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### **Blizzards, Nor'easters, Cold Waves, Heat Waves, and Space Weather**

The National Weather Service focuses considerable attention on helping people everywhere become a "Weather-Ready Nation" (WRN). Their website can give you and your students much information and help them develop preparedness plans that can be of great help to your community [http://www.nws.noaa.gov/com/weatherreadynation/winter\\_safety.html](http://www.nws.noaa.gov/com/weatherreadynation/winter_safety.html).

In this lesson, we will look at some of the most severe types of weather hazards.

#### **Blizzards and Nor'easters**

"Exciting weather" sometimes doesn't come close to describing blizzard conditions. Strong winds and deep snow, often piled in huge drifts, can shut down an area for days or even weeks. Whether or not they meet the criteria to be called "blizzards," winter storms are one of the most serious threats to life and safety.

The NWS explains:

Winter storms can bring snow, sleet and freezing rain across the entire United States and its territories. Even Hawaii gets snow in its Big Island, and major cities as far south as Atlanta and Dallas have been paralyzed by snow and ice. Blizzards occur when strong wind causes blowing snow and whiteout conditions, making roads impassable. Thousands of people are injured or killed every year in traffic accidents related to slippery roads from winter storms.

(Source: <http://www.nws.noaa.gov/os/winter/>)

To qualify as a "blizzard," the storm must pack sustained winds or frequent gusts in excess of 35 mph, with snow or blowing snow that frequently reduces visibility to less than ¼-mile for 3 hours or more. Related winter storm conditions include "Blowing Snow," "Snow Squalls," "Snow Showers," "Flurries," and in mountainous areas, "Avalanches."

Closely related to blizzards are "Nor'easters": large low-pressure storm systems along the East Coast in which winds are typical from the northeast. They usually develop between Georgia and New Jersey within 100 miles of the shoreline, and progress northeastward. They obtain maximum intensity near New England the Maritime Provinces. But they have produced billions of dollars in damages over much of the I-95 Corridor between Washington DC and Boston. Coastal areas can sustain severe erosion and other impacts.

With modern forecasting technologies, such as satellites and radar, it is no longer possible for a community to be caught unawares, as was once the case. Sometimes problems result from the fact that, on occasion, a blizzard can follow several days of unexpectedly warm weather that causes people to let their guard down. The famous "Blizzard of 1888" which brought great destruction to New York City and elsewhere happened in mid-March, a few days after flowers started to bloom. Blizzards often not only pack gusts of near-hurricane force and leave deep snow, but usher in several days of extreme cold so that even modern snow-removal equipment cannot handle the results. People cause in vehicles or forced to walk outside are at risk of frostbite or hypothermia.

Go to [http://www.nws.noaa.gov/os/winter/ground\\_blizzard.shtml](http://www.nws.noaa.gov/os/winter/ground_blizzard.shtml) and explore the resources found here.

**Which of these have affected your region?**

**What are the meanings of winter storm “advisories,” “watches,” and “warnings”?**

**What strategies would you use to teach your students how to prepare for:**

**Before a storm arrives?**

**During a storm?**

**After a storm?**

### **Cold Waves and Heat Waves**

Even in the absence of precipitation, severe weather can pose great threats to human health. Prolonged periods of extreme low or high temperatures may occur in your area, and so you need to help your students know what to do.

You can find much information at: <http://www.nws.noaa.gov/os/cold/index.shtml>.

**Describe how you could incorporate this into your lessons.**

**What strategies should you use to teach your students about the “Wind Chill Index” and ways to prepare for dangerous conditions?**

**What is the “Polar Vortex”? How should you help your students to understand its effects?**

Many parts of New York State have experienced cold waves. Here is a link to climatological data for the Albany area: <http://www.weather.gov/media/aly/Climate/coldwaves.pdf>. Perhaps you should try to locate similar information about cold waves in your region.

At the other extreme, heat waves also pose a severe threat to the health of local populations. The dangers from long periods of high temperature not only threaten people who have to work or play outdoors, but also affect riders in cars and even those inside buildings, especially where no air conditioning is available.

You can find much information at: <http://www.nws.noaa.gov/os/heat/index.shtml>.

**Describe how you could incorporate this into your lessons.**

Because children and others love to be outside during fair weather, even when temperatures become excessive, it is vital that you teach them about the dangers of **ultraviolet radiation**.

**Examine information at <http://www.nws.noaa.gov/os/heat/uv.shtml> or other sources. Describe how you could incorporate this into your lessons.**

### **Space Weather**

We all know that the ultimate source of energy for Earth comes from the Sun, and that weather is basically a 'huge energy transfer machine.' But it has only been in recent years that we have begun to grasp the impact which slight changes in solar output can have on weather patterns. The scientists and engineers focused on these call them "Space Weather."

You may already be familiar with some space weather phenomena. These include the Aurora borealis or northern lights, sunspot cycles, and coronal mass ejections. Of course, you and your students may be thinking, "How can any of this affect me?"

One good source of information about these and other effects is the NOAA Space Weather Prediction Center, <http://www.swpc.noaa.gov/>.

**Examine information available through this website and describe some strategies to incorporate it into your lessons.**

**Explain dangers of space weather for passengers and crew in commercial aircraft. How might you get students to create presentations about these and other space weather phenomena?**

NASA also monitors space weather, especially with its orbiting SOHO (Solar and Heliospheric Observatory)

**Examine information at <http://soho.nascom.nasa.gov/spaceweather/> or other sources. Describe how you could incorporate this into your lessons.**

Another source of information about space weather is <http://spaceweather.com/>.  
**Describe how you could incorporate this into your lessons.**

In 2010, NASA has launched the Solar Dynamics Observatory <http://sdo.gsfc.nasa.gov/>. This is the first mission for NASA's Living with a Star Program. It is designed to understand causes of solar variability and impacts on Earth. SDO studies the Sun's influence on Earth and Near-Earth space by studying the solar atmosphere on small scales of space and time, using many wavelengths simultaneously.

**Examine this website and describe ways to incorporate it into your lessons.**

**Enrichment:**

Windows to the Universe (<https://www.windows2universe.org/>) provides many useful resources about space weather which you can find through a search of the website.

Teachers from NESTA cooperated with the NBC Learn series, "When Nature Strikes," to create a module about Space Weather.

**Examine resources at**

[https://www.windows2universe.org/earth/natural\\_hazards/space\\_weather.html](https://www.windows2universe.org/earth/natural_hazards/space_weather.html) .

**How might you use these in your course?**