

Studying the Solar Wind on Mars

Transcript:

[music] Mars's atmosphere is much less dense than the Earth's, it only has about one percent of the density of the Earth's atmosphere. However, we're pretty sure that Mars had a much thicker atmosphere in the past, because there's such strong evidence for running water on the surface, and to have running water, Mars's atmosphere had to be much thicker. Now MAVEN is going to look at how Mars lost its atmosphere, in particular whether it could have lost its atmosphere to space. My name is Bob Lin, I'm a professor of physics and I work at the Space Sciences Laboratory of the University of California at Berkeley. MAVEN is a Mars Scout mission for NASA, and it's an orbital mission to Mars which is designed to study the loss of the atmosphere of Mars. For example if there was a large solar eruption, if the solar wind increased in strength, we could then look at how the atmosphere gets lost in each of these situations. Because Mars is in the solar wind, a lot of the loss comes from these ions and electrons that are escaping, and the Particles and Fields package is designed to look at the escape of the charged particles from the atmosphere. We have the Solar Wind Ion Analyzer, which measures the incoming solar wind, then we have the Solar Wind Electron Analyzer, which measures the incoming solar wind electrons. We have the Langmuir Probe and Waves instrument, and that measures solar ultraviolet. It also measures low-energy electrons that might be escaping from Mars, and furthermore it measures waves that might be accelerating the ions so that they can escape from Mars. We then have the STATIC instrument. It will give us the composition of what is escaping, whether it's CO₂, or hydrogen, or helium and so forth. The Solar Energetic Particle instrument, SEP, measures high-energy particles from the Sun, and those particles will hit the atmosphere and cause a lot of damage. And finally there's a magnetometer, which will measure the magnetic field in the solar wind and the magnetic field of Mars. Mars is the only planet, besides the Earth, where you really have a chance that life might have formed. The conditions for life are water, running water, and a reasonably thick atmosphere. We have a chance now to see whether that was in fact what Mars had early on, and whether the atmosphere was lost by this means, so we think it's an extremely important mission to do. [George Diller] Five, four, three, two, one. Main engine start, ignition, and liftoff of the Atlas V with MAVEN, looking for clues about the evolution of Mars through its atmosphere. [music] [satellite beeping]