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Call to the Biological and Physical Sciences in Space Community for White Papers

Dear Colleague,

It is our pleasure to announce the opportunity to contribute to the Decadal Survey on Biological and Physical Sciences (BPS) Research in Space 2023-2032 (BPS2023) conducted by The National Academies of Sciences, Engineering and Medicine. This is the formal call for community white papers to inform this Decadal Survey.

White papers help inform U.S. priorities for research in space for the coming decade. Submission by diverse research groups are encouraged for focused topics (due Oct 2021) or broad campaigns (due Dec 2021) advancing space-related biological and physical sciences.

BPS2023 will review the state of knowledge in the current and emerging areas of the field, and generate consensus recommendations for a comprehensive vision and strategy for a decade of transformative science at the frontiers of biological and physical sciences research in space. The study report will help NASA define and align biological and physical sciences research to uniquely advance scientific knowledge, meet human and robotic exploration mission needs, and provide terrestrial benefits. Information about the study is provided on the Decadal Survey website, Decadal Survey on Life and Physical Sciences Research in Space 2023-2032, where you may check regularly for updates on meetings, activities, and additional opportunities for input.

This call for white papers is an important part of the survey process. White papers provide input from the scientific community into the National Academies' decadal surveys. The success of this Decadal Survey depends on input from a broad range of disciplines and research communities. We recognize that knowledge and techniques in fields associated with BPS in space —beyond those normally associated with this field —can enable scientific discovery, address the scientific and technological needs of space exploration, and result in applications on Earth. Therefore, input is welcome from within and beyond the current space sciences community.

We encourage you to submit a white paper that deals with one discipline or many disciplines associated with BPS. White papers should identify research areas, concepts, methods, tools, techniques, and new ideas that could advance knowledge in at least one of the following areas, though all relevant input is welcome:

- The effects of the spaceflight environment on biological and biophysical systems and processes. Relevant areas of knowledge may range from molecular biology to evolution. Environmental factors may range from altered gravity and radiation in deep space to dust exposure on planetary surfaces.

- The effects of the spaceflight environment, including gravitational effects, on physical systems and processes. Examples of relevant areas include materials, combustion, fluid behavior, and fundamental physics.
- Gravitational and other space environment effects on physical and biological processes involved in the functioning of space exploration technologies.

White papers should include fundamental concepts that address BPS in space, and should take advantage of any science platform that enables the science. Platforms include those that provide zero or partial gravity, are in Low Earth Orbit, are terrestrial analogs of spaceflight or space conditions, and those that may soon be in deep space or lunar environments. White papers may also include research that could enable exploration and future experiments on Mars; however, the Mars surface or vehicles in transit to Mars are not under prioritized consideration as research platforms in this decade 2023-2032.

Two types of white papers are sought:

- ***Topical*** white papers that focus on a single research area, scientific investigation or experiment. There is no specify minimum cost or maximum duration; and
- ***Research Campaign*** white papers that address broad or large-scale goals and may span multiple topics or disciplines, multiple missions, or multiple platforms, but that logically aggregate into a single, defined mission concept. Such proposed campaigns will have a minimum total project cost of $100M, may include a dedicated spaceflight, and will have a maximum duration of 10 years.

Your white paper should articulate how the proposed science represents one or more of the following priorities:

1. Science that can or must be done in space, with anticipated value to human exploration
2. Science that can be done in space, with anticipated value to humans on Earth
3. Science that can be done in space, because the reduced gravity environment enables cleaner analysis of fundamental research questions

Instructions for preparing both Topical and Research Campaign white papers are as follows:

- Length: No less than 2 pages in length and no more than 5 pages in length, exclusive of cover page and cited references;
- Formatting: Use a 12-point font with 1-inch margins on all sides of the document;
- Cover page: Required cover page (not counted in the 5-page limit) should include the title of the white paper (starting with Topical: or Research Campaign:), the primary author's name, phone number, institution, and email address, and a list of co-authors with their respective institutions;
- References: Required cited reference list must contain hyperlinked DOI (digital object identifier) within the document;
- File type: White papers must be in Microsoft Word (.doc, .docx) or Adobe Acrobat (.pdf) formats. No other formats will be accepted;
- File size: White paper file sizes should be as small as possible. File sizes larger than 50 megabytes (Mb) in size cannot be accepted. For file management purposes, please compress your figures as much as possible. You can provide hyperlinks to higher resolution versions of illustrations if you wish;

- Filename format: Format your file names as "LastNameFirstNameMiddleInitial." For example: "SmithJohnB.pdf" or "WilliamsJaneA.doc" (If you do not have a middle initial, do not worry about including one in the filename). Do not use spaces or underscores in the file name.
- Uploading: We can only accept white papers submitted by means of upload to the National Academies' web-based system.
    - Information on submitting ***topical*** white papers is available at: Call to the Biological and Physical Sciences Community White Papers: Topical
    - Information for ***research campaign*** white papers is available at: Call to the Biological and Physical Sciences Community White Papers: Research Campaign
- Deadlines:
    - *Topical* white papers are due no later than Sunday, *Oct. 31, 2021*;
    - *Research campaign* white papers are due no later than Thursday, *Dec. 23, 2021*.
    - In both cases, the earlier a submission is received, the sooner it can be incorporated into the study process, and early submissions are strongly encouraged.

Questions on the process can be submitted to BPSDecadal@nas.edu. White papers submitted to that email address will be returned, and you will be directed to the Decadal Survey websites listed above.

All white papers submitted to the sites listed above will be posted publicly online, where they can be downloaded and viewed freely at Decadal Survey on Life and Physical Sciences Research in Space 2023-2032.

As we enter a new era of research in space, we benefit from current momentum in our U.S. space community and the long history of global cooperation to advance research in space environments. We look forward to working with you to merge ideas and inputs on BPS research needs and opportunities to build a strategy that can enable truly transformative progress in the upcoming decade.

Best wishes,

Robert J. Ferl and Krystyn J. Van Vliet
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