Meeting Minutes of the

Astronomy and Astrophysics Advisory Committee

26-27 January 2023

Members Attending:

Wenda Cao
Kyle Dawson (Chair)
Sarah Hörst
Alexie Leauthaud
Nikole Lewis
Britt Lundgren
Michael McCarthy
Willie Rockward
Keivan Stassun (Deputy Chair)
Abigail Vieregg
Ann Zabludoff

Agency Personnel:

Martin Still	NSF-AST	Bogdhan Mihaila	NSF-PHY
Carrie Black	NSF-AST	Mark Coles	NSF-PHY
Debra Fischer	NSF-AST	Alfredo Galindo-Ubarri	NSF-PHY
James Neff	NSF-AST	Darren Grant	NSF-PHY
Craig McClure	NSF-AST	Vyacheslav Lukin	NSF-PHY
Onica Andrews	NSF-AST	Pedro Marronetti	NSF-PHY
Allison Farrow	NSF-AST	James Shank	NSF-PHY
Matt Viau	NSF-AST	William Wester	NSF-PHY
Renee Adonteng	NSF-AST	Vladimir Papitashvili	NSF-OPP
Valerie Maizel	NSF-AST	Chris Smith	NSF-MPS
Tanner Abraham	NSF-AST	Saul Gonzalez	NSF-MPS
Ed Ajhar	NSF-AST	Linnea Avallone	NSF-OD
Andreas Berlind	NSF-AST	Eduardo Misawa	NSF-OD
Dave Boboltz	NSF-AST	Rhonda Davis	NSF-OECR
John Chapin	NSF-AST	Sarah Williams	NSF-OECR
Chris Davis	NSF-AST	Randy Phelps	NSF-OIA
Harshal Gupta	NSF-AST	Elena Hillenburg	NSF-MEM
James Higdon	NSF-AST	Michael Thomas	NSF-MEM
Sarah Higdon	NSF-AST		
Hans Krimm	NSF-AST		
Glen Langston	NSF-AST	Kathy Turner	DOE-HEP
Zoran Ninkov	NSF-AST	Bryan Field	DOE-HEP
Alison Peck	NSF-AST	Glen Crawford	DOE-HEP
Elizabeth Pentecost	NSF-AST	Julie Carruthers	DOE-SC
Joe Pesce	NSF-AST	Theodore Levine	DOE-SC
Andrea Prestwich	NSF-AST	Patricia Mahoney	DOE
Luca Rizzi	NSF-AST	Elgin Leary	DOE
Nigel Sharp	NSF-AST		
Ashley VanderLey	NSF-AST		
Jonathan Williams	NSF-AST		

Agency Personnel:

Mark Clampin	NASA	Kei Koizumi	OSTP
Paul Hertz	NASA	Jedidah Isler	OSTP
Manuel Bautista	NASA	Kartik Sheth	OSTP
Valerie Connaughton	NASA		
Alise Fisher	NASA		
Hashima Hasan	NASA	Ashlee Wilkins	HSST Committee
Gavriil Michas	NASA	Sara Barber	HSST Committee
Thomas Hams	NASA	Pamela Whitney	HSST Committee
Hannah Jang-Condell	NASA		
Joshua Pepper	NASA		
Mario Perez	NASA	Kathryn Medley	FCC
Andrew Rowe	NASA	Merissa Velez	FCC
Bill Latter	NASA		
Sangeeta Malhotra	NASA		
Natasha Pinol	NASA	Yi Pei	OMB
Eric Smith	NASA		
Joe Smith	NASA		
Dominic Benford	NASA	Brian Patten	NTIA
Alistair Funge	NASA		
Antonino Cucchiara	NASA		
Brian Humensky	NASA-GSFC	Max Katz	U.S. Senate
Rita Sambruna	NASA-GSFC		
Peter Kurczynski	NASA-GSFC		
Julie McEnery	NASA-GSFC	Teddy Cheung	Naval Research Lab

Others:

