Using This Flip Chart

Solar storms can cause fluctuations in the magnetosphere called magnetic storms. These magnetic storms have disabled satellites and burned out transformers shutting down power grids. By following the steps in this flip chart you will soon be able to answer the big question, "***Has there been a measurable disturbance in Earth's magnetic field?"***

In the flipchart you will find **INSTRUCTION CARDS** followed by **INF0RMATION CARDS**.

- **INSTRUCTION CARDS** contain every step necessary to obtain, analyze and record all required online data.

- **INFORMATION CARDS** contain a variety of sample images and helpful tips when interpreting and analyzing the data.

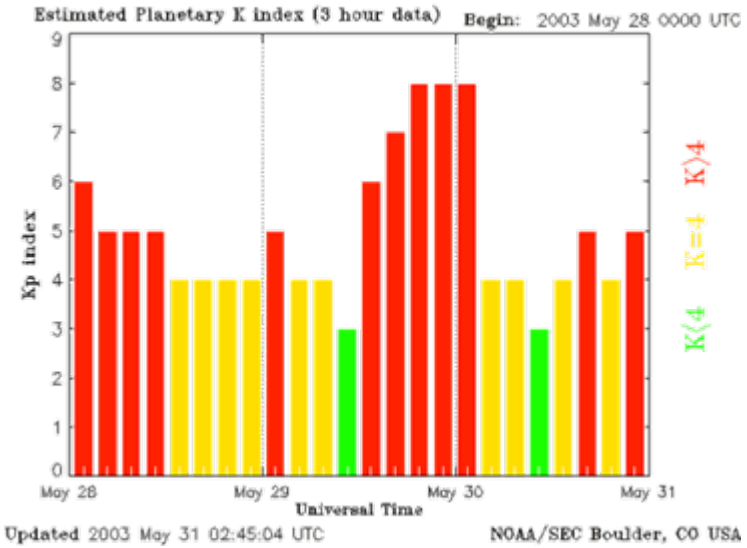
Don't forget to keep your **Data Collection Sheets** nearby in order to collect all of the information you will need to complete your Space Weather News Report!

Live Data and Tutorials
http://son.nasa.gov/tass/tools.htm

KP Index (Estimated Planetary K-index)

1. Open http://son.nasa.gov/tass/tools.htm and click on "**Kp Index"** (live data). A web page containing a bar graph called the "Estimated Planetary K-index (3-hour data)" will appear. Observe the graph for any deviations. (K-indices of 5 or higher indicate 'storm-level' geomagnetic activity. Values of 7 or higher indicate a severe geomagnetic storm.)
2. Refer to your 'Magnetosphere Data Collection' sheet to answer questions **(a)** through **(d).**
3. Close the current window and return to http://son.nasa.gov/tass/tools.htm .

Kp Index (Estimated Planetary K-index)



ANALYSIS TIPS:

The Kp index can be used to predict where you might see an aurora. The higher the Kp number the stronger the disturbance. A large disturbance in Earth's magnetic field is likely to produce strong aurora that extend further toward the equator.

The bars are green when the Kp is less than 4, yellow when the Kp equals 4, and red when the Kp is greater than 4. The red bars indicate a storm warning.

ABOUT THE DATA:

This bar graph contains the estimated 3-hour planetary K-index. It is derived at the U.S. Air Force Space Forecast Center using data from 10 ground-based magnetometers at:

- **Meanook, Canada**
- **Sitka, Alaska**
- **Glenlea, Canada**
- **Saint Johns, Canada**
- **Ottawa, Canada**
- **Newport, Washington**
- **Fredericksburg, Virginia**
- **Boulder, Colorado**
- **Fresno, California**

The values of the K-index are monitored minute by minute with alerts going out when levels reach 6, 7, and 8.

FACT:

Geomagnetic storms have been associated with satellite surface charging and increased atmospheric drag.

