2022 Workshop: Community Science and GDC mission

Long title
Community Science Enabled by the upcoming GDC mission
Conveners
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Description

Geospace Dynamics Constellation (GDC) is a NASA mission currently in formulation that will provide groundbreaking observations of the ionosphere/thermosphere (IT) system, and how that coupled system responds to and internally redistributes external energy input from the Sun and magnetosphere. GDC will address crucial scientific questions pertaining to the dynamic processes active in Earth's upper atmosphere and ionosphere; their local, regional, and global structure; and the dynamic coupling between the ionized and neutral gases of the IT system as well as between the IT system and the magnetosphere. GDC will be the first mission to address these questions on a global scale due to its use of a constellation of spacecraft that permits simultaneous multi-point observations, as well as the first mission to fully resolve the horizontal spatial gradients (to at least 300 km resolution) and temporal rates of change (from seconds to tens of minutes) of all the important state variables in the IT near 375 km. This investigation is central to understanding the basic physics and chemistry of the upper atmosphere and its interaction with Earth's magnetosphere, but also will produce insights into space weather processes that can inform the development of future operational models. Here we seek short, focused presentations on the needs of the community and how the community can leverage the GDC mission to achieve CEDAR objectives and increase the science return enabled by GDC. Specifically, we seek discussion of how ground-based instrumentation can augment the validation and science of the GDC,

what secondary science questions GDC data can be used to answer (in conjunction with ground-based or other space-based assets) , how the community desires GDC data be organized, utilized and visualized, what GDC can contribute to current models, what lessons have been learned from current and past IT system missions, how commercial data can augment the mission's science return, and other topics closely related to the GDC mission. An important outcome of this workshop could also be stimulating discussion of future proposals to a range of funding sources to enable GDC-adjacent or GDC-enabled science. These could include NSF and NASA funded research and analysis, future ground-based capabilities, modeling capabilities, and proposals for other platforms such as cubesat, rocket, balloon, and ISS payloads and associated measurement campaigns. This effort could also serve to identify future science topics that could be the basis for future suggested focused science topics for NASA R2O2R and LWS TR&T among other programs.

Agenda

CEDAR (CDT/HST) Timeline

15:30/10:30 **GEM Discussion**

30 min - EZIE, TRACERS, AMPERE Next

16:00/11:00 **CEDAR / GEM Joint Workshop**

10 min CEDAR Session-Introduction: Yue Deng

20 min - GDC overview: Doug Rowland

15 min - GDC related Q&A – moderator: Shun-Rong Zhang

10 min GEM Speaker 1: Emma Spanswick "Leveraging GDC overflights over Canada"

5 min GEM Speaker 2: Jo Baker "SuperDARN measurement synergy with GDC"

5 min GEM Speaker 3: Doga "GEM Focus Group input on addressing GDC Science"

10 min CEDAR Speaker 1: Astrid Maute

10 min CEDAR Speaker 2: Phil Erickson

17:30/12:30 **CEDAR Continues/GEM Session Ends**

25 min - Open Discussion: Future GEM/CEDAR GDC Synergy –

moderator: Katie Greer

5 min – Closing Summary: Bishop

18:00/13:00 **CEDAR Session Ends**

Connection Information:
WebEx
More ways to join:
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You can also dial 207.182.190.20 and enter your meeting number.

Comments & Chats
Post in the GDC-Community Slack workspace channel # cedar-gem-2022-gdc-workshop.
The GDC-Community workspace can be found at:
https://join.slack.com/t/gdc-community/shared_invite/zt-1afbt5m7r-FmPZPjoLFrMNkPOQKFXBIw

Justification

The GDC mission is a major effort of the geospace community, which encompasses much of the CEDAR community. While it is still several years from launch, the mission will require significant community involvement in its development to ensure success. NASA has announced an intention to fly another mission with GDC --

DYNAMIC, that will focus on remote sensing of the lower thermosphere forcing that impacts the IT system. This is an extraordinary opportunity for the entire CEDAR community to address outstanding science questions, however, we require the knowledge and expertise of that community to guide the mission and leverage the science data that will be generated by the mission.

Related to CEDAR Science Thrusts:
Explore exchange processes at boundaries and transitions in geospace
Develop observational and instrumentation strategies for geospace system studies
Workshop format
Short Presentations
Keywords
energy deposition, IT science, ground-based instruments, dynamic processes
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