Marcia Smith	SpacePolicyOnline.com	Francesco Bordi	The Aerospace Corp.
Vivian O'Dell	UW-Madison	Amy Bender	Argonne National Lab
Lynsey Fitzpatrick	UC San Diego	Karen Walker	Arizona State U
Karin Oberg	CfA-Harvard	Ding Ding Zheng	Arizona State U
Etienne Dauvergne	ESA	Catherine Chen	Arizona State U
Hunter Moore	National Academies	Kate Von Holle	U Illinois Chicago
Nicholas White	George Washington U	Bradford Benson	U Illinois Chicago
Jeffrey Fillipini	U Illinois Urbana-Champaign	John Carlstrom	U Illinois Chicago
John Matthews	University of Utah	Matthew Zajac	U Illinois Chicago
Lori Allen	NSF's NOIRLab	Jeff Foust	SpaceNews
Bob Blum	NSF's NOIRLab	Lewis Groswald	Lockheed Martin
Mark Dickinson	NSF's NOIRLab	Chris Hofer	Amazon
Inger Jorgensen	NSF's NOIRLab	Tammy Dickinson	AMC
Patrick McCarthy	NSF's NOIRLab	Matthaeus Leitner	Berkeley Lab
Constance Walker	NSF's NOIRLab	Natalie Roe	Berkeley Lab
Lamont Di Biasi	L Di Biasi Associates	James Strait	Berkeley Lab
Cambria Billinski	AURA	Alexandra Witze	Nature
Steven Berukoff	AURA	Mitch Ambrose	AIP
Lee Curtis	AURA	Keith Hawkins	Imagibytes
Jean Eisen	AURA	Naeem Altaf	IBM

Phil Puxley	AURA	Joanne Wilson	ITU
Alejandra Voight	AURA	Sylvie Espinasse	ESA
Julie Davis	AAS	Etienne Dauvergne	ESA
Bethany Johns	AAS	John Dyster	Northrop Grumman
Richard Rogers	Stellar Solutions, Inc.	Kelsey Crafton	NASEM SSB
Raha Hakimdavar	Ball Aerospace	David Traore	ORBIT
April Olson	Ball Aerospace	Aaron Roodman	SLAC
Rachel O'Connor	Ball Aerospace	David Goldstein	SpaceX
William Jones	Princeton University	Phil Scott	SDL
Richard Green	University of Arizona	Suvi Gezari	STScI
Sharon Franks	UCSD	James Murday	USC
Nick Saab	Lewis-Burke Associates LLC		
Griffin Reinecke	Lewis-Burke Associates LLC		
Linda Karanian	Karanian Aerospace Consulting		

DAY 1; JANUARY 26, 2023

0932 EDT
Welcome, Opening Remarks and Introductions – Martin Still, NSF[1]

Martin Still welcomes in-person & virtual attendees.

Kyle Dawson welcomes everyone and moves to adopt meeting minutes from the previous meeting.

Meeting minutes from September 28-29, 2022, is adopted.

Kyle Dawson wants to talk about upcoming AAAC meetings. For the next meeting coming in February, he asks members to think about what aspects of the annual report they want to help write. For June the meeting focus will be a Lab Astro update and a discussion of the AAAC annual report.

Carrie Black asks if would be good to lengthen the June meeting to allow more discussion time for a change in the process.

Debra Fischer says that the agenda for AAAC is set by the agencies.

Martin Still states that the gap between June and September meetings sees much change in committee membership. He wonders if the June meeting could be used as a transition from one committee cycle to the next.

Kyle Dawson asks about the best format for the meeting.

Martin Still offers that more discussion is needed. He also states the three agencies [NSF, DOE, NASA] are not prepared in June to respond to the AAAC annual report.

Kyle Dawson agrees that the September meeting is likely better for the agencies to respond to the annual report.

Kyle Dawson mentions one more important item: a new Deputy Chair for AAAC is needed. The position is a bridge to the Chair position so is important to name a replacement quickly. The current Deputy Chair has been appointed to the National Science Board (NSB).

Debra Fischer states that Astro 2020 is rich with topics to address and says that the AAAC charter is to ensure the three agencies are cooperating efficiently.

Kyle Dawson states that it is difficult for the committee as they are in the 10th year of the previous survey, and the first year of the newest one. Now they should be able to dive more deeply into the questions raised by the decadal. He wonders how a task force might compliment the committee on this topic.

Ann Zabludoff recommends a sub-committee might be a better model to follow. Notes that the agencies need to approve any task force or sub-committee.

Kyle Dawson asks what would be in a task force report that would be most useful for the agencies.

Debra Fischer recommends that the committee first look at the task force report and iterate with the agencies to determine the usefulness and ask the task force to revise as needed.

Nigel Sharp says it is a good idea for an agency representative to attend task force meetings to facilitate modifications if needed. He notes that Harshal Gupta is working on writing a task force charge.

Kyle Dawson asks if there are any questions. There are none.

Carrie Black indicates a poll will be sent to members to determine a June meeting date.

Debra Fisher - presentation and update for NSF Division of Astronomical Sciences (AST)[2]

Debra Fischer concludes her presentation.

Q: Ann Zabludoff thanks Debra Fischer and asks about specific areas and sub-categories where the AAAC committee can help.

A: Debra Fischer responds that advice on improving geographic diversity and workforce development of underrepresented populations.

Q: Michael McCarthy asks about various Congressional and Presidential mandates and how will they affect current programs going forward.