Live Data and Tutorials
http://son.nasa.gov/tass/tools.htm

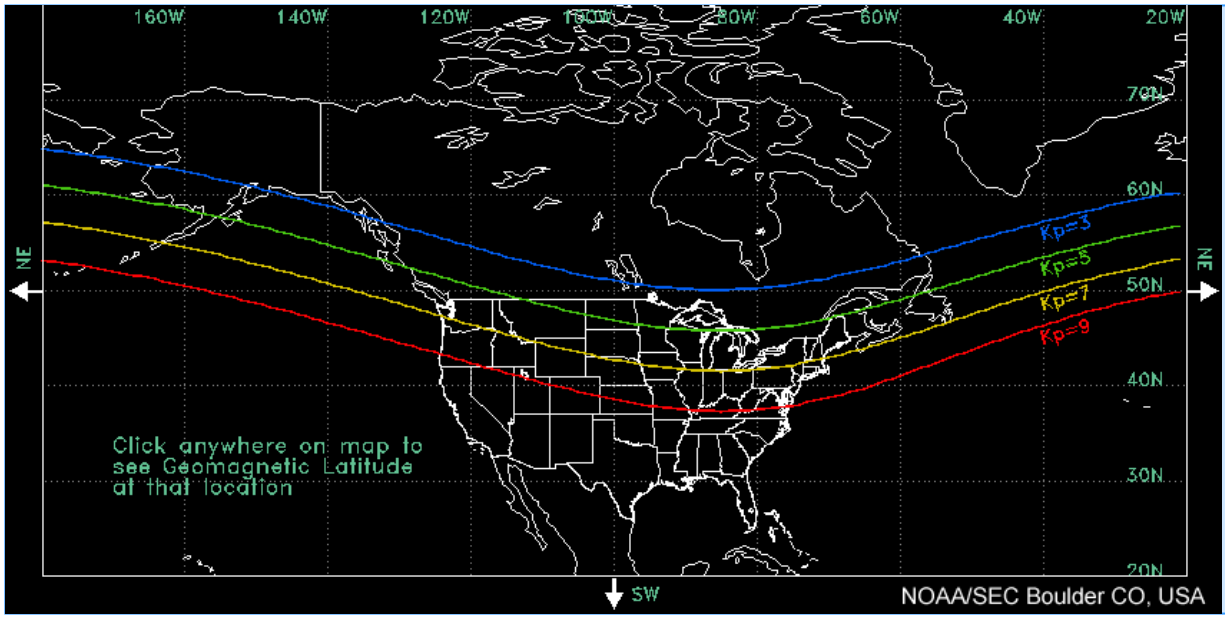
Kp Auroral Map

1. Open http://son.nasa.gov/tass/tools.htm and click on “**Kp Auroral Map”** (live data).
2. Click anywhere on the map to determine the geographic latitude, longitude and corrected geomagnetic latitude for your area.
3. Refer to your ‘Magnetosphere Data Collection’ sheet to answer questions **(e)** through **(g).**
4. Close the current window and return to http://son.nasa.gov/tass/tools.htm .

Kp Auroral Map

ABOUT THE DATA:

The Kp map shows the connection between the Kp index and the predicted southern edge of the aurora in North America. With a Kp of 5, auroras can be expected south to the green line. With a Kp of 9, auroras can be expected south to the red line.



NAVIGATION TIPS:

You can click on any location on the map and automatically find the longitude and latitude.

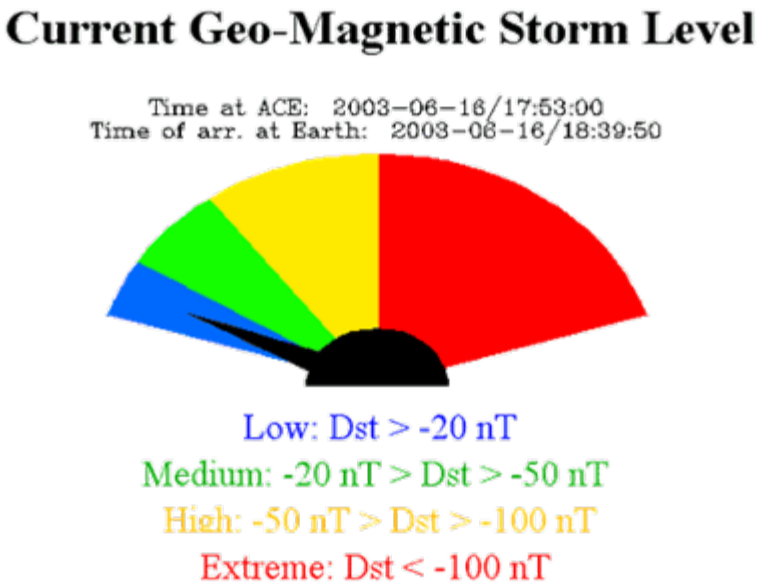
Based on the data from the Kp Index, you can use this map to determine where aurora can be seen.

Live Data and Tutorials
http://son.nasa.gov/tass/tools.htm

Dst Graph (Disturbance storm-time)

1. Open http://son.nasa.gov/tass/tools.htm and click on “**Dst Graph”** (live data). This data is provided in a simple 'dial' format and indicates the intensity of a storm.
2. Refer to your ‘Magnetosphere Data Collection’ sheet to answer questions **(h)** through **(j)** and the **(Comprehension Question).**
3. Close the current window and return to http://son.nasa.gov/tass/tools.htm .

Dst Graph (Disturbance storm-time)



ANALYSIS TIP:
The colors of the Kp, map and Dst are not correlated. Remember to use the numbers when you are determining the strength of the storm and the location prediction for aurora sightings.

ABOUT THE DATA:
This is a tool to characterize the strength of the magnetic field disturbance. Like the Kp graph, it is very easy to read and scientists have interpreted data from the ACE satellite for you.

The ACE satellite is positioned about 1 million miles from Earth, and is always directly between Earth and the Sun. The data includes the time the disturbance arrives at ACE and the time it will arrive at Earth (usually a 30 to 45 minute warning).

Live Data and Tutorials
http://son.nasa.gov/tass/tools.htm