Rocket blasts off, puts NASA radiation belt probes in orbit

Irene Klotz, Reuters

An unmanned Atlas 5 rocket lifted off on Thursday from Cape Canaveral Air Force Station in Florida, placing a pair of heavily shielded NASA science satellites into position to study Earth's radiation belts.

The 190-foot (58-meter) tall rocket, built by United Launch Alliance, blasted off at 4:05 a.m. EDT (0805 GMT), soaring out over the Atlantic Ocean toward an orbit as far as 19,042 miles above the planet's surface.

Riding atop the rocket were the identical twin Radiation Belt Storm Probes, which are expected to spend two years surveying the Van Allen radiation belts, hostile regions that surround Earth and that most other spacecraft try to avoid.

"They're now at home in the Van Allen belts, where they belong," deputy project scientist Nicola Fox told reporters after the launch. "For the science team, the real work now begins."

Named after University of Iowa physicist James Van Allen, the two doughnut-shaped belts of trapped particles were discovered in 1958 by Explorer 1, the first U.S. science satellite. They are held in place by Earth's magnetic field, which traps the electrically charged particles from the sun and deep space.

How the belts form and why they sometimes balloon out is a long-standing mystery.

Understanding the phenomenon is more than scientific curiosity. Every spacecraft orbiting Earth, including the $100 billion International Space Station and its crew, fly through the high-radiation regions, which can degrade solar panels and affect electronics.

"Modern society depends on satellites and other space-based technologies ... making the research and understanding that will come from (the probes) invaluable to building better protected satellites in the future," New Jersey Institute of Technology physicist Lou Lanzerotti said at a pre-launch news conference.

The satellites are expected to spend the coming two years flying in tandem through the heart of the radiation belts. The inner belt begins about 650 miles above Earth and extends to about 8,000 miles, but at times it can dip as low as about 125 miles. The space station flies about 250 miles above the planet.

The outer belt begins at an altitude of about 8,000 miles and extends to about 26,000 miles.

The solar-powered probes, heavily shielded to operate in the radiation belts, are flying in slightly different, highly elliptical orbits that are inclined 10 degrees to the planet's equator, allowing them to periodically lap each other. Science operations are scheduled to begin after a 60-day instrument checkout.

The satellites, built and operated by Johns Hopkins University's Applied Physics Lab, will fly as close as 100 miles to each one another, and as far as 24,000 miles apart.

The dual measurements are key to understanding how the belts puff out and contract over time and in response to solar activity.

"If you imagine sitting on a life raft in the ocean and you suddenly go down and come up again, you don't know very much about what caused you to go down and come up," Fox said before the launch.

"If you have a friend who is sitting on a life raft a little way away, you can say 'Well, did we both go down and up at the same time?' In which case it's a big-scale feature like a tsunami. Did one of us go down and then the other one? You can really start to look at the global dynamics of what's happening in the radiation belts," Fox said.

United Launch Alliance is a partnership of Lockheed Martin and Boeing. The mission cost $686 million, including the launch vehicle.

(Editing by Louise Ireland, Tom Brown and Paul Simao)