A: Debra Fischer says the answer is still TBD as the next year's budget guidance has just been received.

Q: Michael McCarthy asks about the research compliance Presidential memo and cooperation with other agencies.

A: Debra Fischer says they are waiting for OSTP guidance.

Q: Keivan Stassun asks about the impact of MREFC on the AST budget and where might opportunities be to enable major MREFC projects.

A: Debra Fischer says those decisions are with the NSF Director's office and NSB and they determine how they will move forward. She relays information to them on how it will affect AST.

Kathy Turner – presentation and update on Office of High Energy Physics (HEP) DOE activities[3]

Kathy Turner (DOE) updates the committee on the DOE Office of Science (SC) and Office of High Energy Physics (HEP); in particular concerning the report on the HEP Cosmic Frontier Program, organizational budget, Astro2020 recommendations, and planning for the future.

Rhonda Davis, Head of NSF Office of Equity and Civil Rights (NSF OECR) presentation on research misconduct and harassment policies, along with Darah Williams and Eduardo Misowa (NSF)

Rhonda Davis highlights a few items now in place at NSF. At the beginning of the process there was a lot to address to ensure the research was done safely and inclusively. Also wanted to identify partnerships with other federal agencies. One of the first items was on harassment notification and terms & conditions. Currently, all new NSF awards are subject to this. Requires awardee organizations (AOR) to notify NSF

if a PI is under investigation for violations of the organization's code of conduct. NSF reviews the case for criteria to ensure the continuity of science and funded project can continue. NSF may make suggestions for further actions if determined necessary. This may the suspension of the award. Terms & conditions now require that conference proposals are also covered and allow reporting of complaints. Postdoctoral fellowships are also covered by the policy. Specifics of the policy requirements are noted. Also consulting with outside stakeholders for guidelines in responding to claims of sex-based harassment in a research setting. Also plan to recommend outlines for preventing harassment.

Q: Ann Zabludoff asks if there is organizational memory of past violations of policy.

A: Title 9 compliance review would be the mechanism to make this connection.

Q: Is there coordination with other agencies that would recognize repeat offenders?

A: That data is currently not shared. More conversations with OSTP will be needed to better secure research spaces.

Sarah Williams (NSF) talks about the Antarctic Program's anti-harassment policy.
Leadership worked with an external agent to draft a prevention policy and report. The OECR was soon after established by the NSF Director. Prevention is a strong focus including training. A victim's advocate is also now in place in Antarctica to help with safety planning and help navigate the reporting process. Reporting and complaint process identified a reticence to report due to multi-jurisdictions on the ice in Antarctica. In the process of standing up a crisis hotline available 24/7 and help to connect with other resources.

Q: Britt Lundgren: is this available on research vessels?

A: Not yet, but are looking to expand.

Q: Abigail Vieregg: Is there in-house counseling available?

A: Yes, focused on accountability measures, and regular discussions with contractors.

Q: Abigail Vieregg: Is there a benchmark to measure new contractors' compliance?

A: Will be assessing progress with surveys and other project measures.

Q: Britt Lundgren: Would be useful for observatories as well.

A: Plans aren't limited and want to be cognizant of various environments.

Eduardo Misowa, NSF/OD provides a link to the policy paper: OSTP Releases Framework for Strengthening Federal Scientific Integrity Policies and Practices | OSTP | The White House

Highlights the efforts that NSF is taking concerning training and policy in this area.

Q: Kyle: Is there an overlap in this area with other agencies?

A: Eduardo says yes, collaborative working groups are in place to foster cooperation and a unified approach. scientificintegrity@nsf.gov

Kei Koizumi, Principal Deputy Director for Policy Office of Science and Technology Policy (OSTP) presentation on White House initiatives on science workplace topics.

Chips & Science ACT contains several provisions to strengthen agencies' support of the STEM workforce. JWST has raised the profile of astronomy & astrophysics. NSF and DOE Office of Science have had budgets increased, and the Inflation Reduction Act has provided infrastructure for astronomy & astrophysics. All federal science agencies are to improve reporting of demographic data on proposals and awards. OSTP subcommittee on equitable data uses this data to compare DOE, NASA, and NSF progress. Geographic dispersion is also a consideration including undergraduate and graduate awards. Overall for STEM workforce programs in 2023, appropriations will have a real impact. Appreciates AAAC's recommendation to release success rates for proposal funding. Recognizes that protecting scientific integrity is a must and that allegations of harassment are taken seriously.

Q: Keivan Stassun asks about data. How do we ensure that specific data is being identified for collection and by whom?

A: Yes, if everyone is responsible for data then no one is responsible concerning the scientific workforce. Award-funded organizations are responsible for the scientific workforce. The role of OSTP is to integrate fragmented federal research funding.

