National Aeronautics and Space Administration

Washington, D.C.

NASA ADVISORY COUNCIL

ASTROPHYSICS SUBCOMMITTEE

April 7, 2011

NASA Headquarters

Washington, D.C.

Teleconference
Meeting Minutes

Alan Boss, Chair

Rita Sambruna, Executive Secretary

April 7, 2011
Scheduled 2-4 PM

Introduction

Dr. Alan Boss, Chair of the Astrophysics Subcommittee (APS), opened the meeting.

Astrophysics Division Update (APD)

Dr. Jon Morse, Director of APD, provided an update on recent activities. The Agency is weighing the effects of a potential government shutdown on projects such as the James Webb Space Telescope (JWST) and Astro-H, projects that heavily involve civil servants, if Congress fails to pass a FY2011 budget.

Dr. Morse reported on the morning's science highlight, reflected in a press release at nasa.gov, describing an excellent example of how multiple missions work together to discover and follow-up on targets of opportunity. The Swift satellite detected a large increase of the X-ray emission from the center of a galaxy, with follow-up Chandra and the Hubble Space Telescope (HST) exposures; the flare may be related to tidal effects in a star-black hole system.

The Science Mission Directorate (SMD) now has a new YouTube channel featuring science videos, such as a demonstration of the superfluidity of neutron stars as seen by Chandra; NASA hopes to do more of this in the future. It is also an opportunity to see the people behind the science, and its use could be extended to Suborbital and Research and Analysis (R&A) activities.

Public Affairs

Mr. Trent Perrotto, the SMD PAO liason, discussed how NASA currently integrates press releases in complementarity with Education and Public Outreach (EPO) efforts, both with individual researchers and with mission project offices. He clarified the difference between the purpose of the NASA Public Affairs Office (PAO) and EPO. The latter has a specialized audience, consisting primarily of K-12 students and educators. EPO often produces multimedia products for educational purposes, some of which can be repurposed for PAO. PAO, however, promotes news items to both the scientific community and the public, and attempts to tell timely stories about agency accomplishments in educated layman's language. PAO approaches news products by trying to re-tune coordination efforts; over the last few years, the trend has been to increase the number of Web features for a wide range of audiences. It is known that press releases reach a set number of people, but the Web/social media reaches millions through videos, Twitter, Facebook, etc. Hard news items are more driven by the scientists and the centers. PAO's goal is to get the message out in the best way possible, managing the frequency of the news on a daily basis, and promoting the science, primarily.

Dr. Jack Hughes described having been adversely affected by PAO in that he could not have a press release approved for Chandra through NASA channels, and resorted to releasing the news via Rutgers University. He pointed out that NASA' right of refusal was deleterious to maximizing press exposure. Mr. Perrotto cited this incident as a unique case; NASA had posted the Chandra result on Facebook and Twitter, reaching a wide audience. He offered to take the conversation off line, remarking that the larger goal is to find the right product based on

conversations with scientists and centers. Mr. Duane Brown, the Senior Officer for SMD Public Affairs, added that there has been no change in policy. PAO has determined, in some cases, that the best product may not be a press release. NASA Headquarters is trying to engage more PAOs at the different centers and is going to move toward the Web more often, because it reaches more people, and offered his assistance to Dr. Hughes for future determinations.

APD Update, continued

Dr. Morse returned to the discussion of APD activities, noting that the Explorers proposals would be undergoing reviews in Spring and early Summer and announcements for selections for phase A studies would be made in September. Concept study reports for the selections would be due one year later, and a downselect for flight would be determined in 2013. There were 22 proposals in total, 15 of which were Astrophysics proposals. The Explorer program envisions $200M payloads, plus launch vehicle costs. Twenty missions of opportunity (MoOs) were also proposed, 11 of which were Astrophysics proposals. There is involvement with the European Space Agency (ESA) on both full missions and MoOs.

Astro-H update

One of the main instruments for the JAXA Astro-H mission is the soft X-ray spectrometer that had been selected as a MoO in the previous Explorer call. Much testing has taken place in Japan thus far, and flight models are to be developed shortly, with the goal of launching in early 2014. NASA will meet with its JAXA counterparts in late April, at which time both agencies must determine the considerable impact of the 11 March Japanese earthquake and tsunami. JAXA has asked NASA to maintain the current schedule, however.

