NASA ADVISORY COUNCIL

HELIOPHYSICS SUBCOMMITTEE

February 27-28, 2012

NASA Headquarters
Washington, D.C.

MEETING MINUTES

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Robert McPherron, Acting Chair

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Dennis Gallagher, Executive Secretary

NAC Heliophysics Meeting Minutes, February 27-28, 2012

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Monday February 27, 2012

Introduction and Overview of the Heliophysics Division Status (HPD)

Incoming Heliophysics Division (HPD) Director Dr. Barbara Giles reported on various changes that have taken place in the NASA Advisory Council Science Committee (NAC SC). Dr. Mara Hagan will be the new chair of the HPS subcommittee pending the completion of paperwork. Currently Dr. Robert McPherron plays an acting role as chair of HPS. Within the Science Mission Directorate (SMD), Dr. Giles became Director of HPD as of November 1, 2010, Dr. Richard Fisher having retired. Dr. Mary Mellott retired at the end of December 2011. HPD has a new Geospace IPA, Dr. El-Sayad Tallat. Dr. Dennis Gallagher is the new Executive Secretary for the Heliophysics Subcommittee, and is also functioning as the Program Scientist for the Magnetospheric Multiscale mission (MMS) and Solar Terrestrial Probe (STP) program. Dr. Jeff Newmark is the Explorer Program Scientist and is also leading HPD's strategic planning effort. Has also started an organization development process to support the onboarding of a new division director. Dr. John Grunsfeld is the new SMD Associate Administrator (AA).

Dr. Giles reported generally on the HPD Flight program, noting that MMS is working toward a launch readiness date (LRD) of no later than 2014, and is moving along well. STP-5 will follow MMS. In the Living With a Star (LWS) program, the Radiation Belt Storm Probes (RBSP) mission is scheduled to launch in September 2012. The next space environment test bed (SET) is due for January 2014. Solar Orbiter (SO) and Solar Probe Plus (SPP) are planning for 2017 and 2018 launches, respectively. The IRIS mission is scheduled for launch no later than (NLT) June 2013, with a LRD of December 2012. The next Explorer mission will be a downselect chosen from the current competition. Within the Research program, HPD is planning many rocket and balloon missions, including those managed for the Astrophysics Division (APD). Heliophysics system observatory missions are healthy and are tracking space weather events and their effects on Earth's environment.

Science accomplishments.

HPD's STEREO mission has provided three-dimensional images of the first x-class solar flares and coronal mass ejections (CMEs) with unprecedented resolution, allowing for substantial improvements in both science and space weather forecasting models. STEREO also helped to track a solar storm from Sun to Earth, and provided evidence that Earth's atmosphere extends farther into space than previously thought. Other dramatic discoveries have been made, such as the Interstellar Boundary Explorer's (IBEX) detection of atoms from interstellar space penetrating the inner solar system; also indicating that Solar System chemistry appears to be quite different from the space surrounding it. The Voyager spacecraft detected a froth of magnetic bubbles at the edge of the heliosphere, protecting Earth from cosmic rays.

HPD is also developing a new interplanetary space weather forecasting service. The Solar Dynamic Orbiter (SDO) took advantage of an in-flight calibration opportunity, when the new Moon passed in front of the sun, producing a partial eclipse. The sharp edge of the solar limb provided an opportunity to measure in-orbit characteristics of the SDO telescope, which will help to sharpen future mission measurements.

HPD Budget

Dr. Giles reported that the SMD program budget strategy would continue to provide, within the FY13 budget, the most productive Earth and space science program possible for the resources available. The strategy will continue to be guided by national priorities and informed by the Decadal Survey (DS), including a national investment in robotic missions. SMD will consider only those missions with well-developed technologies and an appropriate budget level. The Mars program in particular is being re-prioritized with other NASA organizations to meet both human and science exploration goals. SMD is also concentrating on determining an adequate budget for launch services, including cost-constraining measures for medium-class launchers. The overall budget for SMD is notional at approximately $4.9B, and runs generally flat annually out to FY17. Major FY13 budget changes can be summed up as follows: the Earth Sciences Division is flat; the Planetary Science Division is significantly reduced, reflecting a Mars program re-planning effort; the Astrophysics Division (APD) is slightly reduced; and HPD is slightly increased, reflecting ramp-up of large missions such as Solar Probe Plus. Outer Planets (OP) flagship missions have been deferred.

HPD currently has 86 missions and 98 spacecraft in varying stages of existence and development. Upcoming launches are numerous, and SMD solicitations will continue to provide opportunities for heliophysics science. Tentative future opportunities include Explorer and Discover, New Frontiers, Venture Class and Solar Terrestrial Probes.

HPD will now provide funding for launch vehicles for SPP and Solar Orbiter (SO); this is a recent change. The division has also made a modest investment in the Sounding Rockets program to design higher performance motors. What is essentially the same within the budget is that HPD plans to fully fund all missions in formulation/development, and maintain the supporting research and suborbital programs. In general, the budget is as expected, and individual lines can be discussed as needed. Some of the operating missions are not covered in outyears, reflecting the natural outcome of Senior Review activities. In fiscal terms, “flat” is the new “up.” RBSP will be in an extremely harsh environment and is fuel-limited; a Senior Review will have to carefully consider an extended mission for RBSP. STP and LWS funding profiles will go up and down in a complementary fashion as missions start and stop.

Sounding Rocket program

Black Brant motors continue to be an issue, as the current inventory runs out in September 2012. The first motor from the next production run will become available in November 2012. The supplier for graphite nozzles is no longer making its product, thus Bristol is seeking another supplier. Six motors have been purchased, and 3 Oriole motors have been sent to Wallops Island, planned for use in geospace missions in

the Poker 2013 campaign. HPD plans to partner with the Office of the Chief Technologist (OCT) and the Office of the Chief Engineer (OCE) to participate in a new Peregrine motor design project. OCE has offered the support of engineers at the Marshall Space Flight Center (MSFC) for this new effort. Some new impacts on the Sounding Rocket program may result from an environmental assessment at Poker Flats, concerning debris released after launches. In a new Arctic Refuge Conservation Plan, large swaths are being considered for wilderness designation, which will affect a significant number of flights planned for launching into the ionosphere, especially when launched into the aurora. NASA has been included in the discussion, and is encouraging proposals for a creative solution. The program is also working on Ni-Cad battery issues.

Upcoming missions in the Sounding Rockets program have met with some minor setbacks; CIBER has been postponed by a week. The FOXSI, ATREX, and VESPER missions are still in the planning phase. These launches are expected to have great visibility. MICA (Magnetosphere-Ionosphere Coupling in Alfvén Resonator) was considered a mission success overall, but the Black Brant motor did quite a bit of coning during this mission, which presents a continuing concern.

