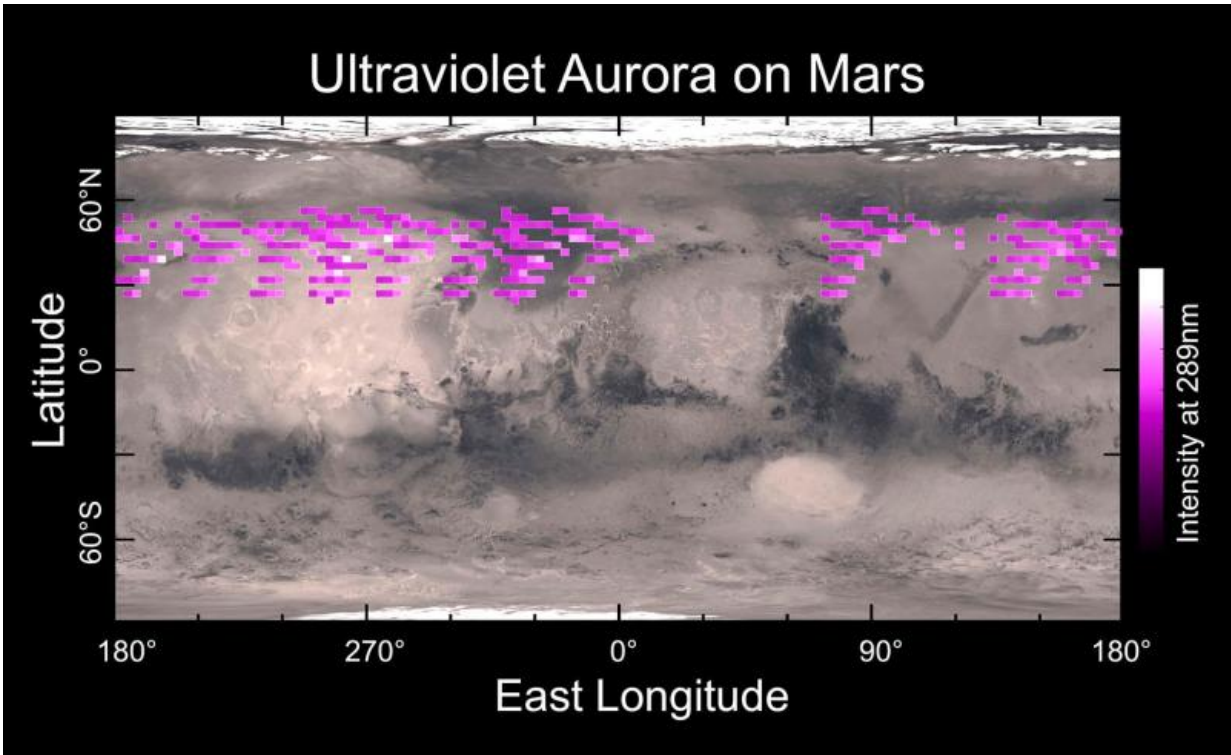


# Does the red planet have green auroras?

May 14 2015, by Bob King



Using its Imaging Ultraviolet Spectrograph (IUVS), MAVEN recorded numerous auroras in December 2014. The map shows that the aurora was widespread in the northern hemisphere, not tied to any geographic location. The aurora was seen in all observations during a 5-day period. Credit: University of Colorado

Martian auroras will never best the visual splendor of those we see on Earth, but have no doubt. The red planet still has what it takes to throw

an auroral bash. Witness the latest news from NASA's MAVEN atmospheric probe.

In December 2014, it detected widespread [auroras](#) across Mars' [northern hemisphere](#) dubbed the "Christmas Lights". If a similar display happened on Earth, northern lights would have been visible from as far south as Florida.

"It really is amazing," says Nick Schneider who leads MAVEN's Imaging Ultraviolet Spectrograph (IUVS) instrument team at the University of Colorado. "Auroras on Mars appear to be more wide ranging than we ever imagined."

Study the map and you'll see the purple arcs extend to south of 30° north latitude. So what would Martian auroras look like to the human eye? Would we see an arcade of nested arcs if we faced east or west from 30°N? Well, er, yes, if you could see into the ultraviolet end of the spectrum. Mars' atmosphere is composed mostly of carbon dioxide, so most of the auroral emissions occur when high speed solar wind particles ionize CO<sub>2</sub> molecules and carbon monoxide to produce UV light. Perhaps properly suited-up bees, which can see ultraviolet, would be abuzz at the sight.