Q Keivan Stassun: Reinforcing this coordination by AAAC is helpful?

A: Yes.

Q: Ann Zabludoff: Bias in data collection is an issue and disclosure is optional for researchers.

A: Another aspect of the same problem is how to collect this data if not a history of doing so, the example given is for LGBTQ. Underlying this issue is the self-reporting question. A lot of the non-responders tend to undercount minority communities. Never will have a mandatory reporting requirement. Nevertheless still can move forward and expand our collection of data and disaggregate to a degree.

Q: Ann asks about the standardization of questions asked by different agencies.

A: Yes, that would be nice. We need to keep plugging away at this challenge. We don't have a Department of Science but many separate science agencies so it is a challenge.

Q: Debra Fischer hopes that OSTP could set the format for questions and then work with agencies to standardize.

A: We have tried at some level but often agencies have mission-driven reasons for wanting to deviate from a uniform federal standard.

Q: Ann Zabludoff: A minimum standard would be helpful.

A: Yes, but is a front-by-front battle. Now working on bio-sketches.

Q: Kyle Dawson: Could you follow up on success in bio-sketches?

A: Impetus came from the research community. Digging into forms and looking for common ground and determining how the agency uses gathered data. We hope to get a uniform result.

Q: Kyle Dawson: What should AAAC take into consideration as we write our annual report? What is the most useful thing the committee can do in writing its report on this particular topic?

A: Keep hammering away. As an example, the provision to improve the collection of demographic data is an 11-year work in progress and will take more years to implement. All agencies, offices, universities, and Congress have roles to play.

Q: Ann Zabludoff: Is it possible for OSTP to create an interagency working group to find these minimum standards for gathering data?

A: If possible, let's talk again before the next AAAC meeting. This is mostly new terrain for federal agencies, so how does it progress? Sustained attention is one, another is community pressure and community demonstration. All can do this in their respective contexts.

Q: Kyle Dawson: Moving away from demographics. CHIPS & Science Act funding. Where do you see successes and shortfalls?

A: I'd have to point you to other places. A signed bill is the perfect outcome. Bills are never matched by annual appropriations.

Q: Glen Langston: This group believes the Astro 2020 decadal is the perfect answer and is there any part of it that reaches the President?

A: The NAS Decadal Surveys are taken very seriously. They are valuable to enable decision-makers to set priorities. Better to have science communities setting them. The level of decisions within the agencies is not visible to President, but sometimes OMB & OSTP does see these.

Q: Michael McCarthy: To what extent will there be large bills in support of science?

A: Believes CHIPS & Science Act will be the last one for several years but knows we'll need to course correct for new technologies, etc. The science community can identify the needs and where course corrections are needed.

Jim Ulvestad, NSF Office of Polar Programs presentation on South Pole Infrastructure[5]

Q&A:

Q: Debra Fischer: Asks about budget and protecting certain funds.

A: Jim Ulvestad says is trying to protect it as a capital investment fund. An example given is that a cargo ship goes to Antarctica only once per year. Getting needed equipment to the ship on time need a predictable budget.

Q: Kyle Dawson asks if the capital costs come from MREFC.

A: Comes from MREFC but means there is less money to fund other projects. The funds roll over into a related R&RA budget line.

Q: Debra Fischer asks how long the funds remain available.

A: It has become an established funding line at approx. $60m/year. Challenging as we cross into a new Congress and new administration.

Q: Ann Zabludoff states that Antarctica is a flagship location for astronomy. Wants to know what are the real constraints that limit beds and traverses and flights to the pole.

A: Jim Ulvestad says that the airframes are old and the first step would be to improve on infrastructure at McMurdo Bay. If one area is improved it comes at the expense of other things.

Q: Do you have a sense if people are actively exploring ways to do sciences without traveling to the pole because of limited resources?

A: Jim says early career scientists are affected, and the priority was sustaining existing projects re Covid. New projects were therefore limited. Other possibilities or workarounds need to look at time-phasing projects, i.e., doing initial parts of the project elsewhere and only bringing the critical phase to the pole.

Q: Kyle Dawson asks about the energy footprint. How does this affect current constraints?

A: Power needs cannot be unchanging, so if new projects require KW energy then existing projects may lose KW.

Q: Anne Zabludoff asks about possible ways of increasing energy production at the pole.

A: Jim says that an additional one ground traverse rather than air resupply is being considered, but currently limited. Renewables are also possible but further study is needed.

Q: Debra Fischer asks if nuclear power at the pole is possible again.

A: Jim says it is true that the current environmental footprint on the ice is large, so nuclear is worth considering.

