Meeting Minutes of the Subcommittee on Disaster Reduction

3 November 2011, 10:00 a.m. to 12:00 p.m., White House Conference Center Lincoln Room

Italics indicate absent members. "T" indicate members participating via teleconference.

Co-Chairs

David Applegate (USGS)
Margaret Davidson (NOAA) (T)
Dennis Wenger (NSF)

OSTP Liaison

Tamara Dickinson (OSTP)

Designated Representatives

BLM *Edwin Roberson*
Daniel Lechefsky
CDC Mark Keim
DHS Bruce Davis
DHS/FEMA *Sandra Knight*
DHS/USCG *Austin Gould*
DOD *Al Johnson*
DOT *Kelly Leone*
Sheila Duwadi
EOP/OMB Grace Hu
EOP/OSTP Tamara Dickinson
EPA *Peter Jutro*
Stephen Clark
FERC Pamela Romano (T)
HUD *Dana Bres*
NASA *Craig Dobson*
NGA *Paul Lewis*
NGB *TBD*
NIH Allen Dearry
NIST *William Grosshandler*
NOAA Margaret Davidson (T)
Laura Furgione
NPS Marcy Rockman
NSF Dennis Wenger
OPHS Sven Rodenbeck (T)
State *Nicholas Suntzeff*
Fernando Echavarria
USACE *Steven Cary*
Dimitra Syriopoulou
USAID *Sezin Tokar*
USDA *TBD*
USFS *Carlos Rodriguez-Franco*
USGS David Applegate
USNRC Brian Sheron

Other Attendees

DHS Mary Ellen Hynes
DHS/FEMA Rachel Sears
NIST Marc Levitan
NOAA Tom Bogdan
Michael Bonadonna
Nell Codner
Genene Fisher
Margaret McCalla
Tracy Rouleau
OSTP Marc LeBlanc
USGS Jeff Love
USNRC Brett Rini
Secretariat Ross Faith
Barbara Haines-Parmele

Agenda

10:00 Welcome and Introductions
10:10 Presentation: Space Weather and the National Space Weather Program
11:10 Report from the Co-Chairs and Approval of Minutes
11:30 Report from the OSTP Liaison
11:55 Close and Next Actions

Handouts

- Agenda
- Draft October Meeting Minutes
- Draft Charter for NWIRP Working Group
- Draft Charter for International Working Group
- SDR website redesign mock-up
- National Space Weather Program one-pager
- SDR *Grand Challenges for Disaster Reduction Implementation Plan: Space Weather*
- NOAA Space Weather Scales

I. Welcome and Introductions

Subcommittee on Disaster Reduction (SDR) Co-Chair David Applegate (USGS) called the meeting to order at 10:00 a.m., and participants introduced themselves.

Applegate welcomed back Marcy Rockman, formerly a AAAS Fellow with the EPA, who had recently transitioned to the National Park Service and anticipated continuing her involvement with the SDR under the umbrella of the Department of the Interior.

Applegate also welcomed Grace Hu of the White House Office of Management and Budget (OMB). Hu stated that her portfolio in OMB's Commerce Branch included activities of the National Institute of Standards and Technology and the National Oceanic and Atmospheric Administration, and therefore extended to aspects of disaster reduction related to weather, space weather, and earthquake hazards.

II. Presentation: Space Weather and the National Space Weather Program

Dr. Tom Bogdan (NOAA/NWS) and Mr. Michael Bonadonna (NOAA/OFCM) spoke to the SDR about the space weather hazard and the National Space Weather Program.

Tom Bogdan is Director of the NOAA/National Weather Service Space Weather Prediction Center and co-chair of the National Space Weather Program (NSWP) Committee for Space Weather. During his career that has spanned basic research, grants administration, program development and operations management in solar-terrestrial physics in both the public and private sectors, Bogdan has held several positions, notably as a senior scientist and administrator with the NSF-sponsored National Center for Atmospheric Research, and as Program Director for the Solar-Terrestrial Research Section of NSF's Atmospheric Sciences Division.

