NATIONAL ACADEMIES Sciences Engineering Medicine

Space Studies Board

Solar and Space Physics (Heliophysics) Decadal Survey
Call for White Papers

Updated 8/19/2022
- Clarification – the number of pages of references is not restricted and will not count against the page limit.
- Final extension of the due date to September 7.

Notice: the white paper due date has been extended to midnight, Pacific Time, September 7, 2022, from the original due date of August 18th.

Dear Colleagues,

It is our pleasure to announce an opportunity to contribute to the Decadal Survey for Solar and Space Physics (Heliophysics) – SSPH 2024-2033 conducted by the National Academies of Sciences, Engineering, and Medicine. We formally call for community white papers to inform the survey, with white papers due August 24, 2022 (formerly August 18).

The decadal survey will be carried out by a steering committee ("survey committee") informed by several study panels and interdisciplinary working groups. The survey's statement of task asks that the survey committee write a report that will:

1. Provide an overview of the current state of solar and space physics science and applications, including:
    - Topics historically part of solar and space physics decadal surveys, including:
        - The structure of the Sun and the properties of its outer layers in their static and active states,
        - The characteristics and physics of the interplanetary medium from the surface of the Sun to interstellar space beyond the boundary of the heliosphere, and
        - The consequences of solar variability on the atmospheres and surfaces of other bodies in the solar system, and the physics associated with the magnetospheres, ionospheres, thermospheres, mesospheres, and upper atmospheres of the Earth and other solar system bodies;
    - New and emerging frontiers where solar and space physics expertise enables significant advances, including but not limited to
        - Science related to the interstellar medium, astrospheres (including their stars), exoplanets, and planetary habitability, and
        - Applications related to robotic and human exploration in and beyond low-Earth orbit and the lunar environment; and

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    - The space weather pipeline from basic research to applications to operations, including the research-to-operations-to-research loop that strengthens forecasting and other predictive capabilities.
2. Describe the highest priority science goals to be addressed in the period of the survey.
3. Develop a comprehensive ranked research strategy that provides an ambitious but realistic approach to address these goals that includes ground- and space-based investigations as well as data and computing infrastructure to support the research strategy, and
4. Assess the state of the profession.

Further details of the statement of task, the "study approach," and FAQs are provided on the decadal survey website: https://nas.edu/ssphdecadal

White paper categories and topics

White paper submissions are encouraged for the topics listed above. They may focus on one or more science goals; notional instrument, mission or ground-based investigations or combinations of these; or issues of broad concern to the community.

To assist us in directing your white paper to the appropriate panel(s) and members of the steering committee, the online submission form will ask that you identify your paper by one of the categories below (Basic Research, Space Weather Application, Infrastructure/Workforce/Other Programmatic) as well as a primary topic within that category (e.g., Solar Physics). In addition, a secondary, optional category may be identified if your paper crosses boundaries among these areas.

Basic Research:

- Solar Physics
- Inner Heliosphere and solar wind interaction with unmagnetized bodies
- Outer Heliosphere
- Planetary Magnetospheres
- Planetary ionospheres/upper atmospheres
- System Science (solar wind - magnetosphere - atmosphere - ionosphere interactions)
- Laboratory space plasma physics
- Fundamental space plasma theory (not specific to a particular region)
- Basic research that is driven by space weather user needs
- Emerging Opportunities: interstellar medium, astrospheres (and their stars), exoplanets (and their magnetospheres/ionospheres/upper atmospheres), and planetary habitability
- Other topic relevant to solar and space physics/heliophysics

Space Weather Applications:

- Space Weather Pipeline from Research to Application to Operations
- Space Weather Research to Operations to Research Loop
- Space Weather Applications related to robotic and human exploration in and beyond low-Earth orbit and the lunar environment
- Other Space Weather

Infrastructure, Workforce, Other Programmatic

- State of the Profession, including workforce capabilities and current status, future needs to improve health and vitality of the community, diversity, equity, accessibility, and inclusion

- Research Tools and Infrastructure (that is not specific to one research area)
- Other Programmatic

Space missions or ground-based investigations

White papers containing notional concepts for space missions or ground-based investigations should include the following:

- A summary of the science goals that the investigation is intended to achieve,
- In as much detail as possible, a description of the investigation including notional estimated costs and schedule, and
- Technology development needs.