Ashley Vanderley, NSF Astronomy Division, Senior Advisor for Facilities on Sustainability – Dark Skies[6]

Ashley Vanderley (NSF) provides updates related to satellites including details related to the coordination agreement announced with SpaceX, progress in addressing radio and optical issues with other private companies, and NSF's upcoming participation in the U.N. Committee on the Peaceful Uses of Outer Space (COPUOS).

Joanne Wilson, Deputy to the Director of Radiocommunication Bureau and Chief of ITU, presents an international perspective on Dark Skies Sustainability. Introduction to the ITU-R Regulations of Space Services

Q: Kyle Dawson asks about topical working groups and asks how often they meet.

A: The study groups are numbered, and #1 has to do with the spectrum. If there is an agenda item at the next conference the working group convenes to address them. There is no #2, #3 is for propagation models to advance the field in deconflicting bandwidth. #4 deals with satellites, #5 terrestrial services and #6 is broadcast services.

Dr. Brian Patten, Satellite Services Team Lead, International Spectrum Policy Division, Office of Spectrum Management, NTIA, Dept. of Commerce[6]

Q: Debra Fischer asks how many other agencies/companies are you working with.

A: Brain Patten says there are multiple organizations he talks to ask for his advice.

Kathryn Medley, FCC Chief Satellite Engineering Branch; Ms. Merissa Velez, Chief Satellite Policy Branch.
The role is technical licensing for all non-federal satellites. The licensing process for satellites is open to the public and encourages comments. The process starts with a filed application. It helps if there is a conversation before the application. There is then a legal and technical review.

The first review is acceptability for filing, making sure the application is complete. Not yet looking at merits. Once deemed acceptable is put on public notice for 30 days. The public has a right to provide comments during this period. The next step is a technical review to decide whether to grant the application. Once the review is complete is in the draft grant stage. There may be restrictions applied here (power level, etc.). Federal agencies are then allowed to weigh in on draft grants and make comments. It then progresses to a grant stage for formal approval and becomes a system that can operate.

Q: Ann Zabludoff asked about the legal & technical elements; they want to know how are being guided by the policy in what they can approve.

A: Melissa Velez answers. FCC has several policy guideline sources in federal law. The Communications Act requires consideration of public comments.

Q: Ann Zabludoff: How do you determine the public interest?
A: Melissa Velez answers that the main guideline is application process compliance along with regulations and public comment.

Chris Hofer, Amazon Kuiper and Co-lead of the IAU CPS Technology and Industry Hub

Q: Kyle Dawson asks about the magnitude range that has been set as a goal.

A: It was set by a conference in 2021 of a magnitude 7 or greater.

A: Ashley adds that a 7th magnitude will cause a streak in observation but could be eliminated afterward without adding nonlinear effects.

A: David Goldstein adds that the 7th magnitude is about what the human eye can see.

David Goldstein, SpaceX, Principal Satellite Policy Engineer

Q: Britt Lundgren asked about how long Starlink satellites are bright enough to see a reflection from the ground

A: For the first few days in orbit aren't very bright, but raising up to operational level orbit can take 45 days.

Q: Ann Zabludoff asks about attitude changes of satellites and reflectivity variations.

A: Attitude changes only require sun energy. 7.5 years is the typical lifespan of Starlink satellites.

Q: Ann Zabludoff asks how many satellites are assumed as a number to mitigate ground observation.

A: Ashley Vanderley says the total number hasn't been discussed.

A: David Goldstein says that the lower the altitude of constellations the better from a ground-based viewing perspective.

Q: Kyle Dawson: How much of a sense do you have of several companies looking to launch satellites and use the same mitigation approaches as SpaceEx?

A: Chris Hofer says they are getting a lot of positive responses internationally.

A: Joanne Wilson says that it is important that the frequency assignments & registrations of satellites match what is actually in use in orbit about the National Frequency Register.

Q: Michael McCarthy asks about the uplink speed for Starlink.

A: David Goldstein says 100 Mbps uplink and 200 Mbps downlink is typical. Are working with some observatories so that they can move large data sets. Speeds will increase with time.

Kyle Dawson highlights the next day's agenda and again asks committee members to consider what they would like to contribute to for annual report writing.

1710: meeting is adjourned.

DAY 2; JANUARY 27, 2023

9:30 AM ET

Martin Still: NSF Program Officer, NSF/AST Call to Order

Kyle Dawson asks if there are any questions concerning writing the AAAC annual report. Hearing none, he states that a priority is taking the information from Ashley VanderLey's Dark Skies presentation in September and the Dark Skies presentations yesterday and combining them into a meaningful section. Kyle asks if anyone has thoughts on writing the Dark Skies section of the report.

Ann Zabludoff states that she feels more information is needed to understand the nature of both motivations for shielding reflections from these missions.