Bogdan explained that advanced technologies that are part and parcel to national security and the global economy, like satellite-delivered services, global positioning, and uninterrupted access to power and transportation, all carry vulnerabilities to space weather, and particularly extreme space weather events. He added that as society becomes ever more dependent on those applications for daily life, the importance of mitigating space weather impacts correspondingly rises.

Space weather manifests in three different varieties. First, solar flares produce ultraviolet and x-ray radiation that, traveling at the speed of light, takes 8 minutes to reach Earth's atmosphere, where it is absorbed. Because the ultraviolet and x-ray radiation arrives so quickly, there is no forewarning. The principal impacts of the radiation include radio blackouts and disruption of global positioning systems (GPS). The radiation released by solar flares is the largest single source of GPS position error. When solar flare radiation is low, GPS error averages about one foot. However, large space weather events can produce errors up to approximately 50 yards, with implications for a number of applications that involve positioning, navigation, and timing, such as financial transactions, deep sea drilling, and precision agricultural, among others.

NOAA has developed three scales to correspond with the three different varieties of space weather. For each scale, the severity of an event is rated one through five. The rapidly arriving ultraviolet and x-ray radiation – the first variety of space weather - is measured on what's known as the "R" scale. So an R-5 event would signify a large release of ultraviolet and x-ray radiation, and on each of the other scales, the designation "five" would similarly indicate a large event.

The second variety of space weather is released in the form of energetic charged particles, such as protons and hydrogen nuclei. The intensity of these charged particles is measured on the "S" scale. Traveling a bit slower than the speed of light, they take between 10 and 30 minutes to reach Earth and principally impact geostationary satellites. The charged particles cause bit-flips in the sensitive electronics onboard

satellites that lead to bizarre commands within a satellite's "brain" and detrimental actions that can result in the entire loss of a satellite. There are several examples of satellites over the last two decades that have been completely lost and disabled because of space weather events. There are over 300 commercial satellites in geostationary orbit alone at a cost of about 200 million dollars per satellite. Especially in developing countries, which do not have the financial resources to construct large, in situ infrastructure, satellite-delivered services, such as telecommunications and telemedicine, are becoming ever more important.

The third variety of space weather is produced by coronal mass ejections (CMEs). The CMEs propel magnetized material toward Earth in something like a "space tsunami". The magnetized material takes approximately 18 to 96 hours to make that 93 million mile trip from the Sun to Earth, and is responsible for producing the aurora borealis and australis, also known as the northern and southern lights, respectively. The magnitude of the magnetized material released is measured on the "G" scale. CMEs can impact power grids and pipelines, although impacts on power grids are likely to be the largest.

Power grids and pipelines essentially act as giant antenna systems. Upon reaching Earth, the magnetized material released by CMEs cause fluctuating fields and spurious currents in power lines, leading to constant direct current flowing through the lines and ultimately overloading the transformers at the end of those lines. The concern from a national security perspective is that transformers are essentially "one-off" devices that have a normal lifespan of 40 to 50 years. So when one burns down or is out of commission, it takes time to replace it. Currently there are only a few companies left in the world that build transformers because they are such boutique items, so a large geomagnetic storm with a potential to take out many tens to perhaps a hundred transformers across the U.S. and Europe presents a big disaster scenario of extended power outage. Like the power grid, pipelines also act as big conductors, although damage from the magnetized material manifests differently. The increased electrical load does not adversely impact anything at the end of the pipelines, but rather, produces an electro-chemical process between the oil and the metal that causes the pipelines themselves to break down more rapidly. These impacts are especially pronounced in the pipelines on Alaska's North Slope, where fluctuating magnetic fields are more common.

