

To: NASA ART for the Biden-Harris Transition Team

From: Paula Szkody, President of the American Astronomical Society *Paula Szkody*

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RE: Priorities/Issues for the Incoming Biden-Harris Administration

On behalf of the over 7,800 members of the American Astronomical Society, we appreciate the opportunity to share our perspectives on the key priorities and challenges for the astronomical sciences at the beginning of the Biden-Harris Administration. The United States has long been a leader in the astronomical sciences, but we have recently fallen behind in key areas. We look forward to working with the new Administration to return the U.S. to the front of cutting-edge science and exploration, led by a diverse and inclusive work force. Astronomy has long been a STEM gateway science and many of our members who are trained as astronomical researchers go on to work in other fields, well equipped to succeed in the jobs of the future.

### **Overall Federal Support for R&D**

As you know, federal funding for R&D as a fraction of U.S. GDP has been in decline for decades<sup>1</sup>, limiting the pace of discovery, the training of new scientists, and the development of technology. One symptom of this decline is that the success rate of proposals for funding programs<sup>2</sup> has dropped to an unsustainably low level, with excellent-rated proposals going unfunded. The scientists who write these proposals depend on federal funding to support the early career researchers who work for them. This funding issue has affected the astronomical sciences in almost all cases. The Trump Administration submitted budgets with cuts across most science programs, and thankfully Congress has rejected most of those proposals.

We support the need for emergency federal spending to address the immediate public health and economic crisis facing the Nation. In fact, the pandemic has hit early career scientists comparatively hard. The programs and agency policies that explicitly support them need extra support or we risk losing a substantial portion of this generation of researchers. We applaud the dedication of NASA leadership in addressing this issue and hope that the Biden-Harris Administration will identify additional resources for these efforts.

In the midst of this emergency spending, we trust that the Biden-Harris Administration will also find a way to address longer-term challenges. In particular, we encourage you to submit budget requests—beginning with FY2022—that fund the bold “Innovate in America” plan to invest an additional \$300B in R&D and breakthrough technologies over four years. Historically, OMB has excluded NASA’s Science Mission Directorate (SMD) from such innovation initiatives. We urge the Administration to fix this oversight and include SMD in the “Innovate in America” initiative because SMD is a critical driver of the Nation’s innovation ecosystem and a key federal steward for multiple scientific and engineering disciplines.

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<sup>1</sup> National Center for Science and Engineering Statistics, National Patterns of R&D Resources (annual series)

## Setting Priorities in the Astronomical Sciences

The National Academies carry out Decadal Surveys to assess the field and workforce and to prioritize new programs, facilities, and missions. The recommendations of the decadal surveys represent the broadest possible community-based consensus and impact the investment decisions of the science agencies over long periods of time. The next Astronomy and Astrophysics Decadal Survey (Astro2020) is expected to be released by Summer 2021. The Planetary Science and Astrobiology Decadal Survey is underway and expected by 2023. The Solar and Space Physics Decadal Survey mid-term review was recently completed.<sup>3</sup> NASA co-sponsors all three, and we urge the Administration's support for the recommendations in these touchstone reports.

## Priorities for NASA Science and Technology

A high priority of previous Decadal Surveys and an overall community ethos is achieving a "healthy" balance between the core research program and the construction of new facilities, which range in size from smaller competitive mission (e.g., *Explorer*, *Discovery* class) to large strategic/flagship missions. Despite community advice, budget pressures have generally led to a reduction in flight opportunities in the smaller competitive categories, which are usually led by individual scientists or research groups. A slow cadence hampers us from quickly addressing emerging frontier science fields, thereby ceding ground to foreign competition, and from training a new, more diverse generation of mission PIs. We urge the new Administration to take steps to increase the frequency of mission opportunities across SMD.

Technology development is critical for enabling future missions and reducing their risk and cost. Increases in these activities were recommended by multiple Decadal Surveys, but the level of investment so far has been insufficient. In this regard, we have been concerned by Trump Administration attempts to eliminate the free-standing technology directorate. Luckily, Congress has rejected these efforts to date. The most recent heliophysics mid-term assessment found that SMD would be strengthened by more cross-division coordination.<sup>4</sup>

### Heliophysics Division

The PROSWIFT Act, signed into law in October, outlines a national strategy for forecasting and safeguarding against space weather events, which can disrupt satellite networks and power grids. We urge the Administration to make the PROSWIFT initiative a reality by providing the necessary budgetary and coordination resources, like continuing the Space Weather Operations, Research and Mitigation (SWORM) interagency working group established by the Obama Administration.

