

## Spectacular meteor shower on Mars from Comet Siding Spring

Several craft orbiting Mars saw its aftermath. Also, after Siding Spring passed on 19 October 2014, **the MAVEN mission got the first direct measurements of dust from an Oort Cloud comet!** Comet Siding Spring passed closer to Mars last month than any known comet has to that planet, or Earth, in recorded history. A fleet of spacecraft orbiting the Red Planet – as well as spacecraft elsewhere in the solar system, and on the ground – observed the event. Among other things, NASA said at a press conference late Friday (November 7) that dust from Comet Siding Spring vaporized high up in the Martian atmosphere, producing what was likely “an impressive meteor shower.” An observer on Mars surface might have seen thousands of shooting stars per hour. **This debris resulted in significant temporary changes to the planet’s upper atmosphere and possible longer-term perturbations.**

The spacecraft orbiting Mars did not actually see the meteors. In the months leading up to Siding Spring’s passage, NASA, the European Space Agency and the Indian Space Research Organization (which had placed a spacecraft in orbit around Mars as recently as September 24), **all decided for safety reason to manoeuvre their spacecraft to the side of Mars opposite the comet’s passage, during the time the event took place.**

However, NASA said on Friday, when MAVEN and some of the other craft emerged, they found a glowing layer of ionized magnesium and other metals, shed by the disintegrating meteoroids from Comet Siding Spring, in a layer about (150 km) above Mars’ surface. **MAVEN – the Mars Atmosphere and Volatile Evolution mission, which has been orbiting Mars only since September 22, 2014 – is specifically designed to study Mars’ atmosphere. It detected the comet encounter in two ways:**

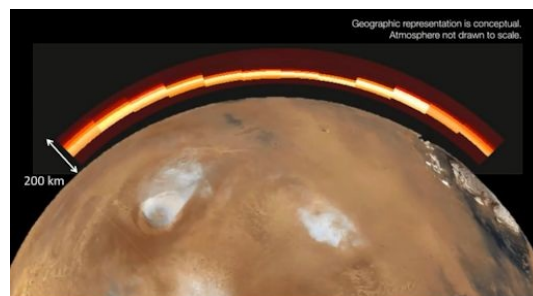
- First, its remote-sensing Imaging Ultraviolet Spectrograph observed intense ultraviolet emission from magnesium and iron ions high in the atmosphere in the aftermath of the meteor shower. Not even the most intense meteor storms on Earth have produced as strong a response as this one. The emission dominated Mars’ ultraviolet spectrum for several hours after the encounter and then dissipated over the next two days.
- Second, MAVEN directly sampled the comet dust and determined its composition, with its Neutral Gas and Ion Mass Spectrometer. It found eight different types of metal ions, including sodium, magnesium and iron. NASA pointed out that:
  - These are the first direct measurements of the composition of dust from an Oort Cloud comet. The Oort Cloud, well beyond the outer-most planets that surround our sun, is a spherical region of icy objects believed to be material left over from the formation of the solar system.

NASA’s Mars Reconnaissance Orbiter (MRO), and a radar instrument on the European Space Agency’s (ESA’s) Mars Express spacecraft also revealed that **debris from the comet added a temporary and very strong layer of ions to the ionosphere, the electrically charged layer high above Mars.** These observations via spacecraft let scientists make a direct connection from the input of debris from a specific meteor shower to the formation of this kind of transient layer in response. That’s a first on any planet, including Earth, NASA says, adding that:

- In addition to these immediate effects, MAVEN and the other missions will continue to look for long-term perturbations to Mars’ atmosphere.

Comet C/2013 A1 Siding Spring travelled from the most distant region of our solar system, called the Oort Cloud, and made a close approach around 2:27 p.m. EDT on October 19. **It came within 139,500 kilometres of the Red Planet. This is less than half the distance between Earth and our moon and less than one-tenth the distance of any known comet flyby of Earth.**

Bottom line: Several spacecraft in orbit around Mars on October 19, 2014 observed the aftermath of the close passage of Comet Siding Spring. These results suggest that an observer on Mars surface would have seen a spectacular meteor shower, with several thousand meteors per hour. Also, the MAVEN mission got the first direct measurements of dust from an Oort Cloud comet!



MAVEN/IUVS Spectrum of Mars Atmosphere After Comet Siding Spring

