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MEETING REPORT

Bradley Peterson, Chair

Elaine Denning, Executive Secretary

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Opening Remarks/Introduction of Members

Ms. Elaine Denning, Executive Secretary of the Science Committee, opened the meeting and made administrative announcements. She introduced Dr. Bradley Peterson, Chair of the Science Committee (SC), who brought the meeting to order. Members and meeting attendees introduced themselves around the room. Dr. Peterson noted that working sessions were on the agenda to complete several delegated tasks.

SMD Overview/FY19 SMD Budget Overview

Dr. Thomas Zurbuchen, Associate Administrator (AA) of the Science Mission Directorate (SMD), presented an overview of activities. Dr. Michael New has been appointed as Deputy Associate Administrator (DAA) for Research, a position that ensures the scientific integrity of research awards and flight programs, and also establishes policy. The DAA for Research acts as the key liaison between the National Academies of Science (NAS) and SMD. Dr. Nicola Fox has been appointed Director of the Heliophysics Division (HPD); she currently is the Program Scientist (PS) for the Parker Solar Probe and is a true leader in the field. She will take her position in August 2018. She is delaying her move in order to get through the critical portion of the Probe's mission development. Dr. Peg Luce and Mr. Jim Spann are playing critical roles in the meantime.

The President's Budget Request (PBR) for Fiscal Year 2019 (FY19) contains some new missions in the fleet, including a Lunar Discovery and Exploration Program. The Double Asteroid Redirection Test (DART) is the first of several missions in the Planetary Defense Program, devoted to countering threats from deep space through a ballistic mitigation strategy. In the Earth Science Division (ESD), several terminations have been carried over from previous budget requests—the fate of these missions is not yet known. The astrophysics mission Wide Field Infrared Survey Telescope (WFIRST) also has been proposed for termination, while still in the early phases of its life cycle. In other news, the Geostationary Operational Environmental Satellite (GOES-S) has launched and will be known operationally as GOES-17. It is emplaced over the Western hemisphere, adding to predictive capability in weather. HPD mission Global-scale Observations of the Limb and Disk (GOLD) launched in January 2018 and is the first of two investigations. Its sister mission is the Ionospheric Connection Explorer(ICON), which is to be launched in June. GOLD is installed upon a commercial communications satellite. The Total and Spectral Solar Irradiance Sensor-1 (TSIS-1) launched in December 2017 to the International Space Station (ISS). The Joint Polar Satellite System (JPSS-1; NOAA 20) launched in November 2017, marking a major milestone in the program.

Science highlights include novel Chandra results on M51, an ultraluminous x-ray (ULX) source. New data have provided clues as to why it is so bright. Neutron stars appear to be the source of this brightness, via synchrotron emissions in the magnetic field. Chandra results recently put limits on the magnetic field strength. The Magnetospheric Multiscale (MMS) mission spotted Kelvin Helmholtz waves at the magnetospheric boundary, whose turbulence can allow solar wind particles to enter the Earth's magnetosphere. NASA Earth-observing data has also contributed to better assessments of drought in the U.S. Multiple ESD spacecraft are providing data for monitoring critical characteristics of the environment, helping to predict groundwater availability and wildfire outbreaks. HPD's Parker Solar Probe entered thermal vacuum testing at Goddard Space Flight Center (GSFC) in January and is undergoing space environment testing. Its launch is scheduled for July 31. The James Webb Space Telescope (JWST) is preparing for testing at Northrop Grumman, constituting the next step in integration and testing. All parts are now in the same location. The last part of an independent review of the schedule is being completed. If the estimate goes over $8B, the mission will be in a breach of the budget cap.

In Fall 2017, the Applied Sciences Program of ESD deployed assets and data in multiple disaster responses: wildfires, hurricanes, and earthquakes. The Global Precipitation Measurement (GPM) satellite

and synthetic aperture radar data contributed greatly, as did Suomi National Polar-orbiting Partnership (Suomi-NPP) and Terra images which were instrumental in understanding the three major hurricanes of the season. The value of these data cannot be overstated both in terms of societal and scientific benefit.

The Transiting Exoplanet Survey (TESS) is set to launch on April 16 and the Gravity Recovery and Climate Experiment Follow-On (GRACE-FO) no earlier than April 29. The InSIGHT mission (Interior Exploration using Seismic Investigations, Geodesy and Heat Transport), will launch to Mars on May 5, and ECOsystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS) to the ISS on June 9. The Space Environmental Testbed (SET-1) is an HPD mission technology demonstration that will fly on the next Falcon Heavy rocket. The FY19 budget focuses on three goals: advance national science and exploration goals; safeguard and improve life; and execute a balanced and integrated science program. Under advancing national science and exploration goals, a Lunar Discovery and Exploration Program has been created to leverage commercial partnerships and build on extensive past lunar exploration and science experience. In addition, planning continues for a potential Mars Sample Return mission, a decadal survey priority, by leveraging international and commercial partnerships.

Under the rubric of safeguarding and improving life, NASA is executing a planetary defense program for Near-Earth Object (NEO) detection and mitigation, developing the DART mission, and studying a low-cost, space-based NEO detection mission. Additional funding will be provided for space weather, while executing a robust Earth science program consistent with the 2017 decadal survey. ESD and NASA are working to re-vector the latest decadal recommendations into missions. Dr. Zurbuchen viewed the key themes in this latest Earth science decadal survey as encompassing the value of competition in terms of cost control, the importance of continuity measurements, the encouragement of looking at innovative ways to obtain measurements, and supporting interagency partners to achieve missions and leverage data to further science research.

To achieve a balanced and integrated science program, SMD intends to execute its program informed by the decadal surveys. The Europa Clipper mission continues to receive support; its launch has been moved from 2026 up to 2025. No funding has been provided for a Europa lander. Given the constrained budget and the mission's cost, WFIRST has been terminated under the FY19 PBR, with remaining funding redirected to competed astrophysics missions and research. SMD will continue to leverage innovation and partnerships in SmallSats and CubeSat technology. Dr. Zurbuchen said he would speak on the implementation strategy for these satellites this coming August, focusing on investing in innovative early stage research and technology to promote economic growth.

Mr. Craig Tupper addressed the proposed SMD budget content for FY19. SMD is at about 2% above the FY17 actuals, the last known previous year. The enacted FY18 budget has not yet been resolved between the quite disparate mark-ups from the Senate and House; NASA hopes for a quick passage this week. The top line for the FY19 science request is about 2% higher than the FY17 level; this is a relatively good result. The outyears FY20-23 are notional and exhibit a slight downward trend, while the NASA top-line remains flat. ESD's budget is roughly the same as in the FY18 request, with no new terminations proposed. HPD will see a small increase for space weather and is essentially stable. The Planetary Science Division (PSD) had a large increase proposed, with two new lines in planetary defense and a Lunar Discovery and Exploration line, with about $200M a year beyond the Lunar Reconnaissance Orbiter (LRO). JWST has been returned to the astrophysics theme. The Astrophysics Division (APD) would see a decrease from $1.35 to $1.185B, with funds from a terminated WFIRST redirected to research lines and the Astrophysics Explorer program.