NuSTAR, a SMEX mission that will be flown on a Pegasus vehicle, is also making progress. Flight optics are being completed and delivered, thermal blankets for instruments are being fabricated, and the project is working on some issues with detectors. Overall, the mission is on plan for completion in November 2011, for a launch in early February 2012.

The Stratospheric Observatory For Infrared Astronomy (SOFIA)'s GREAT (German) instrument has undergone line operations, and has done a short science flight; the aircraft has been flown in various flight patterns. More early science flights with GREAT will be carried out today, and one or two next week. Additional science flights with FORCAST, another infrared instrument, are also planned. The science flights will be interleaved with engineering intervals.

ESA planning for large missions

Neither the LISA nor IXO missions, which represented 50-50 partnerships between NASA and ESA, were recommended as top priorities in either the Planetary or Astrophysics Decadal Surveys. ESA has since discontinued their studies in the LISA/IXO mission lines, and issued an announcement that it will be considering only ESA-led L-size missions fitting their cost cap, and with expected launch in the early 2020's. The downselection for the ESA-led L-class mission(s) will occur in February 2012. ESA has agreed to have a NASA Headquarters civil servant scientist to represent NASA on both the X-ray and Gravitational Waves science teams; announcements will be delivered on 8 April. NASA had been planning to provide a strategic funding level (a few million per year) to US Teams. While APD is expecting some cuts, support for the LISA and IXO teams will continue the rest of FY11. In case of additional unexpected

cuts, the division will consult APS for advice. The JWST re-baseline results must also be known before further determinations can be made. APD will also engage the community through the Astronomy and Astrophysics Advisory Committee (AAAC), the Space Studies Board (SSB), APS, the Board on Physics and Astronomy, etc., and will work with ESA on their re-scoped L1 mission candidates.

Dr. Hughes commented that the Decadal Survey-recommended WFIRST was mission-focused, and not wavelength-focused, with specific implementations, and reiterated the need for a Decadal Survey Implementation Advisory Committee (DSIAC). Dr. Morse agreed, and underlined his plan to reconvene the Committee on Astronomy and Astrophysics (CAA) through the National Research Council (NRC) in the next few months. Through the CAA, NASA will try to find options on WFIRST, and work with ESA's re-scoped missions, as well as SPICA (re-gauging when that mission might launch). Furthermore, APD is looking for opportunities to contribute to ESA's M3 mission. APD will also soon have the results of the next Astrophysics Senior Review so that future mission trajectories might be identified. Dr. Morse stressed that the way missions are being produced in these times of budgetary constraints will have to change.
This same conclusion holds for other SMD Divisions, e.g., Heliophysics and Planetary, which are grappling with similar tight fiscal constraints.

NASA would prefer to engage with ESA competitively on future mission concepts. One important issue to this regard is coordination. NASA will not participate in Euclid or Plato, IXO or LISA, and this was in part due to a mismatch in the two Agencies' timelines. To this end, Dr. Morse has plans to organize an international conference in 2012 to highlight the need to collaborate and set timelines accordingly.

Dr. Arjun Dey commented on NASA's loss of leadership in fields like X-rays, gravity, and mid-IR. Furthermore, NASA may only play a minor role in number of foreign-led missions. Dr. Morse noted that the Planetary division is also facing this problem, and that the SSB needs to be involved directly in this conversation. Others have expressed concern about loss of NASA's leadership as well. The Agency can't possibly lead in all areas, especially if missions cost multibillions of dollars. Science will have to judiciously make progress in this atmosphere. Dr. Morse argued that APD has already obtained great gains out of modest investments in foreign missions (Herschel, INTEGRAL, etc.). He added that ESA currently has a funding advantage for large, complex missions, and it would be good to have NASA participate in those opportunities.