Britt Lundgren states there needs to be clarification on the timescale of current efforts.

Kyle Dawson asks if the committee should seek to find the answers to the questions raised in the discussion or keep them open-ended and present them as needing additional information in the AAAC annual report. He states that the committee should follow up with Ashley VanderLey to see if she has the answers to these questions.

Ann Zabludoff states that the committee must seek additional updates on the evolving situation.

Britt Lundgren states that the committee should seek additional information but ensure there isn't a duplication of efforts with the IAU.

Kyle Dawson states that many of the answers are in the September presentation, and the committee should review those notes and the notes from prior years. Kyle asks for two volunteers to review the committee records. Kyle asks if there are any thoughts on this topic from online attendees.

Bob Blum states this is an essential topic for Rubin Observatory, and they are working on many fronts with NOIR Lab, the IAU, and NSF. He suggests that someone from NOIR Lab and Rubin present on this topic.

Kyle Dawson states that there is an AAAC meeting on February 24th and that the agenda is incomplete. Kyle asks if there is enough time for a presentation on this topic.

Martin Still states there is time for additional presentations, but it depends on the committee's ability to self-organize writing the report.

Britt Lundgren asks if Rubin can provide a written summary of current activities on this issue.

Martin Still responds that the committee can work through Carrie Black and NOIR Lab. Raising the issue allows the committee to track it.

Kyle Dawson states we need to consolidate all the information before the committee.

Keivan Stassun asks that the committee discuss data collection on demographics in the AAAC annual report. The AAAC can provide a way for the agencies to work together on this issue since OSTP states they receive resistance when they attempt to give guidance.

Kyle Dawson asks if there are any other thoughts on this topic.

Ann Zabludoff states there needs to be an assessment of programs to see what works and how to emphasize this issue.

Kyle Dawson states that the audience should not be the agency leaders and that it should be OSTP. The AAAC can outline challenges, summarize recommendations from past reports, and give direction.

Abigail Vieregg agrees that the AAAC should write with OSTP in mind.

Britt Lundgren asks if it is typical for the AAAC report to make it to the House Science Committee.

Kyle Dawson affirms that it is. He asks if it is customary to present to the House Science Committee.

Martin Still states that it has not since 2019.

Nigel Sharp states that it was common to present in the past, but with a formal invitation. Congressional staffers are familiar with the contents of the report.

Keivan Stassun encourages the AAAC to present the report to Congress. Turnover on the AAAC and in Congress results in a loss of institutional knowledge regarding this past practice.

Martin Still states that if you put this topic in the report, staffers will read it and may honor this request.

Kyle Dawson states that he did communicate with Congressional staffers that the AAAC would like an invitation, and they want him to follow up.

Mark Clampin: Director Astrophysics Division, Science Mission Directorate, NASA Headquarters, NASA Update

Keivan Stassun asks what the expectation is for a time domain capability component in all NASA missions.

Mark Clampin is implementing these capabilities across the current mission fleet considering ground-based capabilities. Quick-response missions require an understanding of the capabilities are for space communications. Currently, NASA does not require AOs to be driven by TDAM science.

Ann Zabludoff asks if there are other areas of synergy where other agencies benefit through communication.

Mark Clampin states that work in chronographs and wavefront sensing and control by ground-based programs is an area that NASA can leverage. Sensors, the next generation of photon counting, and quantum techniques to improve resolution are areas of interest.

Kyle Dawson asks about the synergies between ground-based observing and space-based missions.

Mark Clampin believes it is essential to communicate with ground-based astronomy to see how NASA's missions fit within the rest of the community. The community asks how NASA coordinates with LIGO observational data, and it is challenging considering the nature of these missions and the timeline for action.

Kyle Dawson asks what partnerships NASA currently has for follow-up observations.

Mark Clampin states that NASA does fund a fraction of the Keck Telescope. People can buy time on Keck for observations.

Gavriil Michas: Some quantum phenomena that are well investigated in the labs are already giving promising results for further scaling at the theoretical level. (Traversable Wormholes research for example). Quantum tunneling of energy and information near the millisecond regimes is already present and justified. He asks if we have in mind how to scale them further for interstellar research for

communication and navigation as well. Should the committee address further the basic research for phonons?

Pedro Marronetti: NSF Program Officer, Gravitational Physics, NASA/NSF coordination on LIGO[7]

Mike McCarthy (Center for Astrophysics) asks for the error bar for the estimate.

Pedro Marronetti states that LIGO did the 04 estimations. The 04 plus estimate is an extrapolation. The next run will be in 2027. The goal is 190 events.

Abigail Vieregg asks what the logic is for extending the current run to get a specific number of events when the next run increases sensitivity.

