Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
2005 Volume IV: The Sun and Its Effects on Earth

Introduction

The Sun holds a unique place for life on Earth. Without light and warmth from the Sun, life on earth as we know it would not exist. Our increasing dependence on technology also makes us more vulnerable to some of the extreme phenomena that occur in the Sun. The solar magnetic cycle (also called the solar activity cycle, or simply the solar cycle) causes the properties of the Sun to vary over an eleven year cycle. The most dramatic results of this variation are giant solar flares that occur around maximum activity. These flares can cause magnetic storms which can overload power-lines and disrupt communication satellites. There are more subtle effects too which are equally important, if less dramatic, such as the change in the amount of solar energy received on earth and how this affects climatic conditions.

In this seminar we examined the Sun, and the Sun-Earth connection. We looked at the astronomy of the Sun- the structure of the current Sun and how it will evolve and die. We looked at our place in the solar system and the constituents of the solar system. And we spent considerable time examining the Sun-Earth connection, such as the Sun as a driver of weather on Earth. We also dealt with topics related to global warming.

The curriculum units developed as a result of this seminar reflect the range of subjects dealt with at the seminar. The units are arranged roughly according to subject. The first unit, that by Michael Harris, deals with the birth, evolution and death of the Sun. It introduces students to the concept of a changing Sun, which in about five billion years will die, and in the process of dying engulf many of the planets of the solar system.

The next three units deal with the Sun and the solar system. Diane Huot's unit introduces elementary school students to the solar system and the position of the Earth in it, while Waltrina Kirkland-Mullins has developed a detailed introduction to the astronomy of the Sun for elementary school students in a delightful question-and-answer format. Both these units utilize stories and folklore to get children interested in the subject. Many interesting projects are described than can be used not just in elementary school students, but at higher grades, too. And because hands-on activities interest students of all ages, Raymond Brooks has developed a unit that deals exclusively with projects middle school students can do for Science Fairs.

The next three units in this volume, those by Roberta Mazzucco, Marisa Ferrarese and Michele Murzak, deal with Sun as well as the effects of Sun on Earth. They discuss the Sun-Earth connection in terms that students can understand.

The last set of three units deal with concepts of weather and climate. There are two units that deal with the concept of global warming. Crystal Lavoie writes about the greenhouse effect that is believed to be one of the main reasons for global warming. The unit describes experiments that can help students understand the concepts involved.Carolyn Kinder approaches this topic from a different point of view and discusses evidence

for and against a human cause for global warming. The last unit, by Chris Willems, describes the drivers of weather and among other factors, how uneven heating due to the Sun determines our climate.

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