HPD continues to work on memorandums of understanding (MOUs) for a unified space weather capability, and many Federal agencies have been working more closely together on space weather issues: namely the US Air Force (USAF), Department of Defense (DOD), the US Geological Survey (USGS), the National Science Foundation (NSF), the Department of the Interior, the National Oceanic and Atmospheric Administration (NOAA), and the Department of Commerce. These agencies will soon hold a council meeting to establish a framework for tasking. In addition, HPD is participating in a new NASA Space Radiation Working Group, which will enable further research on the impacts of space weather on society.

In response to a question about MMS, Dr. Giles responded that the mission has not yet passed its Key Decision Point (KDP)-D yet (planned for the end of August). There are instruments still being delivered, and which are not officially in integration and test phase.

In the Explorer program, concept study reports are due on September 21, 2012. Review will begin for a downselection in Spring 2013. The Heliophysics Data Policy has been updated, including some changes in program elements contained within the ROSES 2012 solicitation. HPD is planning for its response to the release of the HP Decadal Survey due in early to mid-2012.

Flight mission status report

Dr. Victoria Elsbernd presented HPD's flight status. There is a new revision of NPR7120.5 Rev E currently out for review, which will refine NASA requirements; changes in this document have been driven by increased scrutiny with respect to project performance and the consequences of a culture that focused on technical at expense of cost and schedule. Changes include the introduction of a lock-in of the budget profile at KDP-B, earlier than previously required, with more emphasis on formulation. In the

past, projects had been allowed to proceed to the next phase due to external pressures, despite having insufficient maturity. As a consequence, programs did not always document project decisions, agreements and changes in direction. The changes in the new NPR will address improving the overall program and project performance against internal and external commitments.

Dr. Elsbernd emphasized the importance of the Casani report on upcoming changes in the Flagship missions. Some changes in this area include a larger consideration of scaled-down missions, tailoring, use of a compliance matrix, applicability, formulation agreement, baseline policy, earned value management (EVM), threat assessment, and a stronger role of Center Directors, etc. The final version of this NPR is expected in June 2012.

In terms of individual projects, the stoplight chart is generally green for Magnetospheric Multiscale (MMS); its biggest risk is potential conflict with James Webb Space Telescope (JWST) instruments, which will be competing for space in thermal vacuum testing chambers. A final decision on this matter is targeted for March 2012, and represents a potential $425M impact and 2-month schedule hit to MMS. The ground system critical design review (CDR) has been successfully completed for MMS. Other significant accomplishments have been made in the MMS program, including integration of the spacecraft bus, which is currently in progress.

The LWS program is green overall; RBSP is on track for delivery on August 15, 2012, and the mission is working issues with transceivers, which will be refurbished within a schedule that contains a 14-day slack. RBSP is the first project that has complied with newly implemented 70% cost and schedule confidence levels. BARREL payload manufacturing is also under way. SPP had a KDP-B at the Agency level, and has been approved to go to the next phase of formulation. Significant accomplishments in RBSP include being on schedule for shipping to the launch pad on May 1, 2012.

The Heliophysics Explorers program has a yellow grade for lacking an update in its Program Commitment Agreement (PCA) and Program Plan. Additionally, issues with the IRIS mission have included minor setbacks with parts and deliveries of components, which are being resolved. S- and X-band units have been coming in late, and are near critical-path in significance. A reaction wheel/chipped magnet anomaly has been resolved, however. IRIS cost reserves remain in the red, which may necessitate having to use a good portion of headquarters-held reserve, but mission outlay is still within external cost commitments. The mission is buying back schedule with cost in an attempt to maintain a December 2012 LRD. Within the Heliophysics System Observatory, operational missions are all green. Asked about MMS technical problems, Dr. Elsbernd replied that MMS now understands the root causes of its technical issues. Dr. Ennio Sanchez asked about an issue with BARREL. Dr. Giles explained that BARREL's original solar arrays did not survive thermal environment testing and have subsequently been re-vamped, solving the problem. Dr. Giles also assured HPS that JWST impacts and Senior Review planning remain the same, with no significant issues in sight.

Discussion

Dr. Charles Swenson asked for a quantification of the expected cadence for the Explorers program. Dr. Giles responded that the hope was to have the next solicitation in 2014; the Announcement of Opportunity (AO) would depend on which launch vehicles would be available for the projected launch date. The launch services contract will be updated via Kennedy Space Center at the next HPS meeting. As new vehicles become available, HPD/HPS will receive further updates regarding costs in the March/April timeframe. HPS also discussed a desire to hear from OCT on new planning initiatives and its specific relationship with HPD.

Heliophysics Data Policy: Status and Plans

Dr. Jeff Hayes prefaced a presentation by Dr. Aaron Roberts (Program Scientist for the HP Data and Modeling Consortium) concerning recent minor changes to HPD's data policy. These represent April 2009 updates to June 2007 policy documentation. There are few detailed changes, mostly implementation issues, affecting how data policy is working in practice. Ultimately, HPD wishes to produce high-quality and well-documented data, provide open access to scientifically useful data, keep data flowing without interruption when missions end, and keep data safe for the long term.

The HP data policy is working. New missions are following Project Data Management Plan (PDMP) guidelines, current missions are improving their data, Senior Reviews and Mission Archive Plans continue to help; data are moving into Active Final Archives; and Inventory and Registry of all HP data is being completed. These data will reside within an active interface, a Virtual Space Physics Observatory (VSPO), that will deliver or point directly to data. Legacy datasets are being improved, archived and served; and plans are moving forward for uniform access to HP data. The Space Physics Archive Search and Extract (SPASE) model is the data model that allows provision of uniform descriptions (metadata) for all HP data products and services. Nearly all data from active missions is accessible; and a fair amount of non-NASA data has largely been accounted for. There has been a lag in SPASE descriptions at the detailed (parameter/variable) level. HPD is continually working with the Virtual Observatories (VxOs) to keep up. The problem of uniform access is being addressed by taking advantage of self-documenting and standard formats. Progress is being made in SPASE-based access, primarily through Virtual Observatories (VxOs) and the Consolidated Analysis (CDA) Web. VxOs are functioning ultimately as formulators and implementers of standards. The ASCII "problem" makes simple uses easy, but lack of standards means more metadata will be required for easy, direct access. HPD is moving toward making these standards mandatory. As an illustration, transferring CDAWeb data directly to Interactive Data Language (IDL) can directly fill arrays from Web sources using routines within IDL, usually with a one-sentence command. VxOs are working on generalizing this and similar capabilities to distributed data from multiple sources. Most datasets are now safe for the long term and actively served. Science-quality, high-resolution data are kept at the Space Physics Data Facility (SPDF) in most cases, and for most or all instruments. There are many active solar missions. These data are well served and probably safe; but it is not clear that there is a plan in most cases. RAs exist for a number of older missions, for which HPD will have to work out the details.