Under the FY19 request, the new NASA Exploration Campaign will integrate and align capabilities in programs in a variety of disciplines. The Human Exploration and Operations Mission Directorate (HEOMD) will develop CubeSats supported by both HEOMD and the Space Technology Mission

Directorate (STMD). The current plan calls for STMD to be integrated into HEOMD. A Small Commercial Lunar Initiative will be taking advantage of work going on in the private sector, as well as HEO/STMD-developed technology and capabilities for orbiting the Moon and for surface operations. A portfolio approach will be used, benefiting from lessons learned going forward, and moving toward developing human-rated landers on the Moon, as well as a sample return mission.

On the path of Mars sample return, the Mars 2020 rover is getting ready for its Key Decision Point-D (KDP-D) milestone. The Mars 2020 rover is part of a sample return campaign; there are a number of options to use to attain samples using commercial, international, and communications assets. A Mars sample return conference in Berlin is scheduled for April, after which NASA will be able to determine where there is interest. The key is to retain flexibility. Targeted technology investments are critical to getting risks off the table, as are a focused scope and limited new development, all within a balanced planetary program.

Goals in the planetary defense program are to coordinate ground-based characterization efforts (e.g., Goldstone and Areceibo stations) with space-based assets. The planetary defense budget is three times larger than that of FY18 and will support DART.

In ESD, the Landsat 9 mission continues toward completion and NASA is excited about the team. GSFC is in the lead role, working with industrial partners. A 2020 launch date is considered ambitious for Landsat 9, but the date is becoming more solid. Landsat 9 is a cornerstone mission, with the U.S. Geological Survey (USGS) providing the ground system. ESD's Radiation Budget Instrument (RBI) has been terminated for technical and programmatic reasons only. The intention going forward is to look for a capable, affordable radiation budget instrument for launch no later than 2026. This instrument would provide the continuity measurement for the future, consistent with the decadal survey recommendations.

In the great observatory arena, NASA is looking forward to getting JWST off the ground, and to the next great observatory, WFIRST. WFIRST looks at the universe with a much bigger field of view than HST or JWST, and addresses large-scale questions about the universe. If terminated, mission funds will go to a competed Probe-class mission Announcement of Opportunity (AO) in FY19.

Dr. Zurbuchen said he looked forward to the efforts of Dr. Michael New and Dr. Ellen Gertsen in looking at cross-cutting programs in SMD to tackle future challenges and education. NASA also awaits the Committee's response to the Research and Analysis (R&A) charge, as SMD wishes to answer critical questions as to whether or how NASA can support transformative high-risk, high impact research. The idea is to have systems in place for "home runs" to occur. Another issue is the proper use of the advisory committees in helping NASA to get better. With the new structure, the committees have the chance to establish "muscle memory" as a team and have ongoing discussions within SMD on what defines success.

Dr. Peterson noted that it would be useful to schedule regular committee meetings well in advance, to create a more effective and cohesive pattern of advice and, with a strong endorsement from Dr. Zurbuchen, said he would push this idea at the NASA Advisory Council (NAC) level. Dr. Susan Avery asked if the Ocean Worlds program would be going forward. Dr. Zurbuchen indicated that the Europa Clipper represented the Flagship mission in the program, which is further supported by ongoing R&A and technology investments. Dr. Mini Wadhwa asked, with respect to FY19 Mars sample return activity, what specifically in addition to Mars 2020 would be involved. Dr. Zurbuchen said Mars 2020 is the first leg of a Mars sample return strategy. The Mars Exploration Program is studying the return leg now; the more that is known about those requirements, the more effectively Mars 2020 can be implemented as a system. The most important part will be launching a vehicle from the surface of Mars and into Mars orbit. It also will require sophisticated sample-handling technologies. Dr. Peterson asked if the three candidate landing sites were to include or exclude "special regions" (where local conditions might support introduced or

extant life). Dr. Zurbuchen reported that there is no plan to include special regions; but rather to land near sites that are thought to have harbored water in the past. As this was a technical question, he would provide the Committee a more definitive response. Dr. Kathryn Flanagan asked that the NAC structure better coordinate activities so that committees can better do their homework. Dr. Mihir Desai asked if there were a NASA-wide vision or strategy for the use of SmallSats. Dr. Zurbuchen said he would talk more about this strategy in August, and that it would be aligned with decadal survey guidance.

Dr. Peterson asked if the DART mission would preserve some technology aspects of the Asteroid Redirect Mission. Dr. Zurbuchen noted that DART is being posited as an impactor on an asteroid, and is seen as a two-mission set, one of which would be funded by the European Space Agency (ESA). DART is now being developed via Congressional guidance and has been on the list for a while. Dr. Peterson posed a general question, often asked by astronomers: is the decadal survey still relevant? And are big missions dead? Dr. Zurbuchen asserted that the surveys are relevant in every community and continue to help NASA to direct and manage its funding within existing restraints. The broader question is really for all the stakeholders. JWST is getting ready for launch, so big missions are not dead. What happens with future astrophysics will be subject to the next survey, as well as budgetary limits. NASA aspires to do as much as it can within the constraints (e.g. budget, Administration, Congress).

Dr. Avery commented that the power of the decadal survey is demonstrated in the justification of budgets. In ESD, the difference is in appreciating the continuity of data. She described how the Sustained National Climate Assessment committee helped her realize how much NASA Earth Science data permeates society and global issues like national security. She wasn't sure how to get the message on continuity out to the community, and to other agencies. The decadal survey doesn't really address the needs of the population that ESD serves. Dr. Zurbuchen said he could not fault the survey for its conclusions, but that he took the continuity arguments very seriously, and fully recognizing that science demands the observation of trends in various time scales. Many NASA programs have multiple foci, as in other communities. While not all aspects of these questions are understood, NASA is always having the discussion with the community.

To prepare for a brief question and answer session on WFIRST, Drs. Peterson, Flanagan and Mainzer recused themselves and either left the room or moved to the public area. Dr. Jeff Hoffman asked what would happen to WFIRST's mirrors should the mission be terminated, as the cost of storage is not insubstantial. Dr. Paul Hertz, Director of APD, said he had directed the WFIRST team to execute their FY18 plan, and until the Congressional response is determined, APD is not executing plans for zeroing out WFIRST including making those kind of decisions. Recused members rejoined the discussion. Dr. Zurbuchen thanked the SC for promulgating a laudatory NAC finding on NASA's esteemed civil servant workforce.

