Transcripts of Mars Atmospheric Loss: Plasma Processes

[Music]

Even though it's not obvious just by looking at it, scientists think that Mars, a dry, dusty planet, may have once looked at lot more like Earth, with a blue atmosphere, thick clouds, and possibly even water.

Scientists also think that Mars lost its atmosphere over the course of billions of years, gradually transforming into the Red Planet we know today. NASA's MAVEN spacecraft will help provide clearer answers regarding Mars's climate history, and scientists think several processes have had an effect. For example, there are a series of what are known as Plasma Processes that can slowly strip away a planet's atmosphere. These processes are started by the Sun, which emits light in the form of high-energy photons.

When a photon at an extreme ultraviolet wavelength enters a planet's atmosphere, it can run into a molecule that makes up the atmosphere's gases. The molecule absorbs the photon, and the energy from this impact can kick off an electron, leaving behind an ion. This stray electron will eventually recombine with another ion, and the energy the electron gives to this reaction is sometimes enough to split the molecule into its component parts, give those parts a lot of speed, and launch them out into space. And although this process occurs continuously in most atmospheres, with a self-maintaining cloud of ions and electrons forming a planetary ionosphere, the escape of atoms over billions of years can contribute to the overall loss of a planet's atmosphere. This could even turn a blue, water-covered planet into a planet just like Mars, and MAVEN will help us figure out exactly what happened.

[Satellite beeping]