

Sun-Earth Day Mission Highlights:

Introduction to IBEX!

[Opening Sound Clip]

[Troy Cline]

Although our technologies have changed over time, our goal **to understand the Sun**...remains the same.

[Sound clip]

My name is Troy Cline and welcome to Sun-Earth Day 2011: Ancient Mysteries-Future Discoveries. This new theme opens the door to a variety of topics ranging from ancient solar sites and discoveries to current and future discoveries. Many of these new discoveries involve NASA missions that, when combined, tell an even greater story of our dynamic solar environment. So...throughout the 2011 we'll share information about ancient *solar* sites as well as numerous interviews with people who are directly involved with current and future NASA missions.

Today's Sun-Earth Day podcast is about something very very large – the whole of the solar system. The solar system spreads far beyond the last planet or comets that circle the sun -- it only stops when it bumps into material streaming from other stars out there, stuff that's known as the galactic medium.

In today's podcast we'll hear from 2 NASA scientists who work directly with a spacecraft called IBEX, or the Interstellar Boundary Explorer. You can look forward to several more podcast on this mission throughout the year. To give us a brief introduction to this series is Eric Christian, the IBEX Deputy Mission Scientist at the Goddard Space Flight Center.

[Eric's intro]I'm Dr. Eric Christian and this is the first of several podcasts on the Interstellar Boundary Explorer, IBEX mission. IBEX is a small satellite, about the size of a card table that is in Earth orbit, but a very elliptical orbit that extends all the way out to the moon, so it can get out beyond the Earth's magnetosphere. From this position it takes pictures of the edge of our solar system. Not with light but with a special particle called an energetic neutral atom. An energetic neutral atom is a very fast moving ion that grabs electrons from the solar wind and then it becomes neutral. When it is ionized it spirals on the magnetic field lines and it is reflected all over the place, once it collects the electron becomes neutral it travels straight, just like a photon, by collecting them we can make a picture using the light of the photons.

[Troy Cline] So let's get started with our first IBEX interview. Today we talk to Nathan Schwadron who is in charge of research from IBEX. This spacecraft studies the very edges of our solar system and a magnetic field that surrounds us called the heliosphere.

Nathan: Helios is a Greek term which means the sun. Sphere is a sphere, so if you think about it, it is a sphere that surrounds our entire sun. Now the sphere surrounds not only our sun but it surrounds all the planets, a very large sphere, and it turns it is not a sphere at all, it is actually a very complex shape that surrounds all of these structures. Now currently we don't really know what that structure really is, what that boundary is that surrounds our solar system. We are learning more about them every day. The Voyager satellite that was launched many years ago, back in the 70's, managed to cross those boundaries. Both Voyager 1 and Voyager 2 crossed those boundaries and they detected the local properties. IBEX is imaging those global boundaries. Now for the first time we are able to provide images and ultimately infer what those structures really look like. And so our Heliosphere is the domain that separates our solar system from the local galactic environment. For the first time through IBEX we are able to image it.

When we think about our solar system it is easy to imagine it as empty space. In fact it is not empty space. The environment of our solar system, the environment between the planets is actually an atmosphere that is continually released continually by the sun. Our sun is so hot that it pumps out a very fast, what we call supersonic solar wind. The solar wind blows out from the sun and into the galaxy. Now it doesn't just continue to expand just like there is material between the planets there is a medium that exists in the galaxy at large. Now at some point that solar wind which is moving out very quickly, out from sun, butts up and runs against the medium that pervades the galaxy that fills the entire galaxy. Those 2 materials that we call plasmas collide that creates the boundary that actually surrounds our solar system. In a sense those boundaries prevent those materials from the galaxy from coming into the solar system and protects us from fairly harsh radiation that exists in the galaxy.

Troy: The edges of those boundaries, says Nathan, are defined by the sun sitting at the center.

Nathan: If you look inside those boundaries you find what we call the solar wind, which is created by our very hot sun. It continually creates material and pumps material, which is very fast, out into the system.

Troy: IBEX will also help determine how those boundaries change over time.

Nathan: Imagine you are in a boat and you come across waves you can imagine that structure surrounding the boat, the waves in front of the boat- the bow waves- and the waves behind- the tail- are all going to change due to disturbances in the

medium that you are moving. And that is part of the reason that our Heliosphere changes in time. There is another factor, remember what inflates our Heliosphere, actually the solar wind itself that is controlled by the sun. There are periods when the sun is quieter near solar minimum when there are relatively few sunspots, few solar storms and there is solar maximum period where the sun gets more violent, stronger magnetic fields more aurora that are associated with the disturbances released by the sun. So the solar wind as it inflates the Heliosphere will actually change with time in concert with the changes of the sun. When it is quiet the pressures are low the Heliosphere will deflate and the boundary around our solar system can actually move inward. When it is violent and the pressures associated with the solar wind are high it actually causes those boundaries to inflate out.

[Closing]

[Troy Cline] We'd like to thank Eric and Nathan for taking the time to talk to us today, and we'll be keeping our eye out for new information IBEX might find along the solar system's boundary.

[Lindsay Bartolone] Education and public outreach lead for the IBEX mission. We have some additional education resources that you might want to check out. These can be found on the IBEX website.

[Troy Cline] Don't forget to download the new mobile version of NASA's Space Weather Viewer from iTunes! This app is an adaption of the current Space Weather Media Viewer and features near-real-time imagery from a wide variety of NASA missions, as well as video interviews with prominent scientists about the causes of space phenomena and NASA-created visualizations. You can download the app by doing a search in iTunes for the 'NASA Space Weather Media Viewer'. After downloading the app, we would really appreciate seeing your reviews and comments!

I hope you enjoyed this Sun-Earth Day Highlights podcast. We are very interested in hearing your questions and comments. If you have something to say, just join us in Facebook or send an email to sunearthday@gmail.com. If selected we'll share it on one of our upcoming podcasts!

For all other details about the Sun-Earth Day program including information about our past SED themes be sure to visit our website at sunearthday.nasa.gov. While there, don't forget to register in order to receive Sun-Earth Day updates!

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