

Dynamical Neutral Atmosphere-Ionosphere Coupling Acquisition Process Planning Information

Notice ID NNH22ZDA004L

In order to assist the community in its planning for a Dynamical Neutral Atmosphere-Ionosphere Coupling (DYNAMIC) mission, NASA is releasing its current strategy for this mission's acquisition in order to provide details that may assist community planning and to enumerate the key drivers.

It is emphasized that this announcement is NOT a Request for Proposal, nor is it an Invitation for Bid. This announcement is subject to revision or cancellation at any time and is not to be construed as a commitment by the Government to enter into a contract or to release an Announcement of Opportunity. Please do not request a copy of the solicitation, as no solicitation exists at this time. When a solicitation is issued, it will be made available through the NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES) at <https://nspires.nasaprs.com/external/>. It is the responsibility of Offerors and interested parties to monitor SAM.gov, NSPIRES, and the DYNAMIC Acquisition Homepage (linked below) for the release of the solicitation and amendments, if any, and they will be responsible for downloading their own copy of the documents. NASA Clause 1852.215-84, Ombudsman, is applicable. The Center Ombudsman for potential acquisitions can be found at <https://www.hq.nasa.gov/office/procurement/regs/Procurement-Ombuds-Comp-Advocate-Listing.pdf>.

Any questions about DYNAMIC or its acquisition strategy should be directed via email only using subject line "DYNAMIC NNH22ZDA004L" to: jared.s.leisner@nasa.gov. Depending on the nature of the question(s)/comments, NASA may respond on an individual basis by email or may post responses at the Questions and Answers (Q&A) section of DYNAMIC Acquisition Homepage (linked below). Anonymity of persons/institutions who submit questions/comments will be preserved.

Summary

NASA's Science Mission Directorate (SMD) intends to release a draft Third Stand Alone Missions of Opportunity Notice (SALMON-3) Program Element Appendix (PEA) no earlier than February 2022 to solicit a DYNAMIC Small Complete Mission (SCM). This Principal Investigator (PI)-led investigation will be solicited under a not-to-exceed cost cap.

DYNAMIC is a mission envisioned to "substantially advance understanding of the variability in space weather driven by lower-atmosphere weather on Earth" [[2013 Solar and Space Physics Decadal Survey](#)]. Interested individuals are strongly encouraged to read the decadal survey description of the mission concept for further information.

Due to the strong overlap in the necessary measurement capabilities to accomplish the science recommended for the Geospace Dynamics Constellation (GDC) and the DYNAMIC mission,

NASA is leveraging its implementation of GDC to execute DYNAMIC in a cost-effective and resource-efficient manner.

NASA is intending to solicit a DYNAMIC implementation using small spacecraft that can launch as a rideshare with the GDC mission. GDC is planned to provide comprehensive measurements in a coordinated constellation of identical observatories in low Earth orbit. The DYNAMIC PI will be granted access to the GDC science data at the same time.

Proposals submitted in response to this forthcoming PEA will be selected for flight through a two-step competitive process, where the selected investigations proceed to Phase A, with an eventual down-selection that leads to one investigation entering Phase B. The SCM will launch as a rideshare in the same general time frame as the Geospace Dynamics Constellation (GDC) mission.

The project is designated as Category 3 as defined in NPR 7120.5F, NASA Space Flight Program and Project Management Requirements. The rideshare payload is designated as Class D as defined in NPR 8705.4A. See <https://soma.larc.nasa.gov/standardao/ClassD.html>.

Unless otherwise stated, all GDC documents referenced in this document may be found on SOMA's [GDC Acquisition Homepage](#). The GDC PEA can be found on [NSPIRES](#). Other documents relevant to GDC's formulation and solicitation are found in the GDC Program Library.

Further information will be posted on the DYNAMIC Acquisition Page at <https://soma.larc.nasa.gov/stp/dynamic> as it becomes available. Questions may be addressed to

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Note: This announcement includes technical constraints on a mission implementation that results from DYNAMIC being formulated as a rideshare opportunity. These constraints are based upon current estimates. They may be updated in later announcements.

