

## EXPLORATION IDEA PROFILE: 3D Printed Magnetosphere Model

3D Printing

### EXPLORATION IDEA

This team will explore the use of 3D printing and design on the creative development of a visual-tactile model of Earth's magnetosphere.

The model will consist of key components of the Earth's magnetosphere in a nested removable format.

The design will be customizable by members of the Maker community for multiple applications and increased impact.

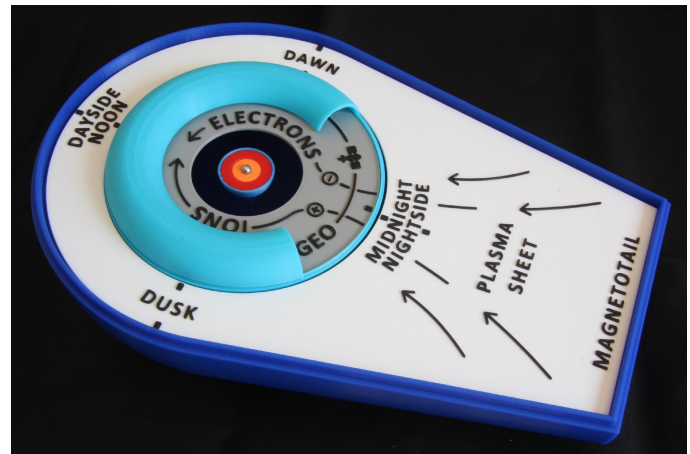
Project files are available [on GitHub](#). Educator Resources are available [here](#). More information is available on the Aurorasaurus [blog](#).

### TARGET AUDIENCE(S)

This project will provide a resource for audiences that include the maker community, educators, students, and science communicators, as well as communities with disabilities and the scientific and heliophysics communities.

### IDENTIFIED NEED(s)

There are currently no 3D touch models of the Earth's magnetosphere. This project provides an important educational resource for those seeking to explain complex heliophysics concepts, while accessibly engaging multiple learning styles.



### RELATED IDEAS/INNOVATIONS

- Modeling other complex atmospheric components
- Modeling other planetary magnetospheres

### MATERIALS/EQUIPMENT

- 3D modeling software
- 3D printer and filament for testing
- 3D slicer software
- optional 4mm bead to represent Earth's core

### EXPLORATION IDEA TEAM

- Team Lead:** Laura Brandt (Aurorasaurus)
- SME Lead:** Elizabeth MacDonald (Aurorasaurus, NASA)
- STEAM Lead:** Lani Sasser (NASA STEAM Innovation Lab)
- Engineer:** Patrick Haas (NASA)
- MMS/EPO Lead:** Leslie Garrison (NASA)
- Affiliated Contributors:** Trae Winter (ARISA Lab)

# 3D Printed Magnetosphere Model

## ***What's the NASA Connection?***

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The project uses tactile technologies like 3D printing to help learners better understand complex heliophysics concepts like the structure of the Earth's magnetosphere and the fact that space is not empty. Other functions could include better contextualizing not only physics concepts, but missions like the NASA Magnetospheric Multiscale Mission (MMS), which is currently exploring magnetic reconnection, one of the mechanisms that cause aurora.

## ***STEAM Subject Matter Targets:***

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### ***Science:***

Structure and physics of Earth's magnetosphere, Earth's structure, plasma physics, aurora physics, MMS mission ties, and interactions between Earth and Sun

### ***Technology:***

Engaging 3D print technology to create a visual-tactile model, creating geometric fits to different printers

### ***Engineering:***

3D printing design, creating visual-tactile representations of intangible structures

### ***Arts:***

Sculptural aspect, appreciation of the artistic structures of nature

### ***Mathematics:***

Geometric solids, understanding models that are not to scale vs. scale of actual structures

***Exploration Idea Profiles*** provide a basic snapshot of an innovative NASA based idea. They are developed through a guided process involving a step-by-step guide/worksheet where participants are invited to consider additional topics that include:

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- Connections to other technologies
- Connections to existing information/research
- Connections to educational standards
- Connections to existing activities/projects
- Universal design
- Next steps

Additional information is also included to assist with further exploration or expansion of the idea in an individualized way.

## ***HOW TO CONNECT***

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