That's not the end of the story however. Martian air does contain 0.13% oxygen, the element that puts the green and red in Earth's auroras. The "Christmas Lights" penetrated deeply into Mars' atmosphere, reaching an altitude of just 62 miles (100 km) above its surface. Here, the air is relatively thicker and richer in oxygen than higher up, so maybe, just maybe Christmas came in green wrapping.

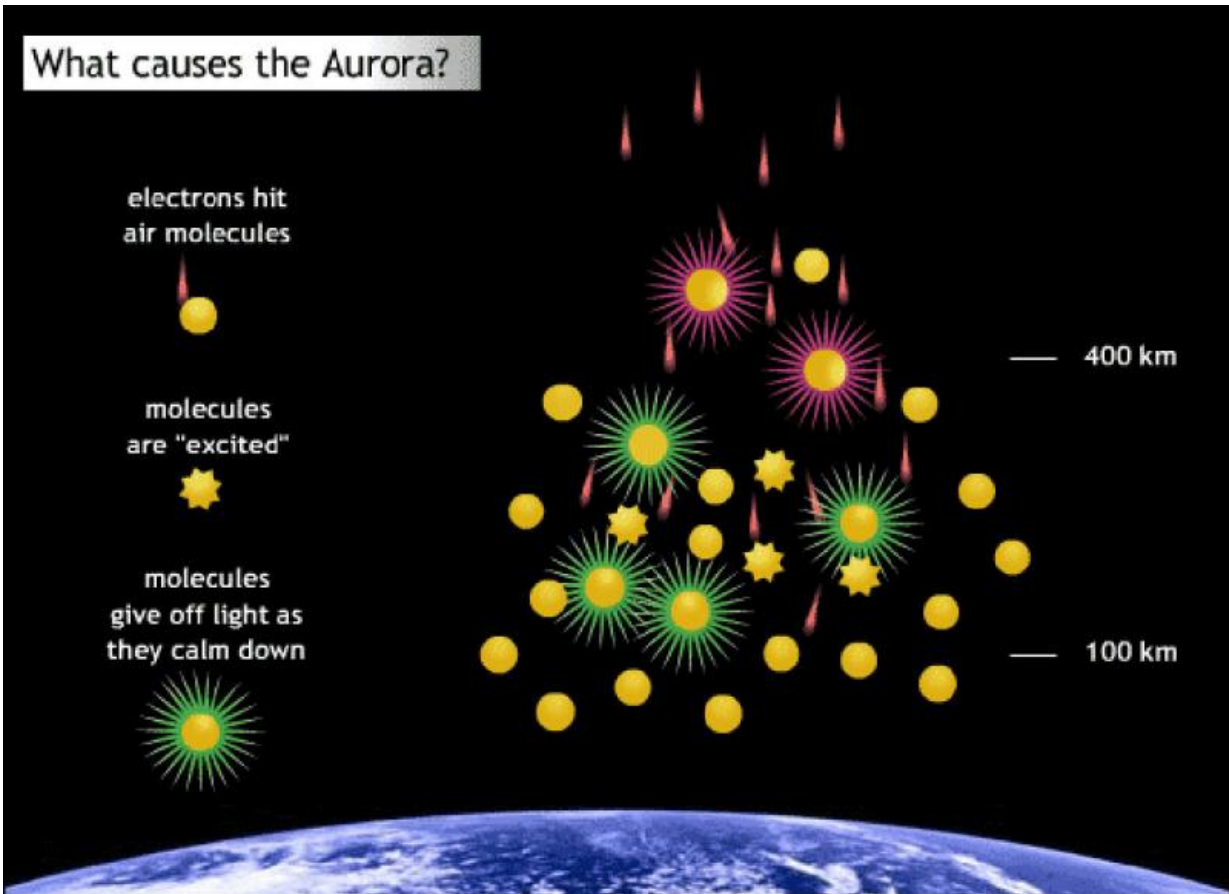


A beautiful curtain of auroral rays spreads across the northern sky last night (May 12) as seen from Duluth, Minn. Aurora colors on Earth are caused by the excitation of nitrogen and oxygen atoms by high-speed particles in the solar wind. Oxygen in particular is responsible for most of the aurora's greens and reds. Credit: Bob King

Nick Schneider, who leads MAVEN's Imaging Ultraviolet Spectrograph (IUVS) instrument team, isn't certain but thinks it's possible that a diffuse green glow could appear in Mars' sky during particularly energetic solar storms.

While the solar wind produces auroras at both Earth and Mars, they originate in radically different ways. At Earth, we're ensconced in a

protective planet-wide magnetic field. Charged particles from the sun are guided to the Earth's poles by following a multi-lane freeway of global magnetic field lines. Mars has no such organized, planet-wide field. Instead, there are many locally magnetic regions. Particles arriving from the sun go where the magnetism takes them.