The sun has an activity cycle lasting about 11-12 years and a "season" in the similar sense that there is a hurricane season. However, data collected over the last half-century have shown that the largest geomagnetic storms did not necessarily occur at the solar maximum, or "peak season", and that an otherwise relatively tranquil solar cycle can still produce a very large solar storm, in much the same way that a massive, once-in-a-decade-type hurricane may occur during a hurricane season that is otherwise fairly quiet. Beyond a rough sketch of the solar cycle and short-notice warnings, science has almost no capacity to predict space weather before events occur. While processes are in place in the U.S. and abroad to improve the capacity, Bogdan explained that the maturity of space weather forecasting is essentially at a developmental phase akin to where meteorology was in the late 1950's and early 1960's.

Based in Boulder, Colorado and operating around the clock, NOAA's Space Weather Prediction Center (SWPC) is the Nation's official source for space weather alerts, watches and warnings. The Air Force Weather Agency handles classified products and services and information for the military and the intelligence community, and the SWPC partners with the Air Force to provide a seamless suite of products and services for the Nation. Industry and the general public can sign up for SWPC products and services at www.spaceweather.gov. The SWPC has an annual budget of about $9 million and leverages NOAA's operational satellites, the GOES spacecraft, and also NASA's research satellites to bring in data for space situational awareness. The SWPC is also closely connected with FEMA Region 8 Headquarters in Denver, which has been designated as the Center of Excellence for Space Weather.

The key U.S. asset that enables the SWPC to issue alerts, watches, and warnings is the Advanced Composition Explorer (ACE), a NASA research spacecraft that was launched in 1997. The spacecraft sits at the L-1 Lagrangian point, well out beyond the geostationary satellites, and acts as a sentinel for precisely measuring incoming magnetized materials from CMEs. After a CME is observed on the Sun's surface, the SWPC attempts to model what the impacts on Earth will be, but it is the ACE spacecraft, much like an ocean tsunami buoy, that actually provides the critical data on the magnitude and exact timing of inbound magnetized material. The ACE spacecraft affords anywhere from 20-50 minutes of lead time for the SWPC to issue warnings to power grid operators and other affected industries so they can take appropriate actions to safeguard the Nation's critical infrastructure. Bogdan noted that the budget situation had delayed work on replacing the ACE spacecraft, which is now 14 years old and past its intended operating lifetime. A failure of the ACE spacecraft would leave the U.S. without the ability to deliver these short-notice warnings since no redundancy exists for this capability. Funding for a follow-on spacecraft is currently being considered by Congress.

Michael Bonadonna (NOAA/OFCM) spoke next to the SDR. Bonadonna is the Executive Secretary for both the National Space Weather Program Council and the Committee for Space Weather, which is organized by the Office of the Federal Coordinator for Meteorology (OFCM). Before joining NOAA, Mr. Bonadonna held several leadership and staff positions during a 23-year career with the Air Force, including as a Master Meteorologist, Politico-Military Affairs Officer, and International Program Manager.

Established in 1995, the National Space Weather Program (NSWP) is a partnership of nine federal agencies to advance solar and space science, space weather service capabilities, and help raise awareness of potential impacts to the Nation. The goals of the NSWP are:

- Discover and understand the physical conditions and processes that produce space weather and its effects.
- Develop and sustain necessary observational capabilities.
- Provide tailored and accurate space weather information where and when it's needed.
- Raise national awareness of the impacts of space weather.
- Foster communications among government, commercial, and academic organizations.

The NSWP is essentially comprised of a coalition of willing federal agencies. The participating agencies provide all the support for the program in terms of funding and effort. The program is organized on two levels: the council level, with a policy focus and membership draw from the senior executive service; and the Committee for Space Weather, which serves as the working level body to implement the council's policies. Other stakeholders with which the council and committee partner and engage include commercial space weather entities, academia, and the international community.

The NSWP has produced several documents over its lifetime, starting with its original strategic plan in 1995. That plan was then updated in 2010. The program drafted implementation plans in 1997 and 2000 and is currently working on a third. Between 2008 and 2011, the program also produced four additional reports (listed below) at the request of the Office of Science and Technology Policy (OSTP).

