First light for MAVEN (w/ Video)

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After 10-month voyage across more than 400 million miles of empty space, NASA's MAVEN spacecraft reached Mars on Sept. 21st 2014. Less than 8 hours later, the data started to flow.

"Our Imaging Ultraviolet Spectrograph (IUVS) obtained these false-color images of Mars on Sept. 22nd," says Nick Schneider who leads the instrument team at the University of Colorado. "They trace the distribution of hydrogen and oxygen in the Martian atmosphere."

MAVEN is on a mission to investigate a planetary mystery. Billions of years ago, Mars was blanketed by an atmosphere massive enough to warm the planet and allow liquid water to flow on its surface. Life could have thrived in such an environment. Today, however, only a tiny fraction of that ancient air remains, leaving Mars a desiccated wasteland.

What happened to the atmosphere of Mars? MAVEN will attempt to answer the question by studying the upper atmosphere, where gaseous material could be lost to space.

Schneider explains what the IUVS saw in its first look: "The oxygen gas is held close to the planet by Mars' gravity, while lighter hydrogen gas expands to higher altitudes and extends past the edges of the image. These gases come from the breakdown of water and carbon dioxide in Mars' atmosphere."

Among researchers, a popular candidate for atmospheric loss is space weather: Eons of solar storms and the relentless buffeting of solar wind

might have stripped away much of the Martian atmosphere.

The IUVS might be able to see this process in action, especially in the aftermath of a CME strike.

A CME, or coronal mass ejection, is a billion-ton cloud of ionized gas blasted away from the sun in the aftermath of a solar flare. When CMEs hit Earth, they rattle our planet's magnetic field, causing Northern Lights and, in extreme cases, power blackouts.

Unlike Earth, Mars has no global magnetic field to protect it. For the most part, the Martian atmosphere is unshielded. That's why gusts of solar wind and CME strikes could strip material away.

"MAVEN's primary science goal is to see how the atmosphere responds to solar forcing," says Bruce Jakosky, the Principal Investigator for MAVEN. "So on the one hand, a CME might strip the outermost layers of the atmosphere. On the other, it might also energize the atmosphere below and repopulate the extended atmosphere with a lot of new material."

Either way, he says, "we expect to see something."

The instrument is also capable of observing Martian auroras. Here on Earth, auroras ring the magnetic poles, north and south. Mars, however, has a different magnetic structure. There is no coherent global magnetic field. Instead, Mars has a patchwork of magnetic umbrellas that sprout out of the surface in hundreds of places all around the planet. If Martian auroras occur, they would appear in the canopies of those umbrellas.

"We are on the edges of our seats, hoping for our first detection," says Schneider.

Having just reached Mars, MAVEN is still in its commissioning phase. Instruments are being checked out, the spacecraft's orbit is being adjusted. The fact that data are already arriving at Earth is an impressive achievement.

This is just the beginning. IUVS is only one of three instrument suites on MAVEN. The Neutral Gas and Ion Spectrometer from the Goddard Space Flight Center and the Particles and Fields Package from UC Berkeley will soon be making their own revelations about Mars.

Provided by NASA