R&A Charge Response Drafting Session 1

The Committee deliberated on drafting a response to the R&A charge to the SMD committees, previously tendered by the SMD AA, to help define how to identify and facilitate high-risk/high-impact and interdisciplinary proposals in the program. Ms. Denning noted that this topic could be continued through the July meeting as well, and that the four discipline committees also are working on the questions. Dr. Jill Dahlburg, Chair of the Heliophysics Advisory Committee (HPAC), said her committee had decided to collect data at the upcoming American Geophysical Union (AGU) meeting in April; individual committee members have been tasked to gather information from the community. Dr. Anne Verbiscer, Chair of the Planetary Advisory Committee (PAC), reported that PAC had discussed the matter extensively and would hold their conclusions until the July meeting. Dr. Shepherd, Chair of the Earth Science Advisory Committee (ESAC) said he had scheduled a conference call in May to have a final discussion. Dr. Peterson reported that the Astrophysics Advisory Committee (APAC) is collecting responses via poll. The SMD R&A program is also collecting one year of data (from ROSES 2017) to support the ongoing

review. The Committee deliberated the multi-part questions in the R&A charge. Ms. Denning collected bulleted feedback items on a series of slides during the discussion.

Dr. Wadhwa commented that in the planetary R&A program, review panels did call out high-risk, high impact proposals, as did Program Managers (PMs). Dr. Dahlburg noted that HPD looked initially at the disparate distributions of marks concerning risk vs. science value. Dr. Flanagan felt that within the peer review process, the question of selectability comes in, and often hinges on the length of observing time. The calls do mention money and feasibility, which tends to convey a subliminal message of conservative outcome. Dr. Shepherd said that this was exactly the tenor of the ESAC discussion, pointing to a need for a cultural change. There was some ESAC discussion of creating a separate pool of money, and of empowering proposers to state clearly (self-identify) that their proposal should be viewed through a high-risk, high-impact lens. Dr. Flanagan noted that with space telescopes, the risk is time, while the reward is science. The figure of merit is observing time, and longer proposals tend to get marginalized. The Virtual Observatories (VOs) use a set-aside pool to get around this issue. Dr. Avery felt this was a fair strategy. Dr. Peterson commented that it was important to instruct review panels in this light; without instruction, they tend to give everyone not-quite-high-enough marks. Dr. Mainzer suggested that SMD gather data so that PMs can identify which programs are high-risk, high-reward; this could be done with a checkbox on NSPIRES, for both proposers and reviewers. Data gathering could be done to determine dollar amounts and the presence of any unusual resources.

Dr. Dahlburg commented that given the expectation that only one in 10 research projects are successful, if only 10% of a program budget is available, outcomes are sure to be low. Dr. Mainzer noted that even "failures" can be successes. Dr. Peterson asked: can you tell an engineering team that it's okay to fail? Dr. Shepherd pointed out that director's discretionary funds (DDF) at GSFC are available for this type of research. Dr. Peterson thought DDFs were great for very low technology readiness level (TRL) projects, but not much beyond. Dr. Flanagan thought that self-identified proposals could attain the same success ratio as other proposals. Dr. Peterson added that this will require programmatic judgement, as well as relevant expertise on the review panels. Dr. Flanagan cited the Laser Interferometer Gravitational-wave Observatory (LIGO) as exemplary, as the expectation of mission success required only one (expected to be rare) gravitational wave event. Dr. Dahlburg stressed that it was important to stay the course in ambitious missions, as success might well require decades. Dr. Peterson agreed, adding that any extended project would need regular milestones and internal evaluations. Dr. Avery felt that contrary to some assumptions, incremental progress in a discipline can indeed have tremendous impact; e.g., a combination of ground-based and satellite-based salinity measurements could transform ocean science. Dr. Peterson asked: does high impact usually mean high cost?

Dr. Flanagan asked if there were strategic plans at NASA designed to regularly yield impact: Is there a place for allowing "stunning serendipity" within the tactical proposal classes? Dr. Avery observed that researchers often go outside the government for serendipity. Dr. Desai suggested the Committee receive a briefing on NASA Innovative Advanced Concepts (NIAC) success rates, while recognizing that the program is technology-only. Drs. Wadhwa and Mainzer suggested a wider discussion on what risk means. Dr. Dahlburg commented that persistence is key to many of these risky proposals; they shouldn't be regarded as shots in the dark. Success in the early, high-risk days of radar and sonar required the long view of people who did not give up easily. Dr. Desai noted that measuring success at milestones gives confidence for continued funding.

Planetary Advisory Committee Report

Dr. Mainzer, Vice Chair of the PAC, delivered the committee report. The PAC is now fully staffed, with good diversity in both disciplines and geographic location. The first meeting of the year was held in February and constituted a very comprehensive meeting on the entire program, including reports from the assessment groups.

The PAC discussed NSPIRES, early career fellowships, the Mars 2020 mission, a Mercury analysis group, Venus opportunities, standardization of planetary data formats, a report from the Planetary Defense Coordination Office, and radioisotopes. In particular, PAC wished to forward their recommendations concerning NSPIRES external reviews. PAC recommends that there not be a delay of more than 48 hours between the time an external reviewer is identified and they are notified that reviews are available to them, and also that visibility into the NSPIRES system be improved. The recommendations are targeted to the PSD Division Director. Dr. Peterson felt that these particular PAC recommendations might well be universal, and should be shared with the other discipline committees for consideration.

Dr. Mainzer briefly described the PAC's other recommendations for the PSD:

Early Career Fellowship (ECF) program - PAC recommends the revision and restoration of NASA's ECF program, dividing it into tenure and non-tenure track research. The ECF could be modeled on NASA's Hubble fellowships, or NASA's postdoctoral programs. Dr. Verbiscer reported that the PAC Executive Secretary, Jonathan Rall, was very pleased with this result.

Post-2020 Mars sample return - the PAC recommends that the downstream Mars sample return strategy include the collection of a simple contingency grab (grab-and-go) sample, along with a curation plan, in contrast to the current plan of a lean sample return strategy. The recommendation keeps in mind the cost constraints surrounding sample return.

Mercury Analysis Group - the PAC recommends the establishment of a separate Mercury Analysis Group (MAG), rather than having it absorbed into other analysis groups, recognizing that Mercury is not adequately represented at present.

Venus Opportunities in Discovery - the PAC finds that Venus is underexplored.

The PAC issued a finding on standardization of planetary data (e.g. GIS and spatial data) to maximize science return from planetary missions.

The PAC has also requested regular reports from the Planetary Defense Coordination Office (PDCO).