- 2008: Impact assessment of Low Earth-Orbit and Solar wind monitoring loss
- 2009: Space Environmental Sensing Mitigation Options Report: Low Earth Orbit
- 2009: Space Environmental Sensing Mitigation Options Report: Solar Wind Monitoring
- 2011: Report on current and planned Space Weather Observing Systems

The 2008 report identifies the impacts that would result from the loss of low Earth-orbiting space and environmental sensors, primarily from the National Polar-orbiting Operational Environmental Satellite System (NPOESS), as well as loss of the ACE spacecraft. The findings of that report determined that the impacts would be rather significant. Based on those findings, OSTP requested a mitigation plan in the

event that these sensors are lost, and subsequent reports were authored in 2009 to meet the request. More recently, the NSWP submitted to OSTP a report it requested covering overall space weather observing capabilities, including a gap analysis, and how those capabilities support services to customers and space weather hazard warnings.

The SDR *Grand Challenges for Disaster Reduction Implementation Plan: Space Weather* was approved in 2010. Bonadonna stated that the plan had served as a succinct and on-target document for informing development of the 2010 National Space Weather Strategic Plan as well as subsequent documents currently under development. Bonadonna stated that the SDR implementation plan included 36 recommendations, and noted that the NSWP is making progress on 35 of them. The 36th deals with creating standards for systems, which Bonadonna explained as being somewhat outside the control of the NSWP. In total, the NSWP relied on a trove of ten key documents, including the SDR plan, and the 185 recommendations included therein to develop the 2010 strategic plan. The strategic plan is available at http://www.nswp.gov/.

In 2011, the NSWP began an initiative for a unified national space weather capability. This includes a sharpening of the program's focus on the end-to-end use of space weather information. During the coming year, the NSWP will be working on its own implementation plan to flesh out the 2010 strategic plan. Bonadonna stated that the implementation plan would be developed with inputs from several studies that have been conducted over the last 10 years or so, as well as the decadal survey that is currently being conducted by the National Academy of Sciences on solar and space science.

III. Report from the Co-Chairs and Approval of Minutes

The October meeting minutes were approved with no changes.

The 2012 SDR meeting dates were announced. With the exception of July, the subcommittee will continue to meet on the first Thursday of each month in the Lincoln Room of the White House Conference Center. The July meeting was moved to the second Thursday of that month (July 12) to avoid proximity to the July 4th holiday.

Applegate reported that the draft charter for the SDR Coastal Inundation Working Group had been circulated for comments to the working group as well as the SDR. Having received no changes, Applegate pronounced the charter approved and noted that it would be signed accordingly by the SDR co-chairs. SDR Co-Chair Margaret Davidson stated that the Council on Environmental Quality may lean on the working group to assist with producing a workshop in about six months time to try to define mutual federal requirements for coastal inundation modeling and develop a more uniform approach to coastal inundation risk assessment. Agencies that are interested in participating on the working group should contact the SDR Secretariat (ross.faith@mantech.com).

Applegate stated that the National Windstorm Impact Reduction Program (NWIRP) Working Group would also be formalized under the SDR in the near term. A draft charter for the group was passed out at the meeting and it was announced that any comments should be directed to the SDR Secretariat. Also, agencies that are interested in participating on the working group should contact the SDR Secretariat. Tammy Dickinson (OSTP) stated that the NWIRP Biennial Report to Congress for Fiscal Years 2009-2010 would be circulated to the SDR soon for comment/concurrence.

Applegate stated that the House Science Committee would be marking up the reauthorization bill for both NEHRP and NWIRP on Friday. This version of the bill pending also includes specific language related to the SDR. If passed as drafted, it would charge the SDR to develop a report on how R&D agendas for various hazards can be better coordinated to realize connections and efficiencies. Irrespective of whether the legislation is passed, Dickinson stated that OSTP was keen on the SDR developing such a document.

