

Sun-Earth Day Mission Highlights:

Interview with Barry Mauk (MMS)

[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.

[Music Transition]

[TROY]

Today on the Sun Earth Day podcast we're talking to Barry Mauk who is a scientist who works at the Johns Hopkins University Applied Physics Lab. This lab is one of many throughout the world that help build instruments and spacecraft for NASA missions.

[Barry Mauk]

This is where we do a lot our space work, build spacecraft, build space instrumentation, do a lot of work for NASA. For example we are now implementing the *Radiation Belt Storm Probes Mission* for NASA; I'm the project scientist for that mission. For MMS, *Magnetospheric Multiscale Mission* that is of particular interest here, we are the lead institution for the issue of particle acceleration caused by the target science of MMS, which is re-connection. We are building one of the sensors the *comprising energetic particles detector suite* and we contract with the Aero-Space Corporation in California for building another one of the sensors for the *energetic particles detector suite*. At APL, we do a lot of space work and we are very excited about being part of the *Magnetospheric Multiscale Mission*.

[TROY]

You just heard Barry mention a mission called the Multiscale Magnetospheric Mission or MMS. This mission is scheduled to launch in 2014, and it will study something that happens in space called magnetic reconnection.

[Barry Mauk]

These Regions of magnetic reconnection occur when one region of space interacts with another region of space. One region of space has a magnetic field contained within it and another has its own magnetic field and those 2 magnetic fields are not necessarily aligned with each other. In fact sometimes they are pointed in opposite directions and when these 2 regions interact with each other, maybe one region is an electrified gas coming from the Sun runs into the electrified gases that exist within the Earth's space environment those 2 regions interact their magnetic fields are oriented in very different directions. These magnetic fields want to connect with each other. The target of MMS is what is called magnetic re-connection. Re-connection is a very important energy convergent process that incurs in space. It is a mechanism were by the energy that is in magnetic fields, just like the magnet fields in a refrigerator magnet, there are magnetic fields in space, those magnetic fields contain energy a very important process that converts some of that energy into the heating of charged particles and the acceleration of charged particles a very high energy a very important process. One of the reasons that we are interested in this, although the MMS, *Magnetospheric Multiscale Mission*, is going to fly around the space environment of Earth, magnetic re-connection process has got to be very important throughout the universe. It's got to be important for some of the dynamics on the surface of the Sun, called solar flares and energy that create energetic particles that have to occur in astrophysical objects like the crab nebula, very bright in x-rays because of particle acceleration, probably in part due to this convergence process called magnetic re-connection.

[TROY]

So the process that happens to accelerate particles, from what I have heard the particle acceleration happens with magnetic re-connection. One of the most powerful particle accelerators, I'm sure.

[Barry Mauk]

Yes, that is actually right. One of the real mysteries of magnetic re-connection is how exactly it is able to energize particles. If you look at the very simple physics, particles get accelerated by electric fields and magnetic re-connection creates a large electric field in a very confined area of space. That region where the electric field is strong is so small, according to the theories of magnetic re-connection, that we don't know how the particles stay in that region long enough in order to gain the very high energies that they do. So that is one of the real mysteries of magnetic re-connection. How in fact it achieves energizing particles at such high energies where as when you do a simple calculation you would suggest that it should not be able to do that. And so that is a real mystery. My investigation in particular on MMS is to trying to understand.

[Closing]

I'd like to thank Barry for talking to us today and look forward to future interviews with people involved with the MMS mission.

[Troy]

For more information about the MMS mission just visit their website at mms.gsfc.nasa.gov . You can join them on Facebook, Twitter and YouTube.

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!

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