Heliophysics Advisory Committee Report

Dr. Jill Dahlburg, Chair of HPAC, presented a report; the committee is now fully formed, although a number of members will be rotating off in April. The HPAC last met from November 29 to December 1, 2017. The Committee heard results from the HPD Senior Review, which considered 16 missions in extended phase and recommended that they all be continued. The HPAC determined that the review was fair and unbiased and issued a letter of concurrence to HPD. The next review will be held in three years instead of two.

The HPAC was briefed on NASA's new Internal Scientist Funding Model, which was created in an effort to take proposal-writing pressure off its civil servants. HPAC commended HPD for its fair and reasonable plan, and found also that the plan alleviated funding uncertainty for these civil servant researchers, and also expanded the review panel pool. Dr. Desai asked if there had been any discussion of the model's impact on R&A, and stagnation. Dr. Dahlburg agreed that the impact of the model needs to be monitored regularly.

HPAC received a briefing on small orbital missions involving CubeSats, which struck members as revolutionary. For small orbital missions, the Committee feels that HPD should follow the best practices

of the Suborbital program, should treat the projects as contractual documents, and fund CubeSats as it would grants (high-risk, high-impact). CubeSats are operated under an 80% success rate assumption (i.e. the hardware should work), and funded through the Wallops Island launch facility. The Low Cost Access to Space (LCAS) and suborbital programs are critical for training early career researchers. HPAC recommended that HPD consider a set-aside for universities and small organizations (rather than centers and federally funded research and development centers).

HPAC received an R&A program update and issued one finding on the subject. HPAC found that the program analysis groups (PAGs) should report to both the Division Director and the HPAC.

HPAC considered the details of HPD Science Centers and whether they should be one-phase or two-phase centers, virtual, co-located, with research-to-operations components or vice versa, or research-only components.

HPAC heard a briefing on the community's unmet need for High-End Computing (HEC) time. The Ames Research Center has developed modular facilities to mitigate some of the need, but HPAC found that HEC is a limited resource that needs to be treated as telescope time, and will require a change in practice.

HPAC continues to receive inputs from the community on the SMD AA's R&A Charge.

HPAC held its annual Government Performance and Results Modernization Act (GPRAMA) exercise, and rated HPD Green for all three aspects of Heliophysics objectives.

Lunch Presentation: *Destination Space Station and Beyond*
Science Committee member Dr. Tamara Jernigan provided a presentation and video of her experiences as a Shuttle and ISS astronaut. The session was Skyped with a local school classroom, Ms. Luzdary Chamorro's sixth grade class at Gunston Middle School in Arlington, VA. The students asked many astute questions that were addressed by Jernigan, such as what it was like to experience the high g-forces associated with space travel.

SMD Strategic Data Management Working Group
Ms. Ellen Gertsen presented an overview of a Strategic Data Management Working Group (SDMWG) that was introduced at SMD in early 2018. She and Dr. Kevin Murphy co-chair the group, which deals with how to prepare for the future, take advantage of information Technology (IT) advances to further science, and make NASA archives more available to the public, enabling more analytic capability. NASA's oldest science data is 40 years old (dating to the Voyager mission). Dr. Jeffrey Hayes interjected that roughly 50% of all new peer review papers are based on archived data, underscoring the value of archived data in time series investigations, as just one example.

The working group will address three challenges: handling the exponentially increasing volume of data; taking advantage of opportunities to promote new science; and providing a forum to enable collaboration and to gain efficiencies of scale. Objectives of the working group are to take a strategic view of data systems, including HEC; promote efficient data management across divisions; develop a data management strategy; and create a roadmap. Many members of the nascent group reside within Headquarters, but NASA is developing a mechanism for broader community input as it develops a five-year strategy. The working group will develop a team of experts; evaluate the state of the archives; develop a Request for Information (RFI); evaluate the RFI responses; and finally, select consultants for opportunities to collaborate. Notionally, the working group will spend the Spring and Summer obtaining community input. In Fall 2018, there will be an outbrief to the SDMWG Chairs. Asked about the state of the current (data) storage system, Ms. Gertsen described it as being distributed around the country, depending on the NASA discipline. She added that some future data-intensive missions (e.g., the NASA-

ISRO Synthetic Aperture Radar mission, NISAR) will be stored on the Cloud due to high data rates. Dr. Murphy echoed Ms. Gertsen's comments on mission-specificity, adding that it was hoped that NASA could take the best aspects of the discipline activities and move them to the Cloud environment.

Big Data Task Force Final Products Review

The SC discussed the Big Data Task Force (BDTF) final products. Dr. Peterson commended the group for sharpening its focus on the seven findings and 11 recommendations.

BDTF Recommendation 3: Establish a data science and computing division in SMD. Dr. Flanagan led the discussion. She briefly described the BDTF's helpful evaluation of all the major archives in Astrophysics. The BDTF white papers were excellent. It was generally agreed that the problem with the recommendation is that it is part of advocacy for a top-down approach to data science in SMD, but that its beneficial intent could be carried out in such a way as to do no harm. Top-down imposition comes with shifting funds and ambiguous reporting chains. Apart from budget issues, BDTF had found that archives were operating quite well and were on the right path. This observation underscores the need for new funds, not a new division. A separate division would not be worth the resources expended and would be difficult to implement. Any new funds for SMD might end up going to a new division and might disrupt an archival system that is already working well. The SC is still a fan of the goals of the BDTF, notwithstanding.

Dr. Desai agreed with Dr. Flanagan's assessment, adding that while a centralized computing center is fine, a division for managing HEC is not worth it. HEC should be managed at the SMD level. The SC concurred with the discussion's outcome.

BDTF Recommendation 10: NASA should consider a joint program with the National Science Foundation's (NSF's) Big Data Innovation Regional Hubs and Spokes. Dr. Verbiscer felt the recommendation to "consider" was easy enough to accept, although it was not clear how NSF would benefit from the joint program. The recommendation to create a community listserv is also easy to implement. Dr. Desai concluded that the recommendation is not controversial, and only commented that the dividing lines between NSF and NASA are not clear. The SC concurred with Recommendation 10.

BDTF Recommendation 7: Establish Server-Side Analytics (SSA) at NASA for data analysis. Drs. Patterson and Shepherd led the discussion. Dr. Patterson enumerated the pros and cons of SSA architectures. SSA can reduce download times for massive files, but the question is whether these download times truly have a negative effect on researchers. Most NASA researchers have capable computer systems, and the time they spend on writing algorithms and doing analysis is usually much longer than download times. Dr. Patterson believed that using SSA might allow data to be viewed and analyzed by a broader community, which would be a positive thing. SSA metrics might also allow NASA to track data users and see what they are analyzing. SSA has huge capabilities which have been demonstrated in the satellite, medical, and banking sectors. There are many SSA packages; the user interface would have to be familiar to the researcher (e.g. is there a cloud version of Matlab?). Other questions are: How do you implement SSA so that it meets most people's needs? How do you manage it? A major disadvantage of employing SSA at NASA is that it is nontrivial to put all of this together for missions – is there one massive repository? Two? Twenty? What about staffing? A researcher can buy a TB of storage for $50, and a Linux box for $2,000 – it's not that hard to do. Would SSA impede research?