PAGs
Dr. Morse reviewed the activities of the various Program Analysis Groups (PAGs). The Cosmic Origins PAG (COPAG) is reviewing the Office of the Chief Technologist (OCT) roadmap. The Exoplanet PAG (ExoPAG) is considering future instrumentation for exoplanet missions, incorporating various techniques, focusing on mid- to small-size missions. The ExoPAG and COPAG are also conducting studies to determine areas of science overlap, and will have a meeting to discuss these possibilities at the end of April.

JWST Update

Mr. Rick Howard gave a brief update on the JWST mission. The project has developed a near-term schedule for 2011-12 with milestones and is making good progress on all technical areas. The re-plan is on schedule for taking a new baseline to Headquarters in June or early July. Discussions are also under way on funding for 2013 and beyond, particularly concerning the discussion of the funds to support the earliest launch date given current budget constraints, while achieving an 80% confidence level. The Joint Confidence Level (JCL) process is just getting started and its results will be folded into the FY13 budget submission. The 5-micron cutoff detector issue, previously identified in the telescope's HgCdTe detectors, has been found to have a root cause: an inadequate barrier layer, which allows indium to trickle onto gold contacts, creating a parasitic circuit. Teledyne appears to have a viable solution, which must be tested before any new detectors are fabricated. Eleven of the 18 JWST mirrors have been completely processed. The first set of 6 flight mirrors will go into thermal vacuum testing next week. The final set of 6 mirrors will be done by the early part of next year. Asked if any further science details could be divulged, Mr. Howard replied that the project may be able to report such details by the time of the NAC's August Science Committee meeting.

WFIRST SDT update

Dr. James Green described the progress of the Science Definition Team (SDT) for the WFIRST mission. Two face-to-face meetings, and one teleconference have been held thus far, with one more meeting to take place before the release of the ad-interim June report. The purpose of the SDT is to provide science requirement flow-down for carrying out the science recommended by the Decadal, i.e., origin of the acceleration of the Universe, a census of habitable exoplanets, and an infrared sky survey. Issues under debate in the SDT include specifying technical parameters necessary to achieve WFIRST science goals. The team must also consider how WFIRST might proceed in the presence or absence of a Euclid mission and is working toward what seems to be a consensus that WFIRST should go forward with a full complement of science goals, whether or not Euclid proceeds. The SDT has formed subcommittees for each of the science goals, each of which is quite active at present, developing figures of merit for their particular science objectives. The team as a whole is considering the form and content of the June report, with an eye to providing information for budget baselines in the Fall.

The SDT members have subdivided into smaller groups studying specific aspects of the science requirements. Four subgroups were defined: the first on Weak Leaning, BA and the high-latitude IR survey; the second on Supernovae; the third on exoplanet microlensing; and the fourth on General Investigator program and Galactic plane survey.

The most important hardship for WFIRST is the fiscal constraints, which are insufficient to support flight hardware. Three fundamental issues have been identified: first, if WFIRST is de-scoped, it will not represent the Survey-endorsed mission and will not return the recommended science in full. Second, unless the mission is launched by 2021, progress from other space-based missions (Euclid) and/or by ground-based telescopes could be made in all three key areas of investigation, strongly reducing the need for it. Since the estimated development time for WFIRST is 7 years, NASA should identify adequate support by 2014, and the mission cost must

be known by Fall 2012. Third, the $1.6B cost figure provides an upper limit only; the mission does not have a specific target cost yet, and the SDT is not aiming for a specific quote.

WFIRST was rated medium-low risk by the Decadal because a large fraction of the technology for the expected science was already available, or would have been within a short time. It is one of the SDT's goals to lower the risk even further, perhaps by using an off-axis aperture, or changing pixel sizes to relax pointing requirements, or tightening them up to improve dithering. An independent cost review may not be in place by June, or in the Fall, however.

Dr. Steve Ritz asked how the SDT is planning to address the larger issues and on what time scale. Dr. Schechter replied that the SDT intends to produce something that satisfies the Decadal Survey and also comes in at a lower cost than the Aerospace estimate. This information will be important for the mid-Decade review.

Asked what NASA would do with the June SDT report, Dr. Morse responded that the Agency would determine whether it could execute the mission recommended by the Decadal Survey; clearly NASA would not want to waste time on doing something that cannot be implemented.