NASA has asked that the survey provide a prioritized list of investments, and NSF has specific requests related to the NSF mid-scale program. White paper concepts related to a specific NASA or NSF program should categorize such investments as follows:

- NASA programs: CubeSat/Sounding Rocket/Balloon Programs, Missions of Opportunity (MO)-scale ($55-75M), Small Explorer Mission (SMEX)-scale ($150M), Medium-Class Explorers (MIDEX)-scale ($250-300M), Moderate-scale missions ($400-650 M with reserves, without launch costs)[1], Large-scale missions (greater than $650M)
- NSF programs: Mid-scale Research Infrastructure 1 or 2, Mid-Scale Innovations Program in Astronomical Sciences, or Major Research Equipment and Facilities Construction

Operational space weather projects may be considered for NOAA, and relevant ground-based projects may be considered for NOAA and NSF.

Restrictions for white papers

White papers will be available publicly, and may not include ITAR restricted, classified, proprietary, or other sensitive materials.

Specifications for white papers

- **Length**: A maximum of seven pages in length, exclusive of the cover page and cited references;
- **Formatting**: Use 12-point font with 1-inch margins on all sides of the document;
- **Cover page**: Required 1- page cover (not counted in the 7-page limit) should include the title of the white paper, the primary author's name and institution, and a list of co-authors with their respective institutions; the cover page may include the synopsis (see below);
- **References**: Cited reference list may be on additional page(s) and should include hyperlinked DOIs (digital object identifiers) whenever possible. There is no limit on the number of references;

[1] Moderate-scale missions were recommended in the 2013 decadal survey for the Solar-Terrestrial Probes program. The report can be read online at: https://nap.nationalacademies.org/catalog/13060/solar-and-space-physics-a-science-for-a-technological-society

- **Figures and graphics:** Graphics should be sufficiently large to clearly illustrate the point. Graphics count against the 7-page limit. Hyperlinks can be used to access higher-resolution graphics;
- **Synopsis:** A short synopsis or abstract at the beginning of the paper is required. The synopsis may be included on the cover page.

Submitting the white paper

A link will be posted on the Survey web page (https://nas.edu/ssphdecadal) with a form to submit your paper. Do not email your paper directly to survey staff or to committee members.

- **Co-authors**: Papers with five or fewer coauthors will be asked to enter the co-authors' given name, family name, ORCiD (if available), email, and affiliation on the submission form. Papers with six or more co-authors will download a spreadsheet from the form, fill in the information for each author, and upload it as part of the submission.
- **Description:** The submission form asks for a short description of the paper (limit 400 characters) that is used to help sort the papers. It may contain the same text as the synopsis.
- **File type**: White papers must be in Microsoft Word (.doc or .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) 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 "FamilyNameGivenNameMiddleInitial." 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. If submitting more than one paper, add a number to the end of the filename. For example: "WilliamsJaneA1.doc" and "WilliamsJaneA2.doc."
- **Optional Publication by the Bulletin of the American Astronomical Society (BAAS):** We will be requesting that the American Astronomical Society publish the white papers in the BAAS (baas.aas.org). In addition to increasing the web search visibility of the white papers, each paper will be indexed at ADS. If you do not wish to have your white paper published in the BAAS, you may opt out before submitting it. Your white paper will still be available via the SSPH website.
- **Due Date: Midnight, Pacific Time, August 24, 2022 (formerly August 18)**
- **Questions:** Questions on the process can be submitted to SSPHdecadal@nas.edu. White papers submitted to that email address will be returned, and you will be directed to the submission site, when available.

These instructions are subject to modification by the Decadal Survey Steering Committee, as needed.

White papers are especially encouraged for mission concepts within the NASA moderate-scale cost box and topics including the emerging frontiers.

Best wishes,

Stephen A. Fuselier and Robyn M. Millan
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