There is also a cost shift associated with SSA computer systems. How long will it take to implement? Must there be new facilities and connections? How many people will be needed to staff SSA facilities, and how will they work hand-in-hand (a necessity) with the science community? It is a sizable job, and is actionable, but not trivial. It will take a lot of work. There are resources available that can help NASA figure it out. NASA will need to run some trades and costs.

Overall, Dr. Patterson thought that SSA tools are mature. The approach has worked in many other industries. A good example is OnShape, a Cloud program that allows multiple users to collaborate on 3-D designs; it shows it can be done and done well. The easier the interface, the more comfortable the users are with the tools, the more acceptance SSA will get. Dr. Hoffman noted that as part of looking at Recommendation 8 (on the Department of Energy's Exascale Computing project), he had had a conversation about putting things on the cloud: if you have an Exascale facility, and the only way to get to it is through a Cloud, it means limitations. Dr. Peterson said that Astrophysics is already ahead of the curve and is building SSA facilities. Dr. Flanagan noted that Earth Science also is doing this. When data volumes explode, it's a different ballgame. If the community is already beating a path to SSA, Dr. Flanagan felt the SC should give it the thumbs-up. Dr. Patterson added that the capability needs to be modular in some way, and expandable. Dr. Murphy commented, from the perspective of Earth Science, that NASA must also consider who can access SSA analytic capabilities, and what the data policy is. SSA may also change how NASA stores products. He recommended using Giovanni for on-demand analysis, and to study the report of a February ES analytics workshop.

BDTF Recommendation 8: NASA should participate in the Department of Energy (DOE) Exascale initiative. Dr. Hoffman commented that if NASA does not have state-of-the-art (SOA) computing facilities, it will become a backwater. NASA also needs to promote the ability to make use of big databases, and needs to educate scientists and engineers on how to conduct searches. It is not just big databases, but the amount of data that results from modeling and simulation. Clearly, NASA needs to stay SOA to attract good computer scientists. Dr. Hoffman suggested that the SC ask NASA staff who already use HEC, how they could use exascale computing abilities. Dr. Flanagan cautioned against conflating Recommendation 8 with 9, as the Program Officer for HEC (Dr. Tsengdar Lee) is already participating with the exascale project. One of the BDTF recommendations was for NASA to contribute models and use cases. She felt that Recommendation 8 was sound and already underway by Dr. Lee; for a small investment, it would be valuable to see how the initiative might address NASA needs. Dr. Jernigan noted that it was critical for NASA to stay in the game in exascale, and to be there as the computer architecture is being designed.

BDTF Recommendation 9: NASA should create a two-to-three-year detailee position to focus on providing access to the Science Data Superhighway. Dr. Murphy said he was running a panel on how to respond to these issues, and that there is a solicitation in ROSES 17, and in the Earth Science Technology Office (ESTO) Advanced Information Systems Technology (AIST) program, that both cover access. Dr. Peterson thought that access to the Superhighway could be achieved with existing conduits, without the need for a detailee position. Ms. Gertsen felt the issue was in thinking more of how to distribute access in an equitable fashion. Dr. Peterson said the issue warranted a cost/benefit analysis as to whether NASA should pursue the issue, and left the recommendation to further discussion.

BDTF Recommendation 11: SMD Data Science Applications Program. Dr. Wadhwa addressed the notion of creating a permanent position of a Data Science Program Scientist, which could create unintended consequences. She felt that the expertise already resides in SMD. Dr. Peterson added that Recommendation 11 presupposes that Recommendation 3 is implemented. Dr. Wadhwa felt it might be useful to have a data scientist to help the four divisions along. Dr. Avery thought that creating a data scientist position was sound and actionable, but not realistic; the person in the position would have far too much to do. It's hard to tell domain scientists what to do in a non-integrated fashion. It also requires a special type of person to persuade domain scientists; this individual would need an intersection of computational knowledge and semantic technology knowledge. NASA may be able to find this type of person at NSF. There are also a lot of unknowns as to whether a $10M program can do all of this. Dr. Mainzer was concerned that the recommendation seems to be untethered to science objectives.

BDTF Recommendation 5: Make NASA's archived science data more usable and accessible. Dr. Mainzer noted that in the Planetary Science Division (PSD), documentation is required when storing archival data. The APD and ESD also hold regular archive reviews. Dr. Avery commented that she had heard no complaints about archived data at ESD and saw no barrier to use. She did feel that the review of data quality needs a policy. Dr. Mainzer noted that in general, these archive reviews are very thorough. The SC concurred that the current state of archive accessibility was sound.

BDTF Recommendation 4: NASA SMD should make the necessary changes in training, proposal and mission reviews, and implementation of the critical capabilities that data science algorithms provide. Dr. Peterson said he certainly supported NASA-sponsored workshops for upscaling skills, but felt that this really was the function of universities, as in data science courses.

The Committee discussed the BDTF findings and generally concurred with the remaining content. In particular, Finding 6 that dealt with modeling workflows was felt to need more fine-tuning, but sound for ultimate acceptance.

Public Comment Period
No public comments were noted.

Meeting Change
Due to weather conditions, a decision was made to have the meeting shifted to a virtual gathering for the following day.

R&A Charge Response Drafting Session 2
The Committee returned to a discussion on the R&A charge. Dr. Wadhwa commented that most interdisciplinary work is being done through research structures, such as the Nexus for Exoplanet System Science (NEXSS), and that a recent re-organization of planetary R&A has helped to facilitate such work. Dr. Mainzer noted that PSD's Dr. Doris Daou also has made efforts to support exchanges between Planetary Science and Astrophysics. Dr. Peterson observed that people wind up proposing to different parts of the division and hadn't heard many complaints about the process. Dr. Shepherd said that ESD has periodic interdisciplinary calls, such as in ROSES Interdisciplinary Research in Earth Science (IDS), in addition to the inherently interdisciplinary nature of Earth Science itself.