Whatever decisions the SDT makes must meet the approval and confidence of the community. It is clear that the SDT is not trying to reduce the science scope. NASA is also waiting to see what ESA decides to do with its M1/M2 mission selection process. Administrator Bolden has sent a letter to ESA Director General Daudin, indicating NASA's willingness to engage in a joint mission that corresponds with the NRC December 2010 report's Option B (merged NASA-ESA mission), while at the same time supporting the SDT's work on option A (US stand-alone mission). However, the realistic budget numbers point to Option D – canceling WFIRST and focusing on augmenting the Explorer program.

Dr. Sally Heap asked if the SDT had looked into the cost of maintaining all three science themes. Dr. Green indicated that the SDT had performed this estimate in a crude exercise, and could make a request of Goddard Space Flight Center staff to provide more detailed costing questions, recognizing that the community would not support a de-scoped WFIRST mission. Dr. Dey asked whether the SDT would be assessing the gains that WFIRST might provide beyond what Euclid might do. Dr. Green answered in the affirmative, adding that the figure of merit associated with Euclid is different from the one recognized in the U.S.; there is no straightforward answer. However, WFIRST is unmistakably broader than Euclid. Dr. Schechter added that the SDT had discussed many scenarios, and understood how the U.S. could work toward a merged mission, and that the community is leaning toward US leadership in any case. However, NASA is not able to know at the moment what ESA might find acceptable. Dr. Dey noted that if Euclid were to be chosen by ESA, it would be important to understand how much better WFIRST would be for Dark Energy science. Dr. Schechter commented that Euclid would do weak lensing better, but that backing off on weak lensing (for WFIRST) would not mean a great cost savings.

R&A Senior Review

Dr. Linda Sparke reported on recent activities of the ongoing R&A Senior Review; one more meeting will take place before the report is due in mid-May. Dr. Jay Gallagher, the Chair of the Senior Review panel, has noted that the panel lacks sufficient data in a number of areas, and the panel report is likely to suggest that additional information be collected before future Reviews. A fair amount of time has been spent on defining what constitutes a good program, in terms of criteria and metrics, since the same set does not apply to all programs. The Guest Observer (GO) and Guest Investigator (GI) programs track publications and have user committees, and based on this input they tweak their programs year by year. However, significant resources are required to collect the metrics data. GO programs are not federal procurement programs and are therefore subject to a different set of rules.

In Astrophysics Theory, a long-range program, metrics have yet to be determined. Concerning the Origins of the Solar System area, the Review concluded that planetary science is a good opportunity for garnering both public support and scientific community interest.

The Fisk report has noted that the NASA R&A program should enable a healthy scientific and technical workforce, prompting the Senior Review to consider what metrics are worthwhile in this respect. High-risk research is also important. A meeting participant commented there is a working model/precedent for NASA/NSF collaborations in this area. Dr. Sparke agreed that an effective process for NASA/NSF working together is already in place.

Dr. Lou Allamandola requested a formal report or briefing on the Senior Review outcome. Dr. Sparke recommended that subcommittee members leave comments on the web link. Dr. Morse took an action to have the R&A Senior Review Chair brief APS at the next in-person meeting.

Physics of the Cosmos PAG (PhysPAG)

Dr. Steve Ritz reported on the efforts of the PhysPAG to review the NASA technology roadmaps, at the request of the NRC, stressing that the exercise should not be considered a critical assessment from the Physics of the Cosmos (PCOS) perspective but rather it is aimed at providing valuable input. A Technology Study Analysis Group (TechnoSAG) has been set up to this purpose. The TechnoSAG judged that the technology level for IXO and WFIRST was adequate and mature, and that other areas in the PCOS technology portfolio needed to be included in the study as well. There was insufficient time before the APS briefing to include fundamental physics in the study. The LISA project did not have an opportunity to review items on the TechnoSAG list.

The TechnoSAG submitted its findings to the APS in form of a written report, and is soliciting APS comments and approval. Dr. Boss examined the spreadsheets and commented that there was good information contained therein. APS approved the TechnoSAG report document and cleared it for submission to the NRC Roadmap website..