Pedro Marronetti: The next run will further detect more events. However, they are out of reach for an optical telescope. Therefore, ground-based astronomers cannot see them. NASA missions require time to plan, and the chance of a multi-messenger event is 70%. They are worried there may not be a strong case to justify the mission.

Abigail Vieregg asks if the chance of a multi-messenger event decrease in the next run.

Pedro Marronetti responds that it will remain the same.

Debra Fischer asks if the astronomical community is considering an era of 30-meter telescopes.

Pedro Marronetti responds yes.

Ann Zabludoff asks what the trends are for improving localization and for thoughts on the time lag between the event and alerts that go out to the community.

Pedro Marronetti localization is better when sensitivity increases. Three observatories plots in the sky shrink, and there is a larger duty cycle. Improving localization requires more observatories. LIGO in India will help greatly but they have not started construction. Alerts will be better than it was in the past. Many tasks are automated now compared to 03. The expectation is that alerts will follow an event in minutes, along with a sky map.

Ann Zabludoff asks if the plan is to share alerts quicker than an hour.

Pedro Marronetti responds that it could already be quicker than an hour. He advises Ann to send an email, and he will get clarification.

Kyle Dawson asks what the absolute magnitude is for these things.

Pedro Marronetti states that 04 reaches the current level of the telescopes that are in operation in two-3 years.

Kyle Dawson asks what the limitation is for ground-based follow-up.

Pedro Marronetti responds that finding them is the issue, not observation. Currently, you do not have the precision you need to find them.

Nigel Sharp states that localization is not good enough for a larger telescope's field of view. The follow-up is currently 4 meters or less.

Rita Sambruna: The issue between LIGO and NASA missions is that LIGO is down for upgrades while NASA missions are flying detecting transients.

Kyle Dawson: LIGO runs as a physics experiment. If you want to get the maximum science, there needs to be coordination.

Pedro Marronetti: LIGO is transitioning to the coordination phase.

Debra Fischer: Having a clearing house for transient events would be great for the community.

Pedro Marronetti: Windows on the Universe supports coordination efforts concerning transient events. He asks for clarification on Debra's statement.

Debra Fisher responds that coordination is a concern. She asks if there should be a group of individuals who coordinate between LIGO and NASA.

Nigel Sharp responds that there should be a clearinghouse for transient events, and AST funding supports efforts to create those, but rivalries between different groups trying to do it hamper efforts.

Rita Sambruna, Acting Deputy Director, Astrophysics Division, NASA/GSFC, and Suvi Gezari, University of Maryland, Astronomy Department, TDAMM Workshop Report

Kyle Dawson asks what coordination exists for transient events and what improvements are necessary moving forward.

Rita Sambruna: There is currently a group clearinghouse for gamma-ray bursts.

Suvi Gezari: The Gamma-ray Bursts Coordination Network (GCN). Infrastructure exists around ingesting LIGO alerts and coordinating communication about whose following up which alerts and over which parts of the sky.

Ann Zabludoff believes the title for this network is "Treasure Map."

Suvi Gezari believes standardized data formats and the ability to build tools to ingest data can improve the process. She does not support one clearinghouse and believes it is critical to maintaining the freedom to innovate new tools and procedures to ingest data streams and make it readily available is essential.

Rita Sambruna states that inclusion requires that all communities need to be able to participate with TDAMM, so data needs to be available. LIGO is not promptly available to everyone. The AAAC should examine and debate this issue.

Pedro Marronetti asks what data is not available.

Rita Sambruna asks what data LIGO is releasing. Does it include masses, inclinations, and spins.

Pedro Marronetti: Yes. These estimates are part of the data, which allows others to find the object.

Rita Sambruna states colleagues believe LIGO can do more to share data. She thinks they are referring to data that she presumes LIGO does not release for some time.

Pedro Marronetti states that there is no reason to withhold information regarding detection.

Ann Zabludoff: There needs to be communication between LIGO and the community. There seems to be confusion over the release of the data.

Britt Lundgren asks what kind of formal investments TDAMM is getting from the agencies for outreach and diversity.

Rita Sambruna is not aware of support from NASA concerning outreach and diversity for TDAMM.

Public Comment Period

Pedro Marronetti clarifies that LIGO will release the sky map with the alert a few minutes after observing a transient event.

Martin Still asks to describe the mechanism for the alerts.

Pedro Marronetti: LIGO uses the GNC to send alerts. They also release the sky map and link to a website part of the database for Grace DB. It contains the masses of a black hole, the order of estimation, where it is, the probability of it being an actual astronomical event, and the possibility there is an electromagnetic counterpart because there is matter around the event.

Martin Still asks if the alert system is automated.

Pedro Marronetti affirms that it is.