Joint Agency Satellite Division Update
Ms. Sandra Smalley, Division Director of the Joint Agency Satellite Division (JASD), presented an update. JASD builds satellites and ground systems on behalf of the National Oceanic and Atmospheric Administration (NOAA), through a reimbursable program. JASD plays a major role in strategic planning and advancing collaborations with NOAA and partner organizations. There is a big focus on leveraging ride shares, with a huge capacity being available. Continuing programs include the Geostationary Operational Environmental Satellite (GOES)-S, -T and -U series, MetOp-B (with ESA), and NOAA 20. The Joint Polar Satellite System (JPSS-1) satellite launched in November and GOES-17 launched in March of this year. NASA has launched two GOES satellites in a little over a year. GOES-16 is now under NOAA's jurisdiction and referred to as GOES-East. GOES-17 will become GOES-West. GOES-T, the next satellite to fly, completed its Systems Integration Review (SIR) in September 2017. Some minor issues involving magnetometer corrections in the GOES series satellites are in the process of being resolved. With the latest launch, full disk imagery for GOES has increased from 8X to 96X, and from black-and-white to color. This includes shortwave infrared imagery, which improves fire detection. Ms. Smalley displayed high-resolution GOES imagery of Hurricane Harvey striking the Texas coast, which merged Advanced Baseline Imager (ABI) data with the Geostationary Lightning Mapper (GLM), both of which have contributed to greatly improved lightning detection.

In the JPSS series, JPSS-1 is now NOAA-20. The first-light image from the Cross-Track Infrared Sounder (CrIS) instrument was received in January 2018; first-light images now have been received from all five imagers on board. A handover review was completed in early March. Working issues with ATMS and CrIS for JPSS-2 is impacting schedule lightly with a 4.5 month delay.

The MetOpC project (ESA mission) for which NASA is building several instruments, is going very well. It is scheduled to launch in October 2018 from Kourou, French Guiana on an Ariane 6 rocket. Numerous Committee members applauded the efforts of JASD as interesting and impressive, reflecting a wonderful partnership, with valuable instruments that are used immediately. Dr. Mainzer suggested a laudatory finding on JASD.

Dr. Peterson adjourned the meeting at 4:16pm.

March 21, 2018

Ms. Denning opened the teleconference/Webex-only meeting, and Dr. Peterson brought the meeting to order.

DAA for Research Update

Dr. Michael New, acting Deputy Associate Administrator (DAA) for SMD Research, briefed the SC. SMD has five research divisions (four science disciplines plus JASD) that participate in an integrated program. The program strives to be a leader in science, viewed through a lens of excellence and innovation, and to inspire learners of all ages. . There are four cross cutting agency-wide emphases under Research: the first is the Internal Science Funding Model (ISFM). ISFM was adopted to maximize NASA's ability to lead in science, by reducing the amount of time civil servant researchers devote to writing proposals for NASA's own money, and allowing them to concentrate on research, be project scientists, and serve their communities. The model negotiates funds for directed work, which must be science-focused and appropriate to the program. ISFM will undergo periodic peer review, and will not appreciably change any funds going to centers for research. After three years, NASA will evaluate this pilot. There are eight draft success criteria that have been drafted by the Office of the Chief Scientist (OCS), which will be finalized over the next few weeks. SMD has done a survey; Dr. New suggested that Louis Barbier brief the SC on its results, and answer specific questions about competed grants and other aspects.

Observations from the first round of awards have shown variation amongst centers that reflect their respective capabilities. Basic rules between divisions have been more difficult to determine, and will need to be standardized. The intent is to promulgate best practices. In response to a question, Dr. New noted that outside funds cannot be folded into the ISFM.

A second emphasis is diversity and inclusion. It has been shown that diverse organizations are more likely than non-diverse organizations to innovate and excel. Dr. New further defined inclusion as being asked to dance at the dance, while diversity is likened to being invited to the dance. There is now serious discussion about increasing SMD diversity in all dimensions, and there have been two basic studies to try to determine its extent at NASA. NASA is not allowed to collect basic demographic data (gender, race, ethnicity, disability), thus any analysis had to be done on the basis of inference of gender (i.e. no considerations of cis/trans identities). One study looked at first names only, inferring gender most of the time, and assigning inferred genders to proposers. This study did not appear to be biased against female first names. However, because the fraction of female-sounding names amounted to 20%, and because it is known that many more females are actually Ph.D.s (40-50%), there is a discrepancy in the competed mission lines (e.g. Mars Scout, Earth Venture, etc.). Looking at several hundred proposals from 2001-2017, only about 10% of those proposals had female Principal Investigators (PIs). About 90% of those females came in through planetary science. The data are complicated and not easy to work with. SMD is

working with data scientists and building a database that will ingest a decade's worth of research proposals for further analysis. Schema are being developed now, and SMD will look at just astrophysics in a month or so. Once a database is established, SMD can look at the pathways of researchers and validate or invalidate the "folklore." Dr. Mainzer asked, as a female Discovery PI, if SMD had done a survey of people who have proposed. Dr. New said this had not yet been done, and that SMD was working with the National Academies to find the best way to understand the problem. The midterm decadal assessments for both astrophysics and heliophysics will address this question as well.

Beginning in 2017, all SMD solicitations will contain language on diversity. In 2018, all proposers will be briefed on cognitive bias and will undergo half-day training courses. SMD recently revamped two advisory committees in light of diversity issues. NASA is also working to increase diversity in Senior Review (SR) panels and working groups (WGs), and is looking to NSF for further guidance and examples.

Another emphasis, on anti-discrimination and anti-harassment efforts at NASA, began with a letter written by Administrator Charles Bolden that contained clear statements on behaviors that will not be tolerated, followed up by a similar letter by Acting Administrator Robert Lightfoot. SMD AA Thomas Zurbuchen is also involved in an effort to better publicize NASA's policy and the processes for filing complaints. NSF has changed their policy and now requires reporting claims. NASA is also developing statements about what one should do to respond to discrimination and harassment, which will be disseminated through "Dear Colleague" letters. There is an FAQ page about grants online, in which contingencies are being made much clearer.

Finally, SMD also is looking at how to better develop the NASA and non-NASA workforce, and is formulating new training opportunities that will target late early-career researchers to grow them into future mission PIs. One approach will be to reinvigorate hands-on experience programs with flight projects through the airborne campaign, sounding rockets, and CubeSats. SMD also is partnering with centers to develop a more diverse cadre of program managers (PMs), and is specifically looking for feedback from the SC on this effort. The intent is to move to a more strategic approach with stakeholders by involving colleges and universities that have not been reached out to in the past. SMD currently is participating with the Office of Small Business projects to develop a roadshow that will feature minority-serving universities. Dr. Peterson suggested that SMD incentivize older PIs to groom younger people for future roles. Dr. New noted that in the latest New Frontiers AO, there are requirements for these next-generation preparations.