Public comment period

Dr. Morse, responding to a request for meeting presentations, noted that they are posted publicly, or to request by email. Dr. Morse added that some members of the community had expressed discomfort with dissemination of information about LISA/IXO, and stressed that APD had tried to be deliberate and talk to the affected people first, and the subcommittee second. There were some misinformed emails and blog comments that muddied the waters, beyond NASA control.

Summary and Adjournment

Dr. Boss summarized the meeting briefly, noting that APS was pleased to hear about the reconstitution of CAA. No issues were noted for NAC. Dr. Boss adjourned the meeting at approximately 4:07 PM.

APPENDIX A: Meeting Attendees

NASA Headquarters

Alan Boss
Jon Morse
Rita Sambruna
Marian Norris
Trent Perrotto
Dwayne Brown
Linda Sparke
Vernon Jones
Jaya Bajpayee
Stephen Merkowitz
Colleen Wilson-Hodge, NASA MSFC

Webex Participants

Louis	Allamandola	NASA Ames Research Center
Gary	Bernstein	University of Pennsylvania
Jay	Bookbinder	SAO
Roger	Brissenden	SAO
Joan	Centrella	NASA Goddard
William	Danchi	NASA HQ
Michael	Devirian	NASA JPL
Edna	Devore	SETI Institute
Arjun	Dey	NOAO
Jens	Feeley	NASA HQ
John	Gagosian	NASA HQ
Michael	Garcia	Smithsonian
Jonathan	Gardner	NASA Goddard
Neil	Gehrels	NASA Goddard
Daniel	Golombk	The Space Telescope Science Institute
Kevin	Grady	NASA
James	Green	University of CO
Richard	Griffiths	NASA HQ
Ilana	Harrus	NASA HQ
Kathy	Hartman	Goddard

Hashima	Hasan	NASA
Sally	Heap	NASA
Tim	Heckman	Johns Hopkins University
Rick	Howard	NASA HQ
John	Hughes	Rutgers University
MaryElizabeth	Kaiser	Johns Hopkins Hospital Committee Member
Louis	Kaluzienski	NASA HQ
Caryn	Knutson	National Academy
Chryssa	Kouveliotou	Marshall
Jeff	Kruk	GSFC
Lia	Lapiana	NASA HQ
Michael	Levi	Lawrence Berkeley Laboratory
Christopher	Martin	Cal Tech
John	McCarthy	Orbital Sciences
Mark	Melton	Goddard
Saewoo	Nam	OSTP
AnnMarie	Novo Gradac	NASA HQ
Bill	Oegerle	NASA Goddard
Terry	Oswalt	Florida Institute of Technology
Paul	Ray	Naval Research Laboratory
James	Rhoads	Arizona State University
Steven	Ritz	UCSC
Michael	Salamon	Dept of Energy
Paul	Schechter	MIT
Amy	Scott	Association of American University
Ken	Sembach	Space Telescope Science Institute
Randall	Smith	SAL
Robin	Stebbins	GSFC
Amy	Svitak	Space News
Leisa	Townsley	Penn State University
Zlatan	Tsvetanov	John Hopkins University
Kathy	Turner	Dept of Energy
Michael	Werner	JPL
Nicholas	White	NASA
Kent	Wood	Naval Research Lab
Joan	Zimmermann	Zantech

APPENDIX B: Meeting Agenda (conducted via telecon/Webex)

Agenda
Astrophysics Subcommittee
April 7, 2011
Via telecon/webex (Eastern Standard Time)

Thursday, April 7		
2:00-2:05 p.m.	Introduction and Announcements	A. Boss
2:05-2:45 p.m.	APD Division Update	J. Morse
2:45-3:00 p.m.	JWST update	E. Smith/R. Howard
3:00-3:15 p.m.	WFIRST SDT activities report	P. Schechter/J. Green
3:15-3:30 p.m.	R&A Senior Review update	L. Sparke
3:30-3:45 p.m.	PhysPAG technology study group update	S. Ritz
3:45-3:55 p.m.	Public Comment period	A. Boss
3:55-4:00 p.m.	Summary and Adjourn	A. Boss