Following a discussion of the subject, SDR Members were encouraged to give additional thought as to how to approach such a task given the potential charge from Congress, and also with respect to issues beyond those specifically called out in the draft legislation that the SDR may want to address. It was anticipated that a volunteer SDR task force would be set up to take on this effort in the months ahead. The draft text is below.

SEC. 302. COORDINATION OF FEDERAL DISASTER RESEARCH, DEVELOPMENT, AND TECHNOLOGY TRANSFER.
Not later than 2 years after the date of enactment of this Act, the Subcommittee on Disaster Reduction of the Committee on Environment and Natural Resources of the National Science and Technology Council shall submit a report to the Congress detailing—

(1) current Federal research, development, and technology transfer activities that address hazard mitigation for natural disasters, including earthquakes, windstorms,wildfires, floods, and the current budgets for these activities;
(2) areas of research that are common to two or more of the hazards identified in paragraph (1);
(3) opportunities to create synergies between the research activities for the hazards identified in paragraph (1); and
(4) coordination of Federal disaster research, development, and technology transfer activities through the Interagency Coordinating Committee on Natural Hazards Risk Reduction established under section 301 and the Advisory Committees established under section 5(c) of the Earthquake Hazards Reduction Act of 1977, as added by section 103(4) of this Act, and section 205 of the National Windstorm Impact Reduction Act of 2004, as amended by section 204 of this Act.

Allen Dearry (NIEHS) reported that on October 25-26 in St. Petersburg, Florida, the NSTC Subcommittee on Ocean Science and Technology (SOST) held a principal investigator one-year update workshop on the Deepwater Horizon Oil Spill. The workshop was a follow-on to the workshop that SOST held in October 2010. The purpose was to gauge and update the progress in research on the oil spill that has taken place over the past year. The workshop was attended by approximately 150 scientists from academia, the federal government, and industry. The majority of participants from academia were affiliated with institutions in the Gulf Coast states, but also included others from around the country. Scientists from Mexican institutions also participated. The workshop's six themes were:

- Oil and dispersants: their ***extent and fate*** (e.g., air, surface water, water column, beaches, marshes);
- Oil and dispersant impacts and mitigation: ***coastal environments*** (e.g., near shore, shallow reefs, beaches, marshes);
- Oil and dispersant impacts and mitigation: ***offshore environments*** (e.g., deep ocean habitats, deep coral systems, seep communities);
- Oil and dispersant impacts and mitigation: ***human health and socio-economical systems*** (e.g., exposure, community vulnerability and resilience);
- Oil and dispersant impacts and mitigation: ***living marine resources*** (e.g., protected and harvested species, essential food chain);
- Use of ***in situ and remote sensors, sampling and systems*** for assessing the extent, fate, impacts and mitigation of oil and dispersants.

The research presented at the workshop covered topics in the physical, chemical, biological, oceanographic, and social sciences. Major focuses included the vulnerability and resilience of

communities, populations, and infrastructure, as well as seafood safety and the related-economic and social consequences. More information on the workshop is available at http://www.marine.usf.edu/conferences/fio/NSTC-SOST-PI-2011/index.shtml.

Dearry stated that the workshop's organizing committee, on which he serves, intends to finalize a report from the workshop over the next six weeks and present that report in mid-December in Houston at the Gulf Summit, which is a more policy- and politically-oriented meeting involving the five Gulf Coast governors. The report will deal with the progress in research that has been made since the oil spill and is intended – at least for the purpose of the summit – to help inform policy decisions by the Gulf Coast states. Dearry also reported that a number of the SOST agencies were coordinating their research.

There is also a parallel effort run by the Gulf of Mexico Research Initiative (GoMRI), which is the BP-funded $500 million, 10-year research activity. GoMRI held its own workshop a few days prior to the JOST workshop, and Dearry noted that federal officials from the interagency ocean science community spoke with the GoMRI representatives about trying to coordinate activities for future years.

