to Dr. Killeen.
* The four topical areas and their working groups should meet together because they are so interconnected.
* The topical areas teams and their working groups should meet regularly.
* Overlap the meetings of the AC-GEO and the AC-ISE, if possible.