

Caught in the Solar Wind: A Study of Space Weather and its Influence on Earth

Unit Objectives:

In designing this unit, we have tried to keep the following goals in mind at all times. We wanted to create activities that were:

- challenging
- practical
- inquiry based
- hands-on
- easy to prep
- related to current events
- applicable to a variety of science courses
- accessible to a variety of grade levels
- FUN

We realize that most teachers will not have the time to tackle all of these activities as a complete unit, but hope that if you have success with a few, you'll come back for more. While all the lessons apply to the Massachusetts Frameworks and National Science Education Standards, we all have a lot of material to cover, and chances are, you will need to move on to new topics long before you've finished the unit. In a perfect world, you could easily spend three weeks on this unit. If you only had a week, consider these activities first:

- Who Dunit? A Solar Mystery
- All or part of PowerPoint 1
- Journey from the Sun
- Graphing Sunspots
- Coronagraph
- Ionosphere Scale Drawing
- Aurora in Your Backyard
- Spaceweather.com Web Quest
- Space Weather Forecasting

Before teaching about space weather, it will be helpful to review your understanding of the general behavior of the Sun. Even if you don't have time to show the first PowerPoint to your classes, take some time to scan through it for background information. Two books that we found especially helpful were:

The 23rd Cycle: Learning to Live with a Stormy Star by Sten Odenwald
Storms from the Sun by Michael Carlowicz and Ramon Lopez.

They are easy reads and give a great deal of background. The PowerPoints and many of the activities come with teacher sheets which provide detailed background information to help you prep.

The unit requires little special equipment or materials, although access to a Sunspotter Telescope would enhance the students' interest in the sun. If you can acquire a copy of the video *Perfect Disasters: Solar Storm* by the Discovery Channel (www.discovery.com), it is a great interest-building introduction to the unit. Every earth science teacher should also have a copy of the music CD *AstroCapella* by The Chromatics (available through Amazon). As always, availability of a computer lab with Internet access will be important. However, there are many activities that can be done without computers at all. Our PowerPoint slides have been designed to be easily reproducible as overhead transparencies.

Please feel free to use any of our documents as you wish. You may want to change directions, questions or format of any of the activities, PowerPoints, etc. Do whatever you think might make the activities work for you.

The target audience of this unit can vary depending on some adjustments. We see much of this material working well with 8th and 9th grade Earth Science or General Science students. A few activities are better suited for 11th or 12 grade physics students. This unit would also fit nicely in an astronomy course, where more time might be available without having to worry about frameworks.

We are excited to hear feedback from anyone who has tried any part of this unit, and hope you'll take a moment to drop us a quick email with comments and/or questions. We think the final project has the potential to be a great learning experience for the students and a highlight of the course. If you can find a way to make time for it, let us know how it went. We'd love to see some examples of student work. Any ideas on the unit would be greatly appreciated. You can reach us by emailing

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