Future challenges include metadata production and use, enforcement of format standards, storage of large data volumes, model-data comparisons and insights, and completion of VxO plans.

Education/Public Outreach (E/PO) policy

Dr. Hayes briefly reviewed the Education/Public Outreach (E/PO) status in place of Ms. Stephanie Stockman, announcing that the budget for E/PO has been cut considerably. SMD's E/PO program was cut by $4M in a $15M total budget from FY13 out; this sharp reduction profoundly affects the grant program, which will not be solicited during this round of ROSES. There was also a FY12 budget cut in E/PO, for which NASA is trying to re-phase grants in progress. The cuts will be painful. Cancelling the solicitation means that the HP supplements are also being cancelled, due to cost of peer review, etc. In a year, NASA should have a better solicitation for E/PO after a wedge can be built up. There are three forms of E/PO policy in SMD; one is part of KDP-C, which states that no more than 40% of the E/PO budget can be spent before launch. There is also a public engagement policy; and now a presidential directive against "swag" – henceforth there will be no more mouse pads, shoelaces, etc. Posters, some pins, patches, and stickers are still permissible. Dr. Hayes agreed to provide documentation of the E/PO changes for the subcommittee. The Office of Management and Budget (OMB), however, was deemed responsible for the decision on swag. Many other agencies were cut in this same way. NASA's Headquarters-level Office of Education also received a 33% budget cut.

In term of SMD E/PO vs. Mission E/PO budgets, the E/PO cut is at the SMD level. There are also programmatic items such as forums that coordinate E/PO activities- the HP forum is at UC-Berkeley. Mission E/PO is within each mission line (roughly 1%), and will not change.

Discussion data policy

Dr. Karel Schrijver commended HPD's data policy efforts, important in an interdisciplinary environment; he was also glad to see support for an open data policy. He also noted that it is important to use data from PSD (Kepler, for example) for comparative magnetic environments, love to use Kepler data, but there is difficulty in obtaining such data. In addition, an open data policy is not kept at NSF, open data policy not kept: What is the nature of discussions within and without agencies on this matter? Dr. Hayes explained that NASA restricts proprietary data for a given period of time; HST, for example, uses a restriction period of 6 months. The SO collaboration is different; the European Space Agency (ESA) signed on to the NASA data policy, but within the instrument teams there will be more constraint. JAXA is more restrictive with its data as well. Interagency efforts to support an open policy include a white paper from the National Science Board that supports a taxpayer-supported archive; NSF would like to lead this effort. NASA's OCIO also has a mandate to consolidate data centers and reduce the footprint of computer rooms. Dr. Schrijver encouraged NASA to publicize its efforts in maintaining an open data policy, perhaps by making an effort to quantify how successful it has been. Dr. Lika Guhathakurta commented that inside of SMD there are different data policy rules; it would be a good idea to homogenize these so that interdisciplinary data sharing could be accomplished. There should be a more intensive dialogue about this in SMD. Dr. Hayes reviewed the various policies in SMD, and pointed out the need to access

Earth Science data in a way that makes sense to HP, scientifically. There are different notations and terminology, as well as the challenge of managing enlarging data sets. Dr. McPherron commented that during the first year of THEMIS, 75 papers were published, a direct result of the open data policy.

Lunch talk

Mission Scientist Dr. Eric Christian gave a talk concerning recent science emerging from The Interstellar Boundary Explorer (IBEX) mission.

Annual Ethics Briefing

Kathleen Teale, Senior Attorney with the Office of the General Counsel (OGC), provided the annual ethics briefing for the subcommittee.

Discussion

The subcommittee began a discussion of suggested findings. Dr. Charles Swenson recommended a finding on maintaining continued awareness and monitoring of the costs associated with the launch services industry and how to bring this in line with HPD needs and planning processes. It is not clear that a relationship between OCT and HPD exists in fact; more evidence would be welcome to HPS. Dr. Newmark noted that there has been work on the Technology Roadmap, and OCT did solicit feedback from each of the centers and directorate divisions to include in this roadmap, particularly on cross-cutting technologies such as laser communications. Dr. Swenson commented that the roadmap is more like a wish list, not a strategic document. Dr. Newmark agreed that the President's budget greatly reduced funding for OCT relative to original expectations. Dr. Ennio Sanchez raised a continuing concern about Black Brant motors and the development of new rockets, and its impacts on science over the next few years, particular 2013 and onwards. Are these technical and procurement problems going to continue? Dr. Gallagher noted the continuing effort to augment the ability of new motors, but there will be a lag wherein HPD will lack a certain class of motors for some time. Dr. Gallagher agreed that it would be reasonable to ask for a briefing on the new Marshall Space Flight Center motor design, and to obtain the findings of the latest Sounding Rockets Working Group (SRWG) meeting. In response to a subcommittee comment about the Research and Analysis (R&A) structure, Dr. Giles noted that the division is still working toward a resolution. The MOWGs are working with Division scientists and brainstorming.

Chief Scientist Report

Dr. Waleed Abdalati, NASA Chief Scientist, addressed HPS for the first time, describing himself as functioning within Mr. Bolden's inner circle as a science observer, unencumbered by the responsibilities of implementing programs in SMD. He provided perspective that is slightly different than that of science managers. Dr. Abdalati also represented science outside NASA as well through external communications, acting as another science voice for the agency. The Chief Scientist conducts conversations with OMB, the Office of Science and Technology Policy (OSTP), and the Hill about NASA, determining how science

fits into the NASA and national investment portfolio. The Chief Scientist is also a representative of the science community to NASA, and of NASA managers, etc.

Dr. Abdalati agreed that NASA is in a very difficult budget environment, and is stressing its broader interests. Top-tier priorities are commercial crew and the International Space Station (ISS); the space launch system (SLS)/multipurpose crew vehicle (MPCV), and JWST. He felt that the current, healthy HPD program is a testament to how HPD has dealt with limited resources while producing a large number of missions. PSD has suffered reductions, largely in the Mars programs, and has withdrawn from its previous plans with ESA to collaborate on two 2016/2018 missions, due to lack of resources and reluctance on the part of the Administration to enter a path that would require 3 Flagship missions. The Mars program still exists, but the joint 2016/2018 missions have been halted. NASA has told ESA and Russia that it will come to the table with new planning. PSD received $62M instead of the expected $162M. SMD AA Grunsfeld is working with Space Operations Mission Director Bill Gerstenmaier, and with OCT and the Chief Scientist to develop a plan that will capture the spirit of the Planetary Decadal Survey. The Mars program is awaiting the landing of the Mars Space Laboratory in August 2012, and is still planning the aeronautics MAVEN mission. There is a 1 in 3 chance that there will be a Mars Discovery mission, depending on the outcome of the competition. Former Mars program manager Orlando Figueroa has come back on board to develop a revitalized Mars plan through the new Mars Program Planning Group (MPPG). The group's final report which will be delivered to Dr. Grunsfeld.