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<sup>3</sup> Review of Progress Toward Implementing the Decadal Survey - Solar and Space Physics: A Science for a Technological Society

<sup>4</sup> Decadal Survey for Solar and Space Physics Midterm Assessment 2020 page 140: Findings 3.12 and 3.15

### Astrophysics Division

The *Roman Space Telescope*, the top-ranked flagship mission of the 2010 Astrophysics Decadal Survey<sup>5</sup>, endured multiple cancellation proposals during the Trump Administration. Roman has a viewing area 100 times bigger than Hubble while maintaining the same high resolution and level of sensitivity. Congress has formally authorized the mission and appropriators have rightly rejected these cancellation proposals each time. We strongly encourage the new Administration to stop this anti-science and counterproductive budgetary ploy beginning with its FY2022 budget proposal and include full funding for the mission. The James Webb Space Telescope is the top flagship mission from the 2001 Astrophysics Decadal Survey, and will require top level agency oversight and support given its scheduled launch in late 2021.

### Planetary Science Division

We are not reaping the full scientific yield from the suite of NASA planetary missions because the scientists who use them have inadequate funding due to the low selection rates for competed R&A and technology development programs. This badly needed increase in the R&A budget has been raised at numerous advisory group meetings this year and in the meetings for the upcoming Astrobiology and Planetary Science Decadal Survey.<sup>6</sup> We urge the new Administration to take steps to increase the frequency of PI led competed mission opportunities. An increased frequency in directed missions, which do not offer the diversity and training on-ramps of PI led missions, is straining the available funding for R&A programs in Planetary Science Division.

### **A Strong and Inclusive Scientific Community**

The strongest research and teaching community is one where all members of society actively engage in equitable practices. The STEM fields have sought to achieve this equity, and great progress has been made toward gender parity in the astronomical sciences. However, the astronomical sciences' efforts to improve racial and ethnic diversity have not yet been nearly as successful. Support for the following initiatives will help in this regard.<sup>7</sup>

Expand Masters-to-PhD bridge programs: In these bridge programs, Historically Black Colleges and Universities (HBCUs) or Minority Serving Institutions (MSIs) partner with "PhD granting institutions". These have been tremendously successful in training and placing talented students in PhD programs, where they have thrived. We need more of these programs and recommend that federal support for them be expanded.<sup>8</sup>

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<sup>5</sup> New Worlds, New Horizons in Astronomy and Astrophysics 2010 Decadal Survey (PDF page 38, document page 3)

<sup>6</sup> Planetary Science Advisory Committee Findings August 2020 page 2: last section titled "R&A: Finding on Impact(s) of Selection Rates Below 20%"

<sup>7</sup> National Science Board: Vision 2030 page 17

<sup>8</sup> National Science Board: The Skilled Technical Workforce page 27: "The Power of Partnerships: Universities and Community/Technical Colleges

Broaden the NSF INCLUDES Program: NSF's Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science program (NSF INCLUDES), provides a collaborative infrastructure for broadening participation. This program can also be expanded to NASA and other science agencies.<sup>9</sup>

Collect Demographics Data: In order to assess the effectiveness of programs to increase the diversity of our fields, we must track the demographics of the community. Data on proposal selections, hiring, observing time awards, and paper citations would provide a much clearer picture of the state of our profession.<sup>10</sup>

### **The United States as an Attractive Destination for Scientists**

The national scientific enterprise has greatly benefitted from attracting and retaining the most talented and highly skilled students and PhDs from around the world. This is threatened by the Trump Administration, through visa restrictions and immigration policies which projected the unfortunate message that the United States is not a welcoming destination. Such policies need to be reversed as soon as possible.<sup>11</sup>

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<sup>9</sup> AAAC Report 2020 page 5: Finding and Recommendation 24 and 25

<sup>10</sup> Decadal Survey for Solar and Space Physics Midterm Assessment 2020 page 142: Findings 5.5, 6.3, and 6.4

<sup>11</sup> National Science Board: Vision 2030 pages 17 and 19