Teacher's Guide

Sunspot Activity and Ocean Temperature

Introduction

Scientists have found there is a possible correlation between the average ocean temperature and solar sunspot activity. By comparing the results from data that has been collected since the 1800's to the present, scientists have found a possible pattern. For example, there are many instances when the average ocean surface temperature and the sunspot activity were at a high or low at about the same time. The source of the controversy is that there are also times in which a correlation is not seen in the data.

Objective

Students will analyze and compare two graphs to determine if there is a correlation between solar activity and ocean temperature.

Procedure

1) Group students into either pairs or teams of four. Read the introduction to the students concerning the controversy.
2) Review with the students an example of how the graphs may be similar and different. Be sure to mention shape, distribution, highs, lows, scale, axis and time frame.
3) Provide students with sufficient time to compare the two graphs. A transparency used as an overlay may be useful for some students.
4) Have the groups present their findings to the class. Some of the groups will argue that the highs and lows of the ocean temperature correlate to the sunspot cycle. Other groups may not see a relationship, and still others ma say that there is a relationship in some areas but not in others which leads to incomplete conclusions. This is precisely why the controversy exists.

Note: The start date for each graph is not the same year. Students will need to locate the appropriate year to begin the comparison. The temperature plots show the deviations in the number of degrees from an average global ocean temperature, so that -0.5 degrees means '0.5 C below the average' ocean temperature. You should also mention other factors that could alter the correlation such as El Nino events. **Be sure to mention this to the students.**

Materials

—Student Worksheet

Note: The ocean temperature data are based on over 80 million measurements made by hundreds of ships that, every hour, dumped a bucket overboard to collect sea water.

Conclusion

Explain that the relationship between the sunspot cycle and the ocean temperature has not been proven or disproven. However, there seems to be a grudging consensus that there is something going on between the two.

Key Terminology:

Sunspot: A dark spot on the Sun's surface indicating intense magnetic activity and solar storms.

Sunspot Cycle: The change in the rise and fall of sunspot numbers over a roughly 11-year cycle for our Sun. Other stars can have different cycle lengths.

Student Worksheet