NASA launches four spacecraft to solve magnetic mystery

March 13 2015, byMarcia Dunn

The unmanned Atlas rocket—and NASA's Magnetospheric Multiscale spacecraft lifts off from Cape Canaveral, Fla., Thursday, March 12, 2015. NASA launched four identical spacecraft Thursday on a billion-dollar mission to study the explosive give-and-take of the Earth and sun's magnetic fields. (AP Photo/Florida Today, Craig Bailey)

NASA launched four identical spacecraft Thursday on a billion-dollar mission to study the explosive give-and-take of the Earth and sun's magnetic fields.

The unmanned Atlas rocket—and NASA's Magnetospheric Multiscale spacecraft—soared into a clear late-night sky, right on time. Within two hours, all four observatories were flying free.

"Just picture-perfect," launch manager Omar Baez said early Friday. "Everybody's cheering. ... Can't ask for any more."

The quartet of observatories is being placed into an oblong orbit stretching tens of thousands of miles into the magnetosphere—nearly halfway to the moon at one point. They will fly in pyramid formation, between 6 miles (10 kilometers) and 250 miles (402 kilometers) apart, to provide 3-D views of magnetic reconnection on the smallest of scales.

Magnetic reconnection is what happens when magnetic fields like those around Earth and the sun come together, break apart, then come together again, releasing vast energy. This repeated process drives the aurora, as well as solar storms that can disrupt communications and power on Earth. Data from this two-year mission should help scientists better understand so-called space weather.

Each observatory resembles a giant octagonal wheel, stretching more than 11 feet (3.35 meters) across and 4 feet (1.22 meters) high, and weighing 3,000 pounds (1,360.79 kilograms) apiece. Numbered and stacked like tires on top of the rocket for launch, No. 4 popped free first more than an hour after liftoff, followed every five minutes by another.

"They're all healthy and turned on. Essentially, we're all green and headed into our mission," said NASA project manager Craig Tooley.

In this undated photo provided by NASA, Magnetospheric Multiscale (MMS) observatories are processed for launch in a clean room at the Astrotech Space Operations facility in Titusville, Fla. Liftoff of the unmanned rocket is set for Thursday, March 12, 2015. The spacecraft will be launched into an oblong orbit stretching thousands of miles into the magnetosphere. (AP Photo/NASA, Ben Smegelsky)

Once the long, sensor-laden booms are extended in a few days, each spacecraft could span a baseball field.

Principal investigator Jim Burch from the Southwest Research Institute in San Antonio said measurements will be made down to the electron scale, significantly smaller than previous heliophysics missions. In all, there are 100 science sensors. Primary science-gathering will begin this summer, following a five-month checkout.

In this photo provided by NASA, the United Launch Alliance Atlas V rocket with NASA's Magnetospheric Multiscale spacecraft onboard is rolled out to the launch pad, Wednesday, March 11, 2015 in Cape Canaveral, Fla. Liftoff of the unmanned rocket is set for Thursday. The spacecraft will be launched into an oblong orbit stretching thousands of miles into the magnetosphere. (AP Photo/NASA, Aubrey Gemignani)

The findings from the $1.1 billion mission will be useful in understanding magnetic reconnection throughout the universe. Closer to home, space weather scientists along with everyone on Earth hopefully will benefit.

"We're not setting out here to solve space weather," Burch said. "We're setting out to learn the fundamental features of magnetic reconnection because that's what drives space weather."

More information: NASA: mms.gsfc.nasa.gov/index.html

Southwest Research Institute: www.swri.org