Science

Science objectives: Investigations must propose focused science objectives that they would complete and that would make specific advances on the broad science questions prioritized for the DYNAMIC mission by the [2013 Solar and Space Physics Decadal Survey](#) (p. 100).

GDC constellation, measurements: Investigations may assume the use of, and are expected to use, measurements from the GDC constellation (see the [GDC Design Reference Mission](#) for the notional constellation configuration). For both the Baseline and Threshold Investigations,

DYNAMIC investigations may assume the use of the GDC primary Physical Parameters (GDC PEA, Section 2.4).

- Note: Although the GDC PEA provided notional measurement characteristics (e.g., Accuracy, Cadence) based on the GDC STDT report and NASA's GDC pre-formulation work, the final GDC measurement characteristics may vary from those values. The final GDC measurement capabilities will be announced after those investigations are selected (expected ~1 month after draft DYNAMIC solicitation release).

For temporal and spatial overlap with the GDC constellation, DYNAMIC investigations will make the following assumptions for the Baseline and Threshold Investigations:

- Baseline Investigation: DYNAMIC will launch concurrent with GDC and in rough alignment with that mission constellation. (See *Technology/Launch considerations* below for information on launch assumptions.)
- Threshold Investigation: DYNAMIC will not launch concurrent with GDC. It will launch within a window that begins six months before and ends three months after the GDC launch. The launch may not be assumed to occur at any particular local time or with any predicted longitudinal separate from any particular GDC observatory. Launch conditions that must be assumed are specified in *Technology/Launch considerations* below.

Auroral imager: NASA is exploring the possibility of including an auroral imager as Government-Furnished Equipment (GFE). This has not been finalized, so current technical details are conservative estimates and will be updated at later points; final information is expected no later than the final solicitation release. One possible outcome is that an auroral imager is not ultimately delivered for integration on the DYNAMIC observatories.

- Incentive, science:
 - Baseline Investigation: Investigations may choose to use the auroral imager for the completion of their science objectives. NASA levies no requirement on how (if at all) the auroral imager is incorporated in the investigation objectives, but it may be to a proposal's advantage to use the auroral imager in a way that provides easy and clear descopes towards the threshold.
 - Threshold Investigation: Investigations may not use the auroral imager for the completion of their science objectives.
- Incentive, funding: Investigations that propose to and are able to accommodate the auroral imager will be given a funding incentive that increases their cost cap (see *Cost/Cost cap* below). Investigations that propose but are unable to accommodate the auroral imager will not receive the funding incentive.
- Science data specifications: The science data to be returned by the imager will be enveloped at a later point, with expectations being no later than the draft solicitation release.
- Technical specifications: As no particular imager has been identified yet, NASA is providing an estimate on the instrument's technical specifications. These specifications do not include margin that investigations are expected to include for any payload component.
 - Length: 80 cm (axis with aperture)
 - Width: 60 cm
 - Height: 50 cm
 - Mass: 35 kg

- Power, average: 25 W
- Data Rate, average: 600 kbps
- Mounting: Nadir deck

GDC science team: The DYNAMIC PI will interact with the GDC science team but will not be a member of the GDC science team. The investigation PI will be responsible for following and ensuring that they and their science team follows the GDC Rules of the Road for interactions with the GDC science team. All interactions with the GDC science team will be managed by the GDC Project Scientist, and the DYNAMIC PI may not assume that the GDC science team will contribute to the completion of the DYNAMIC investigation science objectives.

- The GDC Rules of the Road document will be written as a Phase A activity. Examples are posted on the SOMA's [GDC Program Library](#).

Team Size: NASA requires that each proposal include a science team sufficient to complete the proposed investigation. There will be no direct constraint on team size, but it is understood that the cost cap (see *Cost/Cost cap*, below) will indirectly constrain the team size. While it is anticipated that the DYNAMIC science team will collaborate with the GDC science team, DYNAMIC investigations may not assume leveraging of the GDC science teamwork for the completion of the DYNAMIC investigation science objectives.

Open source: All software developed as part of a DYNAMIC investigation will be required to be released under a permissive (or less restrictive) open source license.

Mission lifetime: Investigations must propose a length of science operations consistent with existing SALMON-3 AO requirements. NASA anticipates that some science objectives could require that DYNAMIC prime Phase E science operations run through the end of the GDC prime Phase E.

- GDC's prime Phase E science operations are planned for a length of three years, and the GDC constellation configuration through time is described by the GDC Design Reference Mission (available in the GDC Program Library, and linked in the DYNAMIC Program Library).

Technology

Risk Class: The investigation observatories will be developed as Risk Class D (per NPR 8705.4A, 7120.5F). Investigations are expected to tailor up safety and mission assurance requirements as necessary and appropriate for the proposed mission lifetime. The safety and mission assurance implementation to meet mission lifetime requirements will be part of the proposal evaluation, per existing SALMON-3 requirements.

Rideshare Users Guide: Investigations will abide by the DYNAMIC System Interface Specification (SIS) document, to be available in the Program Library concurrent with or soon following this announcement, including its Do No Harm requirements. The SIS published with this community announcement is a draft document and may be updated before the final solicitation release.

- Note: The SIS will cover requirements both for rideshare with a primary mission and for a payload on a Venture-class launch vehicle.

Rideshare Payload (RPL) parameters: The investigation observatories will be permitted to use up to two ESPA ports as a rideshare payload, although they may launch on a Venture-class launch vehicle. All other requirements and constraints are described in the Rideshare Users Guide.

Launch considerations: The launch vehicle will release the DYNAMIC observatories after all other payloads have released. The DYNAMIC Mission System Interface Specification (SIS) document, which includes Do No Harm requirements, will be available in the DYNAMIC Program Library concurrent with or soon following this community announcement as a draft document. In addition to those requirements, investigations should base their design assumptions on the following launch and deployment factors:

- Altitude: Between 350 km and 900 km (circular)
- Inclination: Between 80 and 84 degrees
- Mean Local Time of Ascending Node: Not yet determined
- Deployment time: 210 minutes (after launch)
- Power: Launch while powered off

Management and Schedule

Mission milestones: NASA is planning the following mission milestones:

Draft PEA Release	NET February 1, 2022
Final PEA Release	NET June 1, 2022
Pre-proposal conference	~3 weeks after Final PEA Release
Notification proposals due	~6 weeks after Final PEA Release
Proposals due	~4 months after Final PEA release
Selection.....	May 2023 (est.)
Delivery for ESPA Integration	NET July 2027 (est., TBR in Final PEA)
Launch readiness date (LRD)	October 1, 2027 (GDC LRD)

Cost

Cost cap: The investigation will be cost capped, including all mission phases, reserves, and mission unique interface cost of accommodation on and/or delivery to the host mission. Access to space will be provided by NASA and is not within the cost cap. The cost cap for DYNAMIC will be \$170M (\$FY23). NASA intends to offer a \$10M incentive for the accommodation of the auroral imager (see *Science/Auroral imager* above); any funds remaining from the \$10M after accommodation is fully supported will be for allocation elsewhere in the investigation budget.

Storage costs: The investigation is responsible for any storage costs leading up to the delivery date stated in the solicitation. Any increases in storage costs driven by changes in the GDC LRD will be the responsibility of NASA and outside of the investigation cost cap.

- As the launch opportunity is currently unknown, proposals will provide a contingency plan for a potential need to enter storage before delivery to the ESPA integrator. This

contingency will not be part of the investigation development plan and budget. The contingency plan will be for a one-year storage; it will include schedule and cost for ramp down, steady state, and ramp up, and will discuss effects on the investigation team. NASA expects that the investigation team will enter a hibernation mode during this period.

Proposal Evaluation

Evaluation process: Investigations will be evaluated in a two-step process (see SALMON-3 AO, Section 2.5). The one down-selected investigation will proceed into a non-competitive Phase B.

Proposal Submission

Electronic submission: Proposals will be submitted via NSPIRES (as described in the SALMON-3 AO, Requirement 109). In addition, proposals and accompanying documents will be submitted via the Box platform rather than via CD-ROMs (superseding SALMON-3 AO, Requirement 110). Instructions on submission through Box will be made available in the Program Library.