Dr. Abdalati invited HPS members to give him feedback on how science can be better served at NASA. Dr. Charles Kankelborg asked how HPS might think through how the Agency balances large and small investigations. Dr. Abdalati responded that the community speaks to that issue through the Decadal Survey, but NASA also makes its own assessments with the guidance of the advisory subcommittees. The balance is influenced by open competitions to expand opportunities, along with targeted investigations. Balance is an ongoing effort. Noting that GRAIL and Juno have both come in under cost and schedule, Dr. Abdalati averred that the challenge is to do this with larger missions. Dr. Kankelborg commented that there is a tendency for smaller programs to suffer when a larger mission overruns. Dr. Abdalati demurred, adding that despite the situation with JWST there are still robust investments in SOFIA and the suborbital program; but he agreed that smaller missions are vulnerable, and that is where the community needs to speak up. Dr. McPherron commented that students are very dependent on these smaller programs. Dr. Abdalati agreed that more on-ramps were needed for young investigators. Dr. Sanchez asked how game-changing technologies could be developed in the current budget environment. Dr. Abdalati replied that the Space Technology Program is the new home for this effort, an iterative process that will continue. Dr. Giles added that the new Decadal Survey, due out in April 2012, would also determine some of these technology needs through a strategic planning process. Responding to a question about the appropriate balance between flight projects and R&A, Dr. Abdalati responded that this summer, in advance of the FY14 Programming, Planning and Budget Execution (PPBE) exercise, he would be working with the SMD AA in conducting a review of this balance.

Dr. McPherron suggested that simple instruments spread out through the magnetosphere may be more useful than a large mission. Dr. Kankelborg expressed the hope that HPD might accomplish such tasks as intercalibrating multiple instruments. Dr. Swenson added that small capable satellites are certainly

interesting; should we do more of this? Dr. McPherron described a simple mission that employed seismometers every 10 km from the coast to the altoplano of Peru. Such monitors could be successfully linked through a university or a hospital, with the result yielding hoards of satellites talking to a big satellite. Perhaps a halo of satellites around a large satellite at L1 could serve a similar purpose. There was a concern that a move to small mission modalities such as cubesats might consume the entire Sounding Rockets program, even while there appears to be a supportive discussion of multipoint measurements that are potentially eye-opening. Dr. Hayes commented that cubesat lifecycles must be carefully managed to keep them from becoming space debris. Dr. Giles added that ruthless scientific capitalism rules these decisions, as well as risk quantification and mission reliability. Dr. Sanchez raised the issue of cubesat telemetry and scientific merit. Dr. Giles responded that a reasonably managed proposal with appropriate risk should have every chance of success. Dr. Swenson felt that more infrastructure would be necessary to support new cubesats: if the community concludes that it is a valuable mode of operation, does NASA have resources to build the infrastructure to support it? Dr. McPherron felt that such a proposal would be rejected outright in the present atmosphere. Dr. Giles disagreed, saying that it depends on what the proposer brings to the table; in the case of THEMIS, the proposer built ground equipment, brought along a partnership with an agency, and other valuable support mechanisms. Dr. Swenson added that the community is waiting for the Decadal Survey to weigh in; many white papers dealing with commercial solutions for small satellites are being considered. A cubesat program would also need a new set of frequency allocations requiring government approval, and they would also have to be integrated with launch vehicles. Dr. Newmark stated that there is in fact a cubesat competition in place, and proposals were evaluated recently; there is an infrastructure at both NASA and NSF for this (not SMD). The selections will be flown as secondary payloads on existing launches. For large constellations of small satellites, however, the infrastructure is obviously not in place.

Dr. Swenson offered the question: if cubesats are allowed into LCAS program, what happens to matching dollars for support? Dr. Newmark replied that NASA tries to be responsive to community needs; if the community pointed to a need for cubesats, then there would be an evolutionary effect on other areas to accommodate them. Dr. Giles added that there is a mechanism in place to allow a gradual change from one concentration to the other (the annual budget process gives requirements to the various programs). The process projects the number of balloons and rockets, and plans funding on that basis. The annual budget process could support a gradual change to a specified direction, ramping down infrastructure in relation to demand, based on selections made. Dr. Karpen noted that there is a lot of imaging/remote sensing measurements that would not be appropriate for cubesats.

Deep Space Climate Observatory (DSCVR) Mission Briefing

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Dr. Quang-Viet Nguyen, the Program Executive (PE) for the Deep Space Climate Observatory (DSCVR), provided an update on the mission. The mission, originally called Triana, is to be launched to Lagrange Point 1. The spacecraft has been in a clean room under dry nitrogen conditions for 11 years. DSCVR will be able to look at Earth from a unique vantage point, and will see Earth always sunlit. The pixel resolution for imaging is 8 km. DSCVR will study the energetic particle environment, and monitor solar wind, and take 3-D magnetic measurements in support of space weather requirements. Instruments include a Faraday cup, electron spectrometer, magnetometer, a 30-cm telescope (EPIC), and three cavity radiometers. In 2009 NOAA estimated a cost of $47.3M for DSCVR to fly (excluding the LV cost). The USAF has been tapped to provide the LV ($134.5M appropriated). NASA was directed to refurbish two instruments (EPIC and NISTAR) for inclusion.

The primary mission of DSCVR is space weather. The Faraday cup will measure the 3-D distribution function of the proton and alpha components of the solar wind plasma. The fluxgate magnetometer will measures the 3-D magnetic field vector of the solar wind. DSCVR is targeted for launch in September 2014. The launch vehicle will be provided through an open competition. The launch will be the first in the OSP-3 contract, and the Falcon-9 may be the LV. Legacy instruments from NASA are EPIC (Earth Polychromatic Imaging Camera) and NISTAR, an electron spectrometer and pulse height analyzer (PHA). NASA does not have appropriations for DSCVR, hence NOAA will decide which instruments will fly.

Reviewing legacy instruments, Dr. Nguyen described EPIC as a Cassegrain telescope with a 4-megapixel CCD camera. NISTAR has a range of 0.2 to 100 microns, and measures the reflected radiance from Earth. The electron spectrometer and PHA will provide real-time insight into particle events that may impact DSCVR. Three options of operation (functional, mass model, or non-functional) are under consideration, and a decision is expected by the end of April, after a grass-roots cost model has been considered. The hoped-for coronagraph is officially excluded, because of schedule. DSCVR has yet to hire project staff, and there is still the issue of which instruments will fly. NASA is working on a Level 1 requirements document, under review by NOAA, and is also working with the USAF on an interagency agreement for the LV. In next few weeks, the program will complete magnetic testing of DSCVR, develop a concept of operations with NOAA, and develop a baseline project plan with NOAA.

