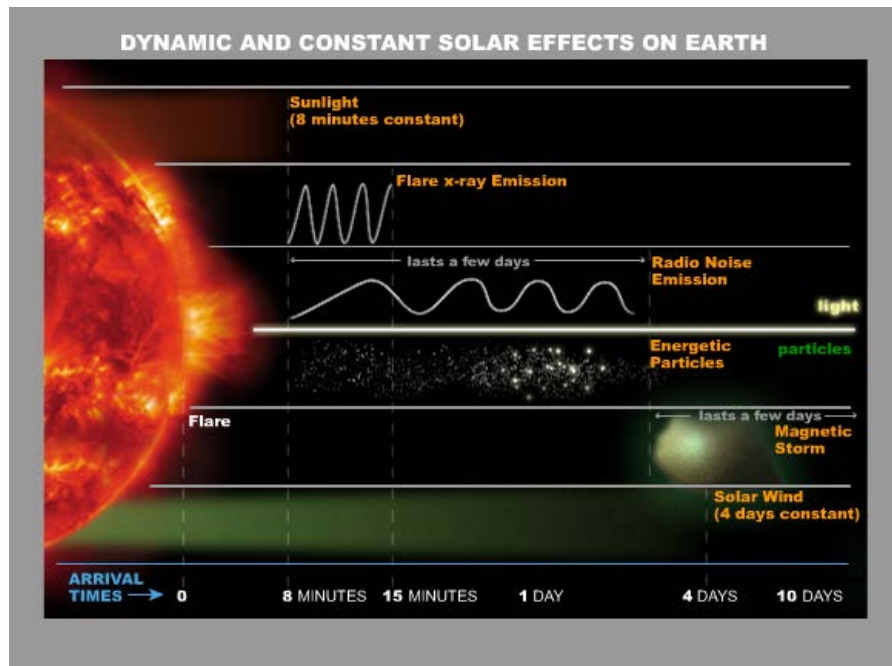


Module 3: How does the Sun affect the Earth?

Activity B: Space Weather

Overview

The Solar Dynamics Observatory (SDO) was launched on February 11, 2010 from Cape Canaveral, Florida. It is the first mission to be launched in NASA's Living With a Star Program, which is designed for research in the causes of solar activity and its impacts on Earth. SDO studies how solar activity is created, how it affects Space Weather, and how it influences life on Earth and the technology we increasingly rely upon. Space Weather can interfere with our power grids, communication and navigation systems on Earth and harm astronauts and satellites in space. If



scientists can learn how to predict when Space Weather events are going to occur, it could help us prevent or lessen the negative effects solar storms have on our technology.

Image: NASA

Camilla Corona is SDO's mascot and your team will assist Camilla in forecasting upcoming Space Weather using current, real-time data and images provided by SDO. Predicting Space Weather is a fairly new science and much is still being learned about how to analyze data from the Sun to accurately forecast Space Weather events. Give it a try, and see how closely your team's Space Weather predictions match actual Space Weather reports!

Team Goal

Your team's goal is to use real-time, online SDO data to forecast upcoming Space Weather conditions and predict the chance of solar storms that may impact Earth.

Materials





- Pencil
- Colored pencils
- Ruler
- 1 piece of legal-size paper or poster paper
- Computer with Internet access
- “The Camilla Space Weather Project” website
- “Space Weather Forecast Submission Form” (online)
- “SDO Solar Storm Prediction” printed data sheet

Engage & Explore!

1. BUILD Knowledge:

Causes of Space Weather

What is Space Weather? Space Weather refers to conditions and processes occurring in space that have the potential to affect Earth, its atmosphere, and our technology. Space Weather is caused by coronal mass ejections (CMEs) and solar flares releasing huge amounts of energy and particles from the Sun, which are carried through space by the solar wind. These massive amounts of solar radiation and particles can cause disruptions in the Earth's magnetic field that affect technology on Earth and in Earth's near-space region.

Space Weather Impacts on Earth

Energy and radiation from the Sun can:

- Create power outages and blackouts if they cause surges in power grids.
- Disrupt our navigation systems (i.e. aircraft, GPS).
- Interfere with communication systems on Earth (i.e. cell phones, ATMs).
- Cause colorful auroras often seen in the polar latitudes (Aurora Borealis in the Northern Hemisphere and Aurora Australis in the Southern Hemisphere).
- Harm astronauts in space (high-energy radiation exposure to x-rays and gamma rays).
- Damage sensitive electronics on orbiting spacecraft (i.e. satellites, space telescopes).

As a team, watch these NOVA and NOAA videos to learn more about the causes and effects of Space Weather:

[Solar Wind and Storms Video](#)

[The Threat to Earth Video](#)

[NOAA Space Weather Videos](#)

Now, navigate to “The Camilla Space Weather Project” homepage to learn more about Space Weather and how SDO is playing a role in predicting solar storms:

[The Camilla Space Weather Project](#)



2. APPLY Learning:

Space Weather Concept Map

Next, with your student-scientist team, review the following two NOAA Space Weather Prediction Center resources (scroll down to the “Space Weather Information” section) and create a concept map to illustrate the causes and effects of Space Weather. This concept map is another artifact for your Module 4 SDO Exploration Museum 3-D Solar Exhibit.

[NOAA Space Weather Poster & Booklet](#)



3. DEMONSTRATE Ability:

SDO Solar Storm Prediction

From “The Camilla Space Weather Project” website homepage, click on the “Forecast” tab and complete the online “Space Weather Forecast Submission Form”. Also, fill out the “SDO Solar Storm Prediction” data sheet to keep a written documentation of your team’s forecast to use in your Module 4 Living Museum & 3-D Solar Exhibit. Your team will use real-time SDO data to identify and analyze solar features to predict the chance that a Space Weather event will occur in the next 24 hours. Your team’s Space Weather forecast will be included in the Module 4 SDO Exploration Museum 3-D Solar Exhibit.

[The Camilla Space Weather Forecast](#)

Fantastic forecasting, the outlook is sunny with the chance of a solar storm!