# 2024 Workshop: GDC Mission: Multipoint Observations & Tools

Long title
GDC Mission: Multipoint Observations & Tools
Conveners
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Description

The Geospace Dynamics Constellation (GDC) is a mission to study the coupling between the magnetosphere and the ionosphere/thermosphere system. GDC will address crucial scientific questions pertaining to the dynamic processes active in Earth's upper atmosphere; their local, regional, and global structure; and their role in driving and modifying magnetospheric activity. GDC will be the first mission to address these questions on a global scale due to its use of a constellation of spacecraft (6) that permit simultaneous multi-point observations. In this session we will have a panel describing the mission and Science Traceability Matrix (STM), followed by short presentations geospace multipoint observation analysis techniques, including Observing Systems Simulation Experiments (OSSEs). We are particularly interested to learn about tools for multipoint analysis and tools that still need to be developed. The science area these multipoint analysis techniques will address include:
(1) Understanding how the high-latitude ionosphere-thermosphere system responds to variable solar wind/magnetosphere forcing. This includes plasma motion, particle precipitation, plasma density structures, and electromagnetic drivers.
(2) Understanding how internal processes in the global ionosphere-thermosphere system redistribute mass, momentum, and energy. This includes electromagnetic drivers and ion-neutral coupling in driving plasma density variations at mid- and low latitudes, processes that create and dissipate horizontally propagating ionosphere and thermosphere structures, the connections between winds, temperature, and

major neutral species density variations, and how seasonal variations and asymmetries in Earth's magnetic field and magnetospheric input affect the ionosphere-thermosphere system.

Agenda

| Start | End | Duration | Topic/Speaker | |
|---|---|---|---|---|
| 1600 | 1605 | 5 | Katelynn Greer | Welcome/Intro |
| 1605 | 1625 | 20 | Doug Rowland | GDC Science |
| 1625 | 1640 | 15 | Scott Palo | Sampling, Aliasing and Musings on Multi-Satellite Analysis |
| 1640 | 1655 | 15 | Phil Anderson | Resolving the Temporal Coherence of Auroral Forms and Electrodynamics Using Multiple Spacecraft |
| 1655 | 1705 | 15 | Rebecca Bishop | GDC Visualization Tool: The Atmospheric Data And mission Planning Tool in an Interactive Visualization Environment (ADAPTIVE)”. |
| 1705 | 1720 | 15 | Olga Verkhoglyadova | Multipoint ionospheric profiling with radio occultations: PROFILE instrument on the GDC mission |
| 1720 | 1735 | 15 | Tomoko Matsuo | Geospace data assimilation tools for GDC OSSEs |
| 1735 | 1750 | 15 | Craig Heinselman | GDC & ISR |
| 1750 | 1800 | 10 | Discussion | |

Justification

The GDC mission was recommended by the 2013 Heliophysics Decadal Survey and requires extensive community engagement for its success. This is an opportunity for the community to help craft the ecosystem of science that will be achieved with GDC throughout the geospace system. Given the wealth of observations the CEDAR community works with, there are ample opportunities for collaboration which may lead to insights into coupling of atmospheric regions, coupling of the ionosphere and

thermosphere, wave dynamics, electrodynamics, vertical energy transfers, composition anomalies, and the implied dynamics of the magnetosphere, thermosphere, and ionosphere.

Related to CEDAR Science Thrusts:
Explore exchange processes at boundaries and transitions in geospace
Develop observational and instrumentation strategies for geospace system studies
Manage, mine, and manipulate geoscience/geospace data and models
Workshop format
Short Presentations
Keywords
GDC, OSSEs, multipoint
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