All data from DSCVR will be available to the public immediately; and the Space Weather Prediction Center (SWPC) may post data to the Web even faster. Dr. Szabo is the current Program Scientist (PS) at Goddard Space Flight Center. If EPIC and NISTAR fly, Dr. Sasha Marshak will be the Deputy PS. Noting that NOAA Level 1 requirements are not the same as NASA Level 1 requirements, Dr. Nguyen offerred that the NASA instruments are more capable than the NOAA Level 1 requirements. NASA will have Level 0 data, with the potential to turn it into science grade data, but with no resources to convert it. A meeting participant commented that modern solar wind instruments can become overwhelmed by large numbers of solar particles; however the Faraday cup can measure the solar wind robustly, although it cannot measure speeds higher than 1250 km/s. DSCVR's instruments can provide a stopgap measure for ACE's aging status.

Heliophysics Decadal Survey

Dr. Jeff Newmark gave an overview on how to integrate the soon-to-be-released Decadal Survey (DS) into the community. The DS will provide the highest priority science for the interval 2013-2022. The Heliophysics DS addresses a broader audience than NASA, to include NSF and NOAA. The NASA Strategic Plan is derived from National Research Council (NRC) studies, the DS, the HPD roadmap and the NASA Science Plan. The Strategic Plan and Science Plans serve as internal NASA implementations of community advice. Currently, the DS is scheduled for release in April 2012, after which its recommendations will be fed into an updated roadmap as well as the NASA Science Plan.

A Roadmap is derived from the community, involving various agencies. It also enlists the aid of the National Academies (NAS), and describes implementation approaches, mission pipelines, science challenges, priorities and strategies, alignment of science strategies, etc. The Roadmap describes how to implement the DS. The goal for HPD is to roll out its Roadmap by December 2012. DS objectives may be able to be rolled directly into the documents, should they remain as they are: fundamental processes, sun-Earth connection, and enabling space weather prediction. There may be some tailoring necessary. The Roadmap is a translation of the DS so that it can be aligned with HPD planning, budget, and performance. The other aspect is with missions; it is not certain that the DS is aligned with HPD budget lines.

Major topics for Roadmap include scientific foundation, the matter of maintaining a balanced program (mission size balance, new missions, operating and developing missions, suborbital, R&A, etc.), applications in space weather, E/PO, and programmatic considerations. This year's schedule will be faster than standard schedules. The plan is to have panel meetings, HPS status reviews, drafts, and a red team review to allow rollout of the Roadmap in the American Geophysical Union meeting timeframe of December 2012. HPD is planning a kickoff teleconference in early April, which can cover topics that do not require the DS language for completion: this discussion will center on strengths, weaknesses, applications in space weather, E/PO, and program elements. The goal is to form a balanced Roadmap committee membership of roughly 12 people (chair, co-chair, HPS members, external co-chairs who are nationally recognized leaders, NASA representatives). HPD is looking for HPS volunteers, excluding members of the DS steering committee. The Roadmap charter is to align the DS strategy with HPD, to craft a sustainable science program, and to provide a useful strategic plan with a notional scheme to guide DS implementation. The Roadmap is envisioned as a streamlined document that contains high-level mission studies, and no point designs. It will also be necessary to identify technologies necessary to implement DS missions. Dr. Giles suggested that the Roadmap committee membership consist of scientists who have interests beyond the personal, and who are ready to step up to the plate. HPD hopes to have the committee signed up within a month or 6 weeks. Between now and December, a total of perhaps 3 face-to-face meetings will be required, and 3 teleconferences. Dr. Karpen asked why NASA could not change its Science Plan to 5-year phasing. Dr. Giles responded that the phasing must be changed by Congress, although there is a discussion afoot about updating language to coincide with presidential terms.

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Heliophysics R&A Program

Dr. Newmark provided an overview on recent changes in the ROSES 2012 competition. Two issues drove these changes; the review process had been taking a long time, and due to lack of notice of intent (NOI) submission, the community had often been stressed by the short notice for review. The goal for review is five months; this timeframe is often pushed because notices of intent were at a rate of less than 60%, preventing the formation of early panels. HP ROSES has now made NOIs mandatory. A step-one proposal is now required, its content identical to that of the NOI, an abstract of the proposed work. The step-one proposal is submitted two months before the proposal is due. This will allow ROSES to get a running start, and can give reviewers three or four months notice to serve on a panel.

The burden on the community due to low proposal success rates has also resulted in proposers submitting the same proposal to multiple opportunities without receiving feedback. This in turn has snowballed the workload. The response has been to make the Guest Investigator (GI) due date the same as the Supporting Research and Technology program. GI funding is preserved separately in this scheme: this is about due dates and not funding. Dr. Zoran Mikic commented that the two-step process could be construed as another burden on the proposer, and that the step-one proposal probably will not shorten the review time. Dr. Newmark replied that the new structure helps to shorten the back end of the review. Dr. Giles added that it is a matter of cooperation to shorten the overall time period.

Dr. Newmark emphasized the important feature of the formal step-one proposal, which is that the proposals will be submitted by the institute. Dr. McPherron felt that this would introduce a further delay at some institutions. Dr. Gallagher suggested that the new form be circulated amongst the subcommittee members for examination. Dr. Schrijver commented that he hadn't appreciated what happens when one brings in an Authorized Organizational Representative (AOR); the AOR sees the proposal as a risk and must define a budget in order to be authorized to make a proposal. Dr. Gallagher noted for clarification purposes that this step does not include deliverables. There are no mandatory deliverables as part of step one- the step-one proposal simply means that one is signing up for a particular science topic. Dr. Giles encouraged the community to confer with each of their institutions to discuss and understand this new mechanism. Dr. Sanchez felt that the new scheme adds a burden to NASA, but would ensure compliance. Dr. Newmark remarked that the issue is trivial, and more a matter of automation. Dr. Mikic commented that step one could weed out proposers. Dr. Giles noted that implementation is still a matter of further discussion; HPD would want community input before such a winnowing change would take place. Dr. Newmark encouraged proposers to carefully read ROSES every year, to assess changes that take place annually in the language.

Dr. Newmark pointed out other changes in the ROSES solicitation: there are now four elements to submit to: Supporting Research; Guest Investigator; Instrument Development and Enabling Science; and Low Cost Access to Space. Dr. Newmark also noted that the Guest Investigator program emphasizes HP data

that are archived in the public domain. Dr. Karpen asked how picking proposals for a mission that might not happen, versus mission for which data exists, would be handled. Dr. Newmark replied that the review panel would have to rate the proposal as best it could. Dr. Swenson commented that it is hard to say that one has a suitable data set if the data set doesn't exist; such proposals usually turn out to be low-rated, but they can still be accepted. He was further concerned that the wording is exclusionary for the GI program; the GI program also looks for science goals outside existing missions, traditionally, and the new wording sounds restrictive by specifying "currently operating missions." Dr. Newmark noted that proposals are not always in phase with launches.

