ne Extremes of Space Weather

discoveries. Many of Dr. Van Allen's students are still working in the field, carrying on and building on that first discovery as well as teaching and mentoring new scientists in the field of heliophysics (the exploration of the sun and its impacts on Earth and the planets of the solar system). To read more about Dr. Van Allen, see ***http://vanallenprobes.jhuapl.edu/science/overview.php***.

Why does the Van Allen Probes mission need two identical spacecraft?

Only with identical instruments on two spacecraft, with one following after the other in nearly the same path, can we measure changes in the radiation belts over both space and time. For example, imagine that a probe detects an increase in radiation at point A. A minute later, it flies through point B and detects a similar increase in radiation. Without a second probe, it wouldn't be possible to determine whether the change was happening across the entire area or whether the location of the increased radiation had shifted from point A to B.

Are the radiation belts actually brightly colored like they are in pictures?

Often scientists use colors to depict conditions in a way that appears different from the way an object or space actually appears visually. They use these models or animations so that people can easily gain information. In reality, if you were to stand in the middle of the radiation belts, you wouldn't be able to see them at all! In the picture on the front of this poster, red indicates areas where there are a lot of high-energy particles, yellow indicates areas that are a little less intense, and green and blue indicate areas with the least amount of radiation.

If the particles are invisible, how do we know they are there?

Even when we can't see something, we can detect it's there by using other senses or tools. Think about a time you have investigated magnetism. You can't see a magnetic force, but you can detect it when you use a tool such as a magnet or a compass. Each probe will carry five suites of instruments onboard that will measure particle numbers, type, speed, direction, and energy, as well as electric and magnetic fields and waves. The instrument suites are called: Energetic Particle, Composition, and Thermal Plasma Suite (ECT), Electric and Magnetic Field Instrument Suite and Integrated Science (EMFISIS), Electric Field and Waves Suite (EFW), Radiation Belt Storm Probes Ion Composition Experiment (RBSPICE), and Relativistic Proton Spectrometer (RPS). By putting together all the data that each of the instruments gather, we will be able to better understand this mysterious region.

Teamwork

Teamwork is important! Scientists and engineers from many universities and organizations have come together as a team to make this mission a success. The Johns Hopkins University Applied Physics Laboratory built and operates Van Allen Probes for NASA's Living With a Star Program, which is managed by NASA Goddard Space Flight Center. The instruments were provided by teams of people from all over the United States that are managed by the University of New Hampshire, The University of Iowa, the University of Minnesota, the New Jersey Institute of Technology, and the National Reconnaissance Office. More information can be found about the spacecraft, the instruments, and the teams of people that work on the mission on the websites listed in the resource toolbox.

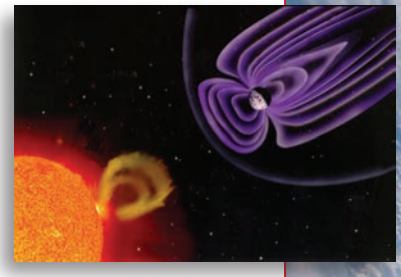

Image credit: NASA. The source of space weather, our dynamic sun, shown with a coronal mass ejection that will interact with the terrestrial magnetosphere, producing geospace storms.

Image credit: JHU/APL. The identical Van Allen Probes will follow similar orbits that will take them through both the inner and outer radiation belts. The highly elliptical orbits range from a minimum altitude of approximately 373 miles (600 kilometers) to a maximum altitude of approximately 23,000 miles (37,000 kilometers).