

# XVIII...Magnetic Storms and Solar Activity

## Procedure:

1) Return to the Kp archive at NOAA and select 6 months during sunspot maximum conditions in the year 2000, and 6 months during sunspot minimum conditions in the year 1996. These can be found at:

2000-Present:

<http://www.sec.noaa.gov/ftpmenu/plots/kp.html>

1996:

[http://www.sec.noaa.gov/ftpmenu/plots/1996\\_plots/kp.html](http://www.sec.noaa.gov/ftpmenu/plots/1996_plots/kp.html)

2) Carry out the same counting and bar graphing procedure as you did in the previous activity, keeping the data separate for solar minimum and solar maximum.

3) Construct one bar graph of the Kp value and frequency for the solar minimum data, and one for the solar maximum data.

4) Answer the accompanying questions.

## Questions:

1) Does the level of solar activity have any impact on how frequent magnetic storms are in the Kp rankings from 1-9?

2) How long would you have to wait, on average, for a magnetic storm with a Kp of 8 during solar maximum? During solar minimum?

3) What is the typical level of magnetic activity during solar maximum? During solar minimum? Can you explain what might be happening to cause this?

For the months of November, 2000 and November 1996 the following counts of instances were identified:

November, 1996	
Kp.....	Number
9.....	0
8.....	0
7.....	0
6.....	15
5.....	11
4.....	26

November, 2000	
Kp.....	Number
9.....	0
8.....	0
7.....	0
6.....	0
5.....	0
4.....	11

## Extensions:

1) It is also possible to include counts for the Kp values of 1,2 and 3. This will be more tedious so students can each be individually assigned a month to process and the results for 12 students can be combined to get a full years statistics in 1996 and in 2000.

2) Students can also record the number of days in which Kp exceeded each of the values and compare the number of 'storm days' at various parts of the sunspot cycle. Generally there is more activity around March and September. The students monthly-averaged bar charts may show this effect.

## More about Kp:

Geomagnetic disturbances can be monitored by ground-based magnetic observatories recording the three magnetic field components. The global Kp index is obtained as the mean value of the disturbance levels in the two horizontal field components, observed at 13 selected, subauroral stations. The name Kp originates from "planetarische Kennziffer" (= planetary index). Kp was introduced as a magnetic index by Bartels in 1949 and has been derived since then at the Institut für Geophysik of Göttingen University, Germany.

Here is what the Kp index actually looks like: **00, 0+, 1-, 10, 1+, 2-, 20, 2+, ... , 80, 8+, 9-, 90**

