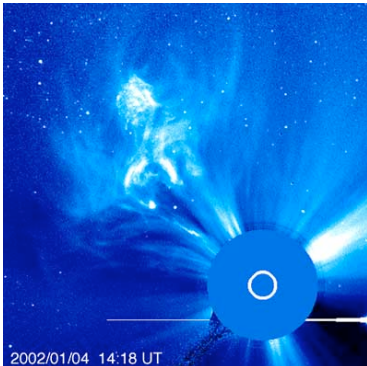


Introduction



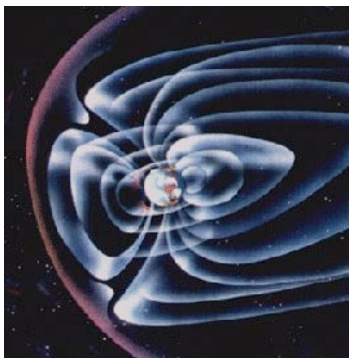
We live next to a very stormy star, the Sun, but you would hardly notice anything unusual most of the time. Its constant sunshine hides spectacular changes. But unless you lived in the Arctic and Antarctic regions of Earth, you would have no clue. Only the dazzling glow of the Northern Lights suggests that invisible forces are clashing in space. These forces may cause all kinds of problems for us, and our expensive technology (Activity 1). It doesn't take long for a 'solar storm' to get here, either. Once they arrive, that change Earth's magnetic field (Activity 2), and these lead to the displays of the aurora which humans have marveled at for thousands of years. Aurora light up the sky with billions of watts of power (Activity 3) and cover millions of square kilometers (Activity 4). Why does all this happen? (Photo- Auroral curtain by Jan Curtis)

Space Weather



It has to do with Earth's magnetic field and how it is disturbed by solar storms and the solar wind. The wind carries its own magnetic field with it (Activity 5), and travels at speeds of millions of kilometers per hour (Activity 6). Scientists keep track of this interplanetary storminess using numbers that follow its ups and downs (Activity 7) just like meteorologists follow a storm's speed, pressure and humidity. Periods of increased and decreased solar activity (Activity 8) come and go every 11 years. Solar flares also have their own story to tell (Activity 9) just like flashes of lightning in a bad storm. (Photo - Coronal Mass Ejection seen by SOHO satellite)

Models and Forecasting



Scientists have to keep track of many different kinds of phenomena in the universe, both big and small. That's why they have invented a way to write very big and very small numbers using 'scientific notation (Activity 10, 11, 12). They also have to master how to think in three-dimensions (Activity 13) and how to use mathematical models (Activity 14). Once they find the right models, they can use them to make better predictions (Activity 15) of when the next solar storm will arrive here at Earth, and what it will do when it gets here! (Sketch of Earth's magnetic field)