R&A Charge Response Drafting Session 3

The Committee returned to Question 2 of the R&A charge on interdisciplinary/interdivisional research. Dr. Peterson commented that it was hard for people from the outside to evaluate whether processes are actually in place at SMD. Dr. Patterson noted that it wasn't obvious where one can specifically respond to calls for such research: Where do we solicit for interdivisional projects? In Earth science, one does not see any language highlighting interdivisional research. Where are these specific calls for interdivisional work? Dr. Shepherd said these calls are focused on interdisciplinary work across ESD, in its six focus areas (e.g. weather, water cycle, solid Earth). He thought there were opportunities for interdivisional work in the focus areas, but they are not called out. Within interdisciplinary calls, there is often targeted language, but at other times the language is broader. To Dr. Shepherd's knowledge, there were no specific calls for interdivisional work. However, ESD's Applied Sciences program is another area that is likely to contain interdisciplinary calls, but also without explicit interdivisional language. Dr. New cited the Exoplanet Research program (by APD and PSD) and Habitable Worlds (by APD, PSD, and HPD), both of which are explicitly interdivisional. Dr. Peterson commented that the structure exists when the research community needs it, and that NASA is good at responding to these needs. He felt the community needs to communicate more with the SC in pinpointing these opportunities. Committee members concurred with

this thought. Dr. Mainzer noted Dr. Daou's efforts in adding seminars and training workshops to the Exoplanets program, which teach planetary scientists how to take advantage of Astrophysics assets. In Earth Science, the need is more applications-oriented. Dr. Peterson concluded that SMD is doing a good job in areas of "pure science," and that interdivisional research seems to be doing well. Dr. Shepherd noted that while the vast majority of ESD is "pure science," there is a small program that focuses on applications. Dr. Mainzer thought that comparative planetology may need more interdivisional research, even as NExSS and the Astrobiology Institute are already doing some of this work. Dr. New added that comparative planetology also is explicitly called out in the Solar System Workings program in PSD, an integrative program.

Returning to the subject of balancing high-risk, high-impact research in the SMD disciplines, Dr. Peterson noted that some have supported the addition of AO language that encourages high-risk proposals. Dr. Mainzer felt that such research should not be pulled out in a separate program call, but that rather proposers could self-identify using a checkbox in the evaluation. Dr. Hoffman also supported some sort of flagging toward a high-risk pool. Suggestions from the PAC had been to include a comments field to assess high-risk proposals. Dr. Flanagan said she personally felt that high cost would be equated with high probability of failure; using the Laser Interferometer Gravitational-Wave Observatory (LIGO) as an example, she thought it was not possible put a number on it. Dr. Hoffman raised the issue of what such research implied the TRL of technologies involved, adding that if SMD wants to foster innovation, it needs to look at the "valley of death," as in the NASA Innovative Advanced Concepts (NIAC) Phase 3 projects.

Dr. Peterson agreed to circulate the SC's R&A charge response language and resolve any remaining differences in July.

Big Data Task Force Final Products Review

Dr. Peterson and the Committee reviewed a few remaining items on the BDTF deliberations; Ms. Denning reminded the SC that more input was needed from some absent members. Dr. Peterson felt that consensus had been achieved in most areas, with modeling workflows being the most incomplete area. Overall, the SC was pleased with the findings and recommendations, made in such a way as to preserve the integrity of data management within each division. Dr. Flanagan thought the newly stood up Strategic Data Management Working Group easily would allow implementation of BDTF recommendations without interfering with management.

Discussion

The Committee touched on the R&A charge response and how high-risk proposals might be encouraged.

The SC discussed a positive finding in support of JASD's performance. Ms. Denning drafted language in real time, capturing member commentary on-screen.

Dr. Peterson began discussion of items that should be brought to the SMD AA's attention. Dr. Mainzer mentioned the practical recommendations from the PAC to make NSPIRES more user- and reviewer-friendly. Dr. Peterson concurred that these ideas should be mentioned. Dr. Shepherd noted that the 2017 Earth Science Decadal Survey had just been released and was in the process of being assessed by ESAC, and that the SC should be aware that both ESAC and ESD are developing forward planning based on the newest recommendations. He said he would brief the SC more fully at the July meeting. Dr. Peterson noted that there had been a lot of concern about the new survey and how it was received, based on its different approach. Ms. Denning suggested commending Dr. Jernigan for her lunchtime Skype engagement with Gunston Elementary School, and a positive mention of Dr. New's presentation on harassment and discrimination.

The SC concurred for the most part to support a finding on diversity and inclusion. Ms. Denning drafted language for the short finding in real time, capturing member commentary on-screen.

The Committee briefly discussed the agenda for its next meeting, to include an Earth Science Decadal Survey outbrief, and a briefing on the ISFM.

Outbrief to SMD AA

The Committee briefed Dr. Zurbuchen on its deliberations. Dr. Zurbuchen thanked the SC for its findings on JASD and NASA efforts to improve diversity and inclusion. He requested that the PAC's findings on NSPIRES be passed to him, and asked to see the SC's BDTF draft when feasible. Dr. Peterson agreed to do the latter before the July meeting. Dr. Zurbuchen referred to the question Dr. Peterson had asked on the candidate landing sites on Mars, and noted that all are believed to not be special regions. The mission is being implemented to avoid special regions.

Dr. Peterson expressed gratitude to the Committee and to Ms. Denning, and appreciated that everyone dealt well with the weather situation. Dr. Peterson adjourned the meeting at 12:14 pm.

Appendix A
Attendees

NAC Science Committee Members
Bradley Peterson, Ohio State University, ***Chair, Science Committee***
Susan Avery, Woods Hole Oceanographic Institute
Jill Dahlburg, Naval Research Laboratory, Chair, Heliophysics Advisory Committee
Mihir Desai, Southwest Research Institute
Kathryn Flanagan, Space Telescope Science Institute
Jeffrey Hoffman, Massachusetts Institute of Technology *(via telecon)*
Tamara Jernigan, Lawrence Livermore National Laboratory
Amy Mainzer, Jet Propulsion Laboratory *(designee, Planetary Science Advisory Committee)*
Pat Patterson, Space Dynamics Laboratory
J. Marshall Shepherd, University of Georgia, Chair, Earth Science Advisory Committee *(via telecon)*
Anne Verbiscer, University of Virginia, Chair, Planetary Science Advisory Committee *(via telecon)*
Meenakshi Wadhwa, Arizona State University
Elaine Denning, NASA Headquarters, ***Executive Secretary, Science Committee***

NASA Attendees
Dennis Andrucyk, NASA HQ
Louis Barbier, NASA HQ
Damara Belson, NASA HQ
Mariel Borowitz, NASA HQ
Jamie Favors, NASA HQ, ESD
T. Jens Feeley, NASA HQ
Ellen Gertsen, NASA HQ
Hashima Hasan, NASA HQ
Jeffrey Hayes, NASA HQ
Paul Hertz, NASA HQ
Patricia Knezek, NASA HQ
Bill Knopf, NASA HQ
Jared Leisner, NASA HQ
Christy Rivera, NASA HQ
Joan Salute, NASA HQ
Sandra Smalley, NASA HQ, JASD
Eric Smith, NASA HQ
Gerald Smith, NASA HQ
Jim Spann, NASA HQ
Dan Woods, NASA HQ
Thomas Zurbuchen, SMD AA, NASA HQ

Non-NASA Attendees
David Gump, DSI
Ana Wilson, Zantech IT, Inc.
Joan Zimmermann, Zantech IT, Inc.