Geospace Management Operations Working Group (GMOWG) Findings

Dr. Larry Kepko addressed GMOWG findings, noting that the first is geospace-specific with regard to the budget profile of TIMED; the GMOWG would like to see a timely restitution of resources for this mission in the outyears. The GMOWG's second finding supports the newly implemented two-step process in the ROSES 2012, and feels it would shorten the review process. Like the simultaneous competition of GI and SRT, the new process should eliminate duplicate proposals. The GMOWG did have concern with the wording of "currently operating missions," but is generally supportive of the process's historical fairness, and feels that the distinctions among the GI, SRT, and LWS programs are better.

Finding: There is no budget for an RBSP extended mission in the outyears; recovering from a zeroed budget line might be difficult.

Finding: the GMOWG discussed what a two-step downselect might look like, and would like to emphasize the recognized fairness of the selection process. The positive benefits of a two-step downselection include strong incentivization for the proposer. If HQ decides to implement the two-step downselect, however, NASA should first do a test run or phase in the process slowly. Afterward it will be possible to compare results with the previous process. The GMOWG is split on the blind review process for step one. The step-one review should be automated and streamlined. The proposers should know what they are being rated on, and should have access to a set of sample questions. The step one review also needs to be quantified (look at median and SD, do not throw out high and low scores). In addition to numerical scoring, a text box should be added for comments about the proposal. Once the step-one process is done, proposers should receive scores and feedback. Step-one proposal elements should be mapped explicitly to the step-one review criteria. The GMOWG prefers a 2-3 page length for a step-one proposal.

Space/Heliophysics MOWG

Dr. Heather Elliot presented the preliminary findings of the SHMOWG via teleconference, and discussed the MOWG's general concerns about the ROSES two-step proposal review process, and the consideration of a possible concomitant downselect process. The SHMOWG recommends proceeding cautiously to maintain the fairness of the process, as the previous review process was highly regarded. This sentiment was common to the whole panel. The MOWG would like to see the results of the newly implemented process and believes that the combination of the GI and SRT due dates would reduce duplicate proposals. However there are concerns about a potentially high rejection rate, the adequacy of numerical scoring, and a sufficiently long step-one proposal (are 2-3 pages enough?) The new structure may also put junior scientists at a disadvantage (in that they could not describe a project in depth in a short proposal), increase the number of proposals, and possibly increase reviewer conflict. In response to these and some HPS concerns raised during a brief discussion, Dr. Giles emphasized that the MOWGs are simply exploring parameter space at the present time, and that no final decisions have been made concerning a two-step downselect. All such decisions would go through broad community discussion.

Declining R&A Funding

SHMOWG feels that the real driver of proposal pressure is related to reduced funding; funding is expected to decrease further and will impact future success rates. This effect might be exacerbated by embedding funding in lines such that the funding is not apparent. Therefore SHMOWG recommends that R&A represent 15-20% of the HP budget instead of 10%. Dr. McPherron added that it is clear that the number of people graduating from space science programs has been increasing, therefore the problem of R&A funding will grow.

Ground-based observatories

Currently ground-based observatories provide important support for scientific research through the flight programs and calibration of instruments. The SHMOWG finds that NASA should work with NSF to establish a Senior-Review-like process for the review of ground-based facilities, but would caution against combining such an activity with the current NASA Senior Review process. NASA would have also have to evaluate how the current meager funding would play into this evaluation. Dr. Schrijver commented that the NSF astronomy review is evaluating major facilities such as Wilcox, Big Bear, and Mount Wilson, and that there seems to be an expectation that NASA will continue to fund them. Dr. Guhathakurta remarked that these facilities have been supported by both APD and HPD; one might move this funding to infrastructure, or tools and methods. Dr. Newmark noted that the finding is simply offering a way to consider a longer-term plan to support ground-based observatories. Dr. McPherron commented that NSF ground-based proposals are often not scientifically sound. Dr. Giles agreed that HPD would take the finding under advisement in order to formulate a plan that is executable.

Infrastructure support

SHMOWG expressed concern about the calibration of flight instruments and maintenance of laboratory measurements, such as atomic parameters, that are vital to NASA. The facility pool is shrinking.

SHMOWG finds that HPD should explore the possibility of low-level funding to keep the most critical facilities in operation, and that these funds should come from LWS and STP, and in cooperation with NASA and other agencies. Dr. Newmark noted that about $200K per year is required to operate beam-line facilities.

Discussion

In response to a question concerning program goals, Dr. Newmark made it clear that in the ROSES element, there is a link to the Senior Review which directs the reader to the Senior Review, which in turn states the goals of each program. Dr. Karpen was concerned about restricting things so highly in the GI program, as it might preclude good science that should be in the GI program. Dr. Swenson commented that perhaps it should be made clear for the next Senior Review that the new ROSES language will affect the goals of the GI program. Dr. Newmark responded that the majority of proposals use existing data and any new and exciting ideas would be 100% appropriate for SRT; the intent is to send the appropriate research to the appropriate research program. Dr. Swenson noted that originally, the GI program was founded on the extended mission funding pool; i.e. it pulled money away from the extended missions and re-competed it. This concept was never really clarified in the community. Dr. Schrijver commented that both MOWGs were appropriately concerned about the two-step proposal with a consideration of a downselect. If the primary plan is to shorten proposal cycle, a two-step would work. But if it becomes a downselect, the net effect is to re-extend the proposal, creating more pressure to write a second proposal with two review cycles. Dr. Klepko noted that 50% to 2/3 of proposals would be eliminated in the first step. Noting that this is an ongoing issue, HPS agreed that HPD should carry on with its evaluation.

Remarks from SMD AA John Grunsfeld

The newly minted SMD AA, Dr. John Grunsfeld, addressed the HPS, first thanking members of the subcommittee for their service. Citing his long-time interest in solar physics and space weather, Dr. Grunsfeld emphasized that the community as a whole has a responsibility to educate the public about the importance of heliophysics, particularly in the K-12 population. In addition, as NASA shares pre-decisional data with HPS, he also asked that HPS members present a measured response to the press, in light of the potential damage an off-the-cuff remark can do to a program. Given the overall state of the economy, HPD is doing very well in terms of NASA budgeting.