Constance Walker wants to reiterate Bob Blum's offer earlier today for Rubin and NOIRLab to present at your next meeting or to provide a written summary. We could answer questions about satellite design mitigations and streak masking and avoidance and impact, for instance.

Martin Still: We can answer questions about satellite design mitigations, streak masking, avoidance, and impact.

Kyle Dawson: There are questions regarding how much study has gone into the brightness of satellites, their number, the impact, and the timing until they reach orbit. Kyle asks about the exposure time for satellite trails at twilight versus the middle of the night. Rubin can answer these questions.

Committee Discussion Period

Kyle Dawson: The AAAC needs volunteers to write the report. Britt Lundgren will compress the Dark Sky material. The AAAC also needs to elect a deputy chair.

Michael McCarthy volunteers to be a deputy chair. Kievan Stassun seconds this motion.

Kyle Dawson: Co-write with Lab-Astro. It is important to lay out the process in the March report. Sarah Hörst and Nicole Lewis will synthesize this information. Data collection is the responsibility of Ann Zabludoff and Kyle Dawson. They will also take on OSTP and the OECR report on research misconduct.

Abigail Vieregg volunteers to summarize coordination between NASA and NSF on South Pole infrastructure.

Kyle Dawson agrees to follow up with Raffaella Margutti to confirm she will summarize NASA and NSF coordination on LIGO in relation to time domain and multi-messenger astrophysics. Wenda and Alexie will work on the atmospheric climate.

Willie Rockward volunteers to merge areas of mutual interest with the decadal to the AAAC report.

Wenda Cao: Agrees to work on the climate change topic. Agencies need to set up a special funding program for infrastructure upgrades.

Debra Fischer states that AURA is developing a carbon emissions calculator.

Kyle Dawson: The DOE's perspective on this is important and they should have 30 minutes to discuss it at the next meeting.

Britt Lundgren states demographics should be raised in the state of the profession report.

Kyle Dawson: The committee recommended creating a document to track action on items. There was a spreadsheet for agencies to update. Kyle took this document and repurposed it to be a tracking checklist for the AAAC.

Keivan Stassun: The document is a way for the AAAC to be accountable to itself and track important items.

Kyle Dawson asks what the AAAC should do with the document.

Debra Fisher asks for the whereabouts of the document, the process for adding new information, and the metric for success.

Mike McCarthy asks how the document is maintained.

Keivan Stassun believes the spreadsheet is most useful if it is regarded by the committee as a whiteboard.

Kyle Dawson states that an option is to share the document so DOE, NASA, and NSF can provide input. However, the AAAC should maintain it because it records actions taken. He agrees to share the information they currently have so everyone has the same information.

Ann Zabludoff: The AAAC should review how agencies address high-priority facilities and emphasize that US leadership requires them. The advancement of science requires maintaining a leadership role. The AAAC needs to encourage NSF to focus on this mission.

Abigail Vieregg states the AAAC is obligated to demonstrate astronomy's importance.

Kyle Dawson: The AAAC needs to highlight potential, map out challenges, and make the most constructive recommendations.

Debra Fisher: A challenge from Astro 2020 is prioritization, and the AAAC can help prioritize items to fund.

Keivan Stassun states it is essential for the AAAC to follow the decadal. There are foundations of a priority list. It could be helpful to rearticulate things that are there to prioritize.

Ann Zabludoff states we can color code the table. Each agency can tell the AAAC where they are making progress.

Debra Fisher states there are time scales with each major facility recommendation. It is not linear.

Keivan Stassun states that rather than a rank order table, the decadal recognizes there are moving parts and time scales. It discusses a pathway or ordering (Figure 1.2 in the document) to understand where to start.

3:07 adjourn.

Presentations:

1) **https://nsf.gov/attachments/306499/public/1_Welcome_Charge_Martin_Still.pdf**
2) **https://nsf.gov/attachments/306499/public/2_NSF_Update_Debra_Fischer.pdf**
3) **https://nsf.gov/attachments/306499/public/3_DOE_Update_Kathy_Turner.pdf**
4) **https://nsf.gov/attachments/306499/public/4_South_Pole_Infrastructure_Impacts_for_Astronomy_Facilities_Jim_Ulvestad.pdf**
5) **https://nsf.gov/attachments/306499/public/5_Sustainability_Dark_and_Quiet_Skies_Ashley_VanderLey.pdf**
6) **https://nsf.gov/attachments/306499/public/6_Sustainability_Dark_and_Quiet_Skies_NTIA_Overview_Brian_Patten.pdf**
7) **https://nsf.gov/attachments/306499/public/7_LIGO_Future_of_Multimessenger_Astrophysics_Pedro_Marronetti.pdf**