

Geospace Dynamics Constellation: Exploring the heart of space weather

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The Geospace Dynamics Constellation mission—or GDC—is a team of satellites that will study Earth's upper atmosphere and provide the first direct global measurements of our planet's dynamic and complex interface with the space environment. This boundary between Earth's atmosphere and space is called the ionosphere-thermosphere (I-T) system.

This [mission](#) will change our understanding of the structure and behavior of the I-T, specifically how it responds to energy input from the Sun and [space](#) environment above and the lower atmosphere below, and how it internally redistributes this energy on a global basis. The processes and dynamics active in this region are involved in many of the space weather effects we experience on Earth, such as disrupted communications and navigation signals, satellite orbit disruptions, and certain triggered power outages.

Using an array of sensors on each spacecraft, working together to gather comprehensive observations, GDC will explore the fundamental physics of this region, which is driven on all scales from minutes to years by a variety of external factors. The level of detail and resolution provided by this mission will give us an unprecedented understanding of the [space environment](#) surrounding our home planet and will grant us new insights into the fundamental dynamics of planetary atmospheres within the solar system and beyond.

GDC will also provide the first opportunity to study I-T physics on a range of scales from small (similar to thunderstorms), medium (similar to hurricanes), to global scales (similar to jet streams, polar vortices, etc.). The new and comprehensive measurements GDC will provide are critically needed to increase our understanding of the upper [atmosphere](#) and to understand this region as both a collection of distinct parts and a system that acts and reacts as a whole. Ultimately, GDC's science investigation will lead to improvements in our ability to specify and forecast space weather effects on a global basis.

The GDC mission is currently in formulation and NASA has started assembling the GDC science team with the selection of three GDC Interdisciplinary Scientists: Dr. Rebecca Bishop (The Aerospace Corporation), Professor Yue Deng (University of Texas, Arlington), and Professor Jeffrey Thayer (University of Colorado, Boulder). Each leads

teams that will bring their own unique capabilities and contributions to the mission. In early 2022, NASA will select the rest of the science team and the instruments that will fly on the GDC spacecraft.

Provided by NASA

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