Asked about the SMD vision for space weather, Dr. Grunsfeld explained that he viewed the agency as a continuum, which among other things, would require space weather measurements useful for the International Space Station (ISS), for understanding the structure of the heliosphere in general, and the types of shielding that will be needed for humans operating in space, whether in LEO or at Mars. As one cannot see the effects of galactic cosmic rays on ISS due to Earth's magnetic field, radiation risks are a large unknown for future human Mars exploration. There are central nervous system (CNS) effects to understand as well. Dr. Kankelborg asked how the community might bring enthusiasm to the public domain. Dr. Grunsfeld suggested having the American Meteorological Society (AMS) to air a solar

segment on national television each week. One can also utilize posters, websites, etc., to target this information to high schools. Asked about the launch vehicle shortage, Dr. Grunsfeld responded that NASA's human exploration program is working hard to solve the problem. The USAF is also very concerned this national problem. One approach is to buy vehicles in bulk, and commercial orbital transportation is another potential service; competition can bring help down the price. Orbital and Space X are working to provide a solution. The new Falcon 9 is similar to a Delta II, but at a lesser cost, however, NASA must wait until it has test-flown. Dr. Giles added that HPD is keeping very close track on the issue and is having constant dialogue with the LV sector. The solution is still a couple of years away.

Dr. McPherron addressed the balance of mission sizes. Dr. Grunsfeld spoke of having thought much about the issue in terms of Astrophyics; a JWST equals about 10 Explorer missions, which in turn would support about 500 scientists. JWST supports 5000 individuals in broader science categories. It is a little harder to make the comparison in Heliophysics. Mission balance in HPD will depend on the stakeholders on space weather, NASA, NOAA, industry, budget, and national priorities. From an investment strategy, NASA wants to be diversified. Science and strategic interest should drive the decision, while the science community must provide guidance.

Lunch talk

Dr. Scott Budzien gave a talk on the Remote Atmospheric and Ionospheric Detection System (RAIDS) on the ISS.

Societal Components of Space Weather

Dr. Schrijver reported on the results of two meetings concerning space weather, both of which centered on solar-flare induced disturbances in the U.S. electric grid and their economic impacts. In a paper triggered by space weather impact studies, Dr. Schrijver described a theoretical event that estimated a $1-2T scenario, with a recovery that could take 4-10 years. The Federal Emergency Management Agency (FEMA) set up a worst-case scenario which illustrated the compounded, cascading effects of a severe effect. This month's IEEE Spectrum emphasized a worst-case scenario as well. However, researchers have begun to examine disturbance events accumulated by the DOE, such as blackouts, voltage drop, and frequency shifts (power quality variations), and see how they correlate with selected x-class events on the Sun to see how they correlate with power grid events. Major flare dates and unusually high geomagnetic activity (Kp) have also been found to correlate with grid events. Except in rare cases, solar/space weather is not recognized as a cause for grid disturbances. By contrast, over a 19-year period, it was found that numerous grid events could in fact be attributed to solar flares, whereas these disturbances had generally been attributed to heat, ice, etc. The average energy lost in the grid during a disturbance amounts to 11-19 GWh per event. DOE estimates that the cost of power outages and power quality events to be between $25-180B annually. The cost of these lower grade interruptions over the past two decades may be as high as $40-80B, much larger than the cost of the Hydro-Quebec Blackout in 1989, which had an estimated impact of $2B. These observations raise the question of upon which type of events to focus attention: low-grade disturbances of large-scale failures. Furthermore, most space weather impacts remain to be

quantified in economic terms, while existing estimates remain to be validated. These minor events are significant enough to warrant further investigation.

It is possible to estimate the frequency of the extremely energetic events based on solar, stellar, lunar and terrestrial records. Such statistics can be gleaned from spacecraft particle instruments, radionuclide signals in biosphere, ice, rocks, and chemical signatures (NO_3 in ice). An examination of many ice cores revealed that there is no correlation between solar energetic particles and nitrates; there were no nitrate spikes for 1859, e.g.

Given these factors, how do we assess the validity of doomsday scenarios? At a NASA Ames meeting in mid-October 2011, attendees from a broad spectrum (NASA, FAA, DOD, State, AF, UK Cabinet Office, FEMA, etc.) unanimously agreed that space weather represents a real and significant risk to society. The gathering also agreed that there needs to be an interdisciplinary, independent and international organization to make a comprehensive assessment of space weather. A relatively small investment could offset future damage. A Space Weather Awareness Dialogue meeting took place later in the same year in Brussels; it is worthwhile to note here that Europe does not have a space weather prediction capability. The workshop conclusion was similar- international cooperation is required to cope with the problem. Humans are increasingly susceptible to space weather, building more satellites, depending more on GPS, systems, cellphones, etc. Some obstacles to assessing the problem include the fact that transformer manufacturers will not release the interior structure of transformers (data necessary to perform simulations), and spacecraft/satellite anomalies occur regularly, but they are not disclosed. The community must somehow create a noncompetitive, anonymous environment in which to disclose relevant variables.

NASA's SWxWG

Dr. Robert Allen stood in for Dr. Chris St. Cyr to report on NASA's Space Weather Working Group (SWxWG), first providing some background. OCE conducted a stakeholder inventory at Headquarters in March 2008, motivated by a Radiation Study Team report conducted by Program Analysis and Evaluation (PA&E), looking at radiation standards impacting the Agency as a whole, for humans, robotics, satellites, etc. As a result, NASA found it necessary to communicate these impacts across divisions and agencies in the Federal government as well. A space weather desk was established at GSFC; in 2010 the Space Weather Desk began to issue alerts/warnings and weekly reports to robotic fleet operators. Recent activity of the SWxWG include conference calls that have included JPL activities, research in dosimetry, establishment of Environmental Effects Facilities, and the breaking down of "siloes" in the Agency. Near-term activities will include more teleconferences, an inventory of requirements across the Agency (several documents exist for human space flight, spacecraft design, et al.); goals/desires to be documented such as UAV Fleet Operations and High-Flier Fleet Operations. Dr. Schrijver noted that FEMA, FAA and EPRI- forecasts do not always agree; which is the authority? Dr. Allen reported that NASA leans heavily on the Space Radiation Analysis Group, which leans heavily on NOAA, for human operations forecasts.

Dr. Guhathakurta added that NOAA provides space weather predictions for missions; NASA does not do this. NASA's Space Weather Lab, however, has been making better models for prediction, and functions as a testbed for future robust operational models.

Discussion

Dr. McPherron felt there were too many presentations in this particular meeting, and inadequate time for discussion. The subcommittee discussed various findings including mandatory open data policies as a significant and effective stimulant to increase knowledge, and the need for more study on the ROSES policy changes (e.g., more detail on the proposed two-step plan and an update from the MOWGs). Dr. Gallagher suggested it would be useful for HPS to voice support for space weather collaboration, noting that there is also a consideration for detailing a NASA employee to the OFCM to strengthen ties. HPS requested a report/findings from sounding rocket group. Dr. Newmark reiterated the request to HPS for nominations for the Roadmap committee. Dr. Max Bernstein provided a brief demonstration of what an AOR would see in a proposal submission in the changed ROSES context; he further recommended an FAQ section on the program element page to describe the new structure.

