



Introduction

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We live in a star's backyard. This star has eight planets revolving around it, it has myriad dwarf planets, and comets and other objects that it holds together with its gravity. This star gives us warmth and light and is responsible for life on Earth. Thus, among all the stars, it holds a unique position in our lives. This star is the Sun. The Sun has been worshipped and venerated as the giver of light and life, long before it was recognized as an ordinary, low-mass star around which we revolve. However, the Sun can have an adverse effect on technology. The magnetic regions on the Sun can emit an immense amount of radiation and magnetized plasma that can interact with the Earth's magnetosphere and cause geomagnetic storms. Such "space weather" events can potentially cause billions of dollars of damage.

This seminar covered a wide range of topics. We discussed the science of the Sun and space weather. We learned about other stars and examined how the properties of stars are determined. We discussed the solar system but did not limit ourselves to that $\frac{3}{4}$ we also looked at how exoplanetary systems are observed and what would make them habitable. We also touched upon astrobiology and tried to imagine what life on a different planetary system could look like. Closer to home, we examined seasons, climate and climate change. We also examined how solar energy can be used to power homes.

The seminar has led to the creation of ten excellent curriculum units for grade levels that range from kindergarten to high school. Perhaps what is even more interesting is that not all units are from science teachers; we have one unit from an art teacher, one from a social science teacher and one from a biology teacher $\frac{3}{4}$ testaments to the fact that the Sun is not merely an astronomical object of scientific curiosity, but an object that has inspired art, plays a big role in society and is crucial for life.

The units in this volume are organized by grade level. We start with the unit written by Joseph Parrett for his kindergarten class with his imaginative use of Superman to explain that different colors of light have different levels of energy; the unit introduces students to basic facts about the Sun, stories about the Sun and seasons. Next is Martine Devine's unit to introduce her 2nd graders to the solar system using poems she has written herself and an imaginative board game. Both Alexandra Wagner and Jason Ward tackle seasons and climate in units for the 3rd grade. The former is about how the Sun causes seasons and how the changing configuration of the Earth-Sun system can change climate; she also focuses specifically on what a change in the climate of the Great Lakes region, where her school is based, will do to that region. Jason Ward's unit uses an unusual hailstorm in Guadalajara to explain concepts of weather. Elizabeth Isaac's 3rd -grade unit takes us into traditional life in the Navajo Nation and the role the Sun plays in the culture, and how solar energy can be

useful there. Taryn Coullier, who usually teaches social studies, found the subject matter fascinating enough to prepare a unit for the 4th grade in which she talks about the life-cycle of stars; this unit can be easily modified for other grades. And then we have Tina Berry, an art teacher, who was fascinated enough about the Sun and solar mythology to create a unit to teach art while teaching both the science and mythology of the Sun. She also makes a foray into exoplanetary systems so that her students can imagine life on very different kinds of planets around different kinds of stars. Although the unit is directed towards 6th graders, it can be used at upper levels too. Next is the set of three units written specifically for high-school students. Joanna Minott's unit introduces students to spectroscopy and how spectroscopy is used to determine what stars are made of. Zachary Meyers uses the example of the Sun to teach electromagnetic radiation and its properties; he also discusses appliances that use or capture electromagnetic radiation. The last unit, by Christopher Sikich, is a unit for biology classes that traces the journey of a photon (a bundle of electromagnetic energy) from the core of the Sun to its absorption by a leaf to get the energy for photosynthesis. This unit goes further and delves into astrobiology and how to examine whether a planet can support life as we know it.

The units cover a wide range of subjects, and each unit is versatile enough that it can be modified to suit other grade levels. I hope that these will be useful to a much larger group of teachers and not just the ten in the seminar.

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