IV. Report from the OSTP Liaison

Dickinson noted that the topics she had intend to cover had already been discussed in the Report from the Co-chairs.

V. Adjournment

The meeting adjourned at 11:55 a.m.

VI. Future Meetings

SDR meetings will be held from 10:00 a.m. to 12:00 p.m. on the dates listed below in the Lincoln Room of the White House Conference Center.

2011

Thursday, December 1, 2011

2012

Thursday, January 5	Thursday, May 3	Thursday, September 6
Thursday, February 2	Thursday, June 7	Thursday, October 4
Thursday, March 1	*Thursday, July 12	Thursday, November 1
Thursday, April 5	**Thursday, August 2	Thursday, December 6

*We are shifting the July meeting to the second Thursday of the month to avoid proximity to the July 4th holiday.

**Subject to cancelation

VII. Agenda Items and Other Communications with the Subcommittee

Please send proposed agenda items and any other items intended for distribution to the full Subcommittee to Ross Faith (ross.faith@mantech.com).

VIII. Contact Information

SDR Leadership

David Applegate	Co-Chair	703-648-6714	applegate@usgs.gov
Margaret Davidson	Co-Chair	843-740-1220	margaret.davidson@noaa.gov

Dennis Wenger	Co-Chair	703-292-8606	dwenger@nsf.gov
Tamara Dickinson	OSTP Liaison	202-456-6105	tdickinson@ostp.eop.gov

Secretariat

Ross Faith	703-388-0308	Ross.Faith@ManTech.com
Barbara Haines-Parmele	703-388-0309	Barbara.Haines-Parmele@ManTech.com

IX. Summary of November Actions

Action	Lead	By When
Send SDR agency links for the website to the Secretariat (ross.faith@mantech.com).	SDR Members	November 18, 2011
Send comments on the charter for the SDR's NWIRP Working Group to the Secretariat (ross.faith@mantech.com).	SDR Members	November 18, 2011
Contact Tammy Dickinson (tdickinson@ostp.eop.gov) to pass along issues, concerns, and information from your agency to the White House Office of Science and Technology Policy	SDR Members	Standing
Contact Tammy Dickinson (tdickinson@ostp.eop.gov) if it would be helpful for OSTP to issue a letter to your Department requesting new (or re-affirmed) designation of representatives. Ideas for other entities that should be represented on the SDR are also welcome.	SDR Members	ASAP
Contact Dennis Wenger (dwenger@nsf.gov) if your agency is able to provide funding support to the University of Colorado-Boulder's Natural Hazards Center.	SDR Members and Federal colleagues	ASAP
Contact the Secretariat (ross.faith@mantech.com) if you are interested in participating in the SDR Coastal Inundation Working Group.	SDR Members and Federal colleagues	Standing
Contact the Secretariat (ross.faith@mantech.com) if you are interested in participating in a task force that will be drafting a lessons learned report covering the earthquakes and tsunami in Japan, New Zealand, Chile, and Haiti.	SDR Members and Federal colleagues	Standing
Contact the Secretariat (ross.faith@mantech.com) if you are interested in participating in the SDR International Working Group.	SDR Members and Federal colleagues	Standing
Send Sezin Tokar (stokar@usaid.gov) your ".gov" e-mail address to receive USG-only updates from USAID on global disaster response activities.	SDR Members and Federal colleagues	Standing
Contact Ross (ross.faith@mantech.com) to receive copies of the Grand Challenges for Disaster Reduction Implementation Plan packets or CD.	SDR Members	Standing

Action	Lead	By When
Let Dave (applegate@usgs.gov) or Ross (ross.faith@mantech.com) know how you use the implementation plans, including when you link to the plans from your agency websites. Send Ross or Dave additional distribution suggestions, including relevant contact information.	SDR Members	Standing