Debrief to the Director

Dr. Giles conveyed her gratitude for HPS efforts, especially at this time of budget release. Dr. McPherron summarized requests for input for the next meeting, including briefings on launch services (particularly launch frequency); a presentation on how HPD and OCT are coordinated for technology demonstrations and instrument development programs that will benefit HP; and another briefing on the two-step proposal process, particularly on what Headquarters will have learned from the step-one process, and the distribution of proposals in each of the 4 categories as compared to previous years.

Findings summary

1. Finding on data policy, expansion of openness, interaction within and between agencies and international partners.
2. Finding on redefining R&A proposal process. HPS finds that the new two-step program should lead to greater efficiency and shorter turnaround.
3. Finding that HPS agrees with the MOWGs conclusions: that further changes in the two-step model, particularly regarding the downselect option at step one, must be further evaluated by the community. HPS commends the efforts of the HPD officers and the MOWGs in redefining the structure.

Dr. Giles emphasized that HPD has not presented any formal plan to bring a two-step process forward, and was hesitant to document that this plan is in place at this time. Dr. McPherron adjourned the meeting at 5:21 pm.

Appendix A
Attendees

Committee members
Robert McPherron, Acting Chair, University of California
Ennio Sanchez, SRI International
Charles Swenson, Utah State University
Judith Karpen, NASA Goddard Space Flight Center
Charles Kankelborg, Michigan State University
Zoran Mikic, Predictive Science, Inc.
Karel Schrijver, Lockheed Martin
Leonard Strachan, Harvard Smithsonian Center for Astrophysics
Dennis Gallagher, NASA HQ, Executive Secretary

NASA Attendees

Marc Allen, NASA HQ
Max Bernstein, NASA HQ
Eric Christian, NASA GSFC
Ellen Cohen, NASA SMD
Paul Demires, NASA HQ
Victoria Elsbernd, NASA HQ
T. Jens Feeley, NASA SMD
Dennis Gallagher, NASA HQ
Tim Gehringer, NASA HQ
Charles Goodrich, NASA HQ
Lika Guhathakurta, NASA HQ
Jeffrey Hayes, NASA HQ
Dierdre Jurand, NASA HQ
Larry Kepko, NASA GSFC
Mona Kessel, NASA HQ
Guan Le, NASA GSFC
Robert Leamon, NASA HQ (IPA)
Jon Malay, Lockheed Martin
Jeff Newmark, NASA HQ
Quang-Viet Nguyen, NASA/JASD
Marian Norris, NASA HQ
D. Aaron Roberts, NASA HQ
J. Rumburg, NASA HQ
Diego Sanches, NASA HQ
Kathleen Teale, NASA OGC, HQ
Dan Woods, NASA HQ
Cheryl Yuhas, NASA HQ

Other Attendees
Tim Anderson, Aerospace Corp.
Scott Budzien, NRL
Uma Bruegman, Aerospace Corp.
Kaitlan Chell, UCAR
Dom Conte, Orbital Sciences
Jaydip Kurdu, OMB
Michael Moloney, NRC
Stewart Moses, Northrop Grumman
Jessica Woods-Vedeler, OSTP
Joan Zimmermann, Zantech IT

Appendix B
Subcommittee Membership

David Alexander
Department of Physics and Astronomy
Rice University

Stuart Bale
Space Sciences Laboratory
University of California

Dennis Gallagher
Heliophysics Division, Science Mission Directorate
NASA Headquarters, ***Interim Executive Secretary HPS***

Charles Kankelborg
Physics Department
Montana State University

Judith Karpen
NASA Goddard Space Flight Center

Robert McPherron
Institute of Geophysics and Planetary Physics
University of California at Los Angeles

Zoran Mikic
Predictive Science, Inc.

Ennio Sanchez
SRI International

Karel Schrijver
Principal Physicist
Solar and Astrophysics Laboratory

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Leonard Strachan
Harvard-Smithsonian Center for Astrophysics

Charles Swenson
Center for Space Engineering
Utah State University

Appendix C
Presentations

1. Heliophysics Division Overview; *Barbara Giles*
2. HPS Flight Program Status; *Victoria Elsbernd*
3. Heliophysics Division Data and Computing Policy and E/PO Update; *Jeffrey Hayes*
4. SMD E/PO Status Report; *Jeffrey Hayes for Stephanie Stockman*
5. Chief Scientist Report, *Waleed Abdalati*
6. Mission Briefing: DSCVR; *Quang-Viet Nguyen*
7. The Heliophysics Decadal Survey/SMD Science Plan; *Jeffrey Newmark*
8. Heliophysics R&A Program; *Jeffrey Newmark*
9. Joint Solar and Heliophysics/Geospace MOWG Reports; *Larry Kepko, Heather Elliott*
10. SMD Associate Administrator Remarks; *John Grunsfeld*
11. Space Weather: What does it cost and how bad can it get? *Karel Schrijver*
12. Meeting Briefing: European Commission November 2011 meeting on the societal consequences of space weather; *Karel Schrijver*
13. Update: NASA's Space Weather Working Group; *Robert Allen*

Appendix D

Agenda

Heliophysics Subcommittee Meeting Agenda
2012 February 27-28

Monday, February 27 – Room 8R40
9:00 Welcome, agenda overview, logistics, introductions
9:15 Heliophysics Division Directors Update
10:00 Flight Mission Status Report, Division Deputy Director
10:30 Discussion
10:15 BREAK
11:00 Heliophysics Division Data and Computing Policy and E/PO Update
11:20 SMD E/PO Status Report 11:30 Discussion: Subcommittee Recommendation
Noon Lunch in Room: The Latest IBEX Science Eric Christian, NASA/GSFC
1:00 Annual Ethics Training
2:00 Chief Scientist Report
2:30 Discussion
2:45 Break
3:00 Discussion
3:45 Mission Briefing: DSCOVR
4:15 The Heliophysics Decadal Survey: Preparation for its delivery and the methods by which the recommendations are incorporated into the 2013 SMD Science Plan
4:45 Discussion

END OF DAY

Tuesday, February 28 – Room 8R40
9:00 Heliophysics Research and Analysis Programs
9:45 Management Working Group Reports (15 minutes each) Joint SH & G MOWG Geospace MOWG Solar & Heliosphere MOWG
10:45 SMD Associate Administrator Remarks
11:15 Discussion
11:30 Space Weather: what does it cost and how bad can it get?
1:00 Meeting Briefing: European Commission November 2011 meeting on the societal consequences of space weather.
1:30 Update: NASA's Space Weather Working Group
2:00 Next meeting planning; review of actions
2:30 Break
2:45 Discussion
5:00 Debrief with Heliophysics Division Director

5:30 Adjourn