Telecon/Webex Attendees
Gale Allen, NASA HQ
Ed Belte, Orbital ATK
Nathan J. Boll, NAS
Francesco Bordi, Aerospace Corporation
Juan Cabarco
Natasha Canole, NASA
Clint Carlson, Aerospace Corporation
Kenneth Chang, New York Times
Art Charo, NAS
Felicia Chou, NASA
Chris Clavin, IDA
L. Curtis, AURA
Dohy Faied, NASA
Jeff Foust, Space News
Doug Gage
Tim Gehringer, USRA
Grace Hu, OMB
Hussein Jirdeh, STScI
James Johnson, NASA
Linda Karanian, Karanian Consulting
Janet Kozyra, NASA
David Ladler
James Lochner, USRA
Margaret Luce, NASA HQ
Kathryn McGirk
Gene Mikulka, Talking Space Podcast
Horace Mitchell, NASA
Ivelina Momcheva, STScI
Kevin Murphy, NASA
Quang-Viet Nguyen, NASA
John O'Meara, SMCVT
Nick Perlongo, Aerospace Corporation
Jose Ramos, GAO
Rebecca McCauley Rench, NASA HQ
Michael New, NASA HQ
Michael Reynolds, U.S. Senate Commerce, Science, and Transportation Committee
Tom Risen, AIAA
John Rummel, ECU
Martin Ruzek, USRA
Ken Sembach, STScI

Arfon Smith, STScI
Marcia Smith, Space Policy Online
Amy Svitak, Space Intel Report
Micheline Tabache, ESA
Travis Vazansky
Jeff Waksman, NASA HQ
Jeff Walter, NASA
Nicholas White, USRA
Pamela Whitney, U.S. House of Representatives Science, Space and Technology Committee
Ashlee Wilkins, AAS
Alexandra Witze, Nature Magazine
Isaiah Wonnenberg, U.S. Senate Commerce, Science, and Transportation Committee
Alex Young, NASA

Appendix B
NAC Science Committee Membership

Dr. Bradley Peterson (Chair)
Ohio State University

Dr. Susan K. Avery
Woods Hole Oceanographic Institution

Dr. Jill P. Dahlburg
Naval Research Laboratory

Dr. Mihir Desai
Southwest Research Institute

Dr. Kathryn Flanagan
Space Telescope Science Institute

Dr. Bernard Scott Gaudi
The Ohio State University

Dr. Jeffrey Hoffman
Massachusetts Institute of Technology

Dr. Tamara E. Jernigan
Lawrence Livermore National Laboratory

Dr. Pat Patterson
Space Dynamics Laboratory

Dr. Walter G. Secada
University of Miami

Dr. J. Marshall Shepherd
University of Georgia

Dr. Anne Verbiscer
University of Virginia

Dr. Meenakshi Wadhwa
Arizona State University

Ms. Elaine Denning (Executive Secretary)
NASA Headquarters

Appendix C
Presentations

1. Science Mission Directorate Report, FY19 Budget Overview; *Thomas Zurbuchen, Craig Tupper*
2. Planetary Advisory Committee Report; *Anne Verbiscer, Amy Mainzer*
3. Heliophysics Advisory Committee Report; *Jill Dahlburg*
4. "Destination Space Station and Beyond;" *Tamara Jernigan*
5. SMD Strategic Management Working Group; *Ellen Gertsen, Kevin Murphy*
6. Joint Satellite Agency Division Update; *Sandra Smalley*
7. Deputy Associate Administrator for Research Update; *Michael New*

Appendix D
Agenda

Dial-In (audio) & WebEx (view presentations online) information is located on page 2.

NASA Advisory Council
Science Committee

March 20-21, 2018

NASA Headquarters, Room 9H40 (March 20)
and Virtual-only (March 21)

Agenda
(Eastern Time)

Tuesday, March 20

8:30 – 8:45	Opening Remarks / Introduction of Members	Ms. Elaine Denning Dr. Bradley Peterson
8:45 – 10:00	SMD Overview FY 2019 SMD Budget Overview	Dr. Thomas Zurbuchen Mr. Craig Tupper
10:00 – 10:15	*Break*	
10:15 – 11:20	R&A Charge Response Drafting Session 1	All
11:20 – 11:40	Planetary Science Advisory Committee Report	Dr. Anne Verbiscer Dr. Amy Mainzer
11:40 – 12:00	Heliophysics Advisory Committee Report	Dr. Jill Dahlburg
12:00 – 1:15	*Lunch* – Member Presentation "Destination Space Station and Beyond"	Dr. Tamara Jernigan
1:15 – 1:30	SMD Strategic Data Management Working Group	Ms. Ellen Gertsen Dr. Kevin Murphy
1:30 – 3:00	Big Data Task Force (BDTF) Final Products Review	All
3:00 – 3:10	*Break*	
3:10 – 3:15	Public Comments	

Dial-In (audio) & WebEx (view presentations online) information is located on page 2.

3:15 – 4:00	R&A Charge Response Drafting Session 2	All
4:00 – 4:40	Joint Agency Satellite Division Update	Ms. Sandra Smalley
4:40 – 5:00	Discussion	All

Wednesday, March 21 *(virtual-only due to Wash, D.C. Federal offices closure for inclement weather)*

9:30 – 9:35	Re-Open Meeting	Ms. Elaine Denning Dr. Bradley Peterson
9:35 – 10:20	Deputy Associate Administrator for Research Update	Dr. Michael New
10:20 – 10:50	R&A Charge Response Drafting Session 3	All
10:50 – 11:00	*Break*	
11:00 – 11:30	Big Data Task Force (BDTF) Final Products Review	All
11:30 – 12:00	Discussion, Findings and Recommendations	All
12:00 – 12:15	Outbrief for SMD AA	Dr. Thomas Zurbuchen
12:15	*Adjourn*	

Dial-In and WebEx Information

For entire meeting March 20-21, 2018

Dial-In (audio): Dial the USA toll free number 1-888-592-9603 or toll number 1-312-470-7407 and then enter the numeric participant passcode: 5588797. You must use a touch-tone phone to participate in this meeting.

WebEx (view presentations online): The web link is https://nasa.webex.com, the meeting number is 995 104 591, and the password is SC@Mar2018 (case sensitive).

**** All times are Eastern Time ****