

DYNAMIC Third Community Announcement Released December 2022
Dynamical Neutral Atmosphere-Ionosphere Coupling
Updated Acquisition Process Planning Information

Updated Notice ID NNH22ZDA004L

In order to assist the community in its planning for a Dynamical Neutral Atmosphere-Ionosphere Coupling (DYNAMIC) mission, NASA is releasing a third update to its current strategy for this mission's acquisition in order to provide details that may assist community planning and to enumerate the key drivers. This December 2022 DYNAMIC Update supersedes the two prior special or community notices that also are available on SAM.gov under ID Number: [NNH22ZDA0004L](https://sam.gov/notice/NNH22ZDA0004L)

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. All interested parties are responsible for downloading their own copy of any 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 simplified Announcement of Opportunity (AO) no earlier than February 2023 to solicit a DYNAMIC investigation. 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 missions, 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 in the same timeframe as 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 as the GDC science team.

Proposals submitted in response to the forthcoming DYNAMIC AO are anticipated to 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. However, if warranted by the evaluation process, NASA reserves the right to select through a single step.

The project is designated as Category 3 as defined in [NPR 7120.5F](#), NASA Space Flight Program and Project Management Requirements. The DYNAMIC project 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 prior GDC Program Element Appendix (PEA) NNH17ZDA004O-GDC 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 December 2022 announcement includes technical constraints on a mission implementation that result from DYNAMIC being formulated as a potential rideshare opportunity. These constraints are based upon current estimates. They may be updated in the draft AO.

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).

Non-DYNAMIC measurements, GDC constellation: 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 no later than the release of the DYNAMIC Draft AO).

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 within a window that begins three months before and ends three months after GDC's launch. The DYNAMIC launch may not be assumed to occur at any particular local time or with any predicted longitudinal separation from any particular GDC observatory. (See *Technology/Launch considerations* below for information on launch assumptions.)
- Threshold Investigation: DYNAMIC will launch within a window that begins six months before and ends nine months after the GDC launch. The DYNAMIC 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.

Non-DYNAMIC measurements, lower atmosphere: Investigations may assume the availability of data characterizing Earth's troposphere and stratosphere that have a low risk of unavailability during DYNAMIC science operations. Measurements considered to be low risk are those central to meteorological efforts that the United States Government has a mandate to continue. The three types of characterizations are global measurements, extreme precipitation events, and catastrophic events.

- *Global measurements:* Full meteorological model (including parameters such as winds, temperature, humidity, clouds, precipitation) with a 25 km horizontal grid and 2 km vertical spacing.
- *Extreme precipitation events (e.g., hurricanes):* At low- and mid-latitudes, measurements provided in near-real time for all events. Retrospectively, events are well-characterized.
- *Catastrophic events (e.g., volcanos, tsunamis):* No direct observation of the events themselves, but related observations could retrospectively provide constraints on key parameters. Those constraints will be situation-dependent, with less accessible events (*e.g.*, underwater events) likely to be less well-constrained.

Non-DYNAMIC measurements, space environment contextual information: Investigations may assume the use of contextual measurements of Earth's space environment that have a low risk of unavailability during DYNAMIC science operations. Measurements that are produced by a small

number of providers are not low risk and their use may represent a risk to the investigation's successful completion. Low-risk measurements include but are not necessarily limited to common indices of geomagnetic activity; common indices of solar activity; ambient solar wind conditions; and large, eruptive solar events on the Earth-facing disk. These measurements may not be assumed to be high enough quality (*e.g.*, resolution, spatial coverage) to permit detailed comparisons with DYNAMIC data.

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 estimates and will be updated at a later time. Final decision 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 an investigation's 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 time, with expectations being no later than the final solicitation release. Proposers can expect the instrument to be capable of identifying regional morphology on the night side.
- Technical specifications: As no particular imager has been identified yet, NASA is providing an estimate on the instrument's technical specifications. These specifications can be considered not-to-exceed (NTE) values.
 - Length: 80 cm (axis with aperture)
 - Width: 60 cm
 - Height: 50 cm
 - Separate control electronics box: 15 x 15 x 15 cm
 - Mass: 35 kg + 5 kg control electronics
 - Power, average: 50 W total including electronics and heaters, throughout the orbit
 - Data Rate, average: 600 kbps
 - Mounting: Nadir deck
 - Pointing Control: 120 arcsec 3-sigma
 - Field of Regard: full view Earth limb-to-limb
 - Requires ISO 7 (Class 10,000) assembly or bagging; and T0 purge.
- Science team: The DYNAMIC PI will accommodate interactions of the Auroral Imager team with the project and the Auroral Imager team leader as an *ex officio* member of the science team. The DYNAMIC PI is encouraged to involve the Auroral Imager key science team leadership in DYNAMIC science activities to the greatest extent feasible.

The Auroral Imager team leader will be responsible for following and ensuring that their team follows the DYNAMIC Rules of the Road for interactions with the DYNAMIC science team.

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 DYNAMIC 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 from other missions are posted on the SOMA's [GDC Program Library](#).

Team Size: NASA requires that each proposal includes 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) may 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 team for the completion of the DYNAMIC investigation science objectives.

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

Data Archive: The investigation team will make mission data fully available to the public through a NASA data archive, (*i.e.*, Solar Data Analysis Center and/or Space Physics Data Facility), in readily usable form, in the minimum time necessary. Barring exceptional circumstances data release shall be within six months following its collection. For additional information, refer to the Heliophysics Division (HPD) HPD Data Policy and SMD Policy Document SPD-41a.

Mission lifetime: The AO will specify neither a floor nor a ceiling for the mission lifetime. Investigations must propose a length of science operations consistent with completing their science objectives. For example, 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.

- For reference, 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 mission will be developed as Risk Class D (per NPR 8705.4A, 7120.5F). Investigations are expected to enhance (*i.e.* 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.

Access to Space: NASA will provide DYNAMIC’s access to space as Government Furnished Equipment (GFE), utilizing either Launch Services Program (LSP) Venture-Class Acquisition of Dedicated and Rideshare (VADR) launch services or rideshare on a Government primary launch. Standard launch services utilizing a domestic launch vehicle certified as Risk Category 1, 2, or 3 per NPD 8610.7D, NASA Launch Services Risk Mitigation Policy for NASA-Owned and/or NASA-Sponsored Payloads/Missions, will be provided. PI-provided access to space will not be an option. The DYNAMIC Mission System Interface Specification (SIS) document, which includes Do No Harm requirements, will be available in the DYNAMIC Program Library concurrent with the Draft AO.

DYNAMIC observatories: There are constraints on the DYNAMIC observatories that follow from NASA providing access to space as GFE. DYNAMIC flight systems must be designed to be able to launch as a rideshare payload. Further, investigations are encouraged to be compatible with launch as a primary payload on a single launch vehicle. During the selection process, NASA will consider as a programmatic factor a flight system’s flexibility in launch configurations. For the rideshare configuration, flight systems shall meet the following constraints:

- ESPA ports, maximum: 2
- Volume, maximum: 42” x 46” x 56” (per ESPA port)
- Mass, maximum: 465 kg (per ESPA port)

Launch considerations: Investigations should base their design assumptions on the following launch and deployment factors. The proposed flight system must be able to accomplish the proposed investigation following an initial launch injection anywhere within the following ranges.

- 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 AO Release.....	NET February 2023
Final AO Release	NET April 2023
Pre-proposal conference.....	~3 weeks after Final AO Release
Notification proposals due	~6 weeks after Final AO Release
Proposals due	~4 months after Final AO release
Step 1 Selection.....	March 2024 (est.)
Phase A Concept Study Reports due	9 months after Concept Study Initiation
Down-selection of Investigations for flight	June 2025 (est.)

Delivery to storage.....NLT December 2028 (est., to be reviewed in Final AO)

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 launch vehicle integrator. Access to space will be provided by NASA and is not within the cost cap. The cost cap for DYNAMIC will be \$250M (\$FY23). NASA intends to offer a \$10M incentive as an addition to the Adjusted AO Cost Cap 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, but if NASA decides to descope the auroral imager, then the funds will be re-negotiated.

Storage plan: The investigation is responsible within the cost cap for work for all storage costs and efforts leading up to delivery of DYNAMIC observatories to the launch vehicle integrator. Proposals shall assume up to twelve months of storage followed by three months of ramp-up to launch. The storage plan shall describe, schedule, and budget the ramp down for, steady state in, and ramp up from the storage period, including a discussion of the effects on the project team, which NASA expects will enter a hibernation mode during this period.

Proposal Evaluation

Evaluation process: Investigations will be evaluated in a two-step process. The one down-selected investigation will proceed into a non-competitive Phase B.

- Note: If warranted by the evaluation process, NASA reserves the right to select through a single step.

Evaluation, IDEA: Interested parties should be aware that SMD intends to add specific inclusion, diversity, equity, and accessibility (IDEA) requirements to AOs, and has published a Request for Information that describes these additions. SMD is committed to a culture of IDEA where all employees feel welcome, valued, respected, and engaged. NASA expects the community's initial planning to include potential methods to ensure a diverse and inclusive workforce and to broaden participation with underrepresented groups. NASA also expects that IDEA will be reflected in the composition of AO proposal teams in accordance with the [SMD Science Plan Strategy 4.1](#).

Proposal Submission

Electronic submission: Proposals will be submitted via NSPIRES. In addition, proposals and accompanying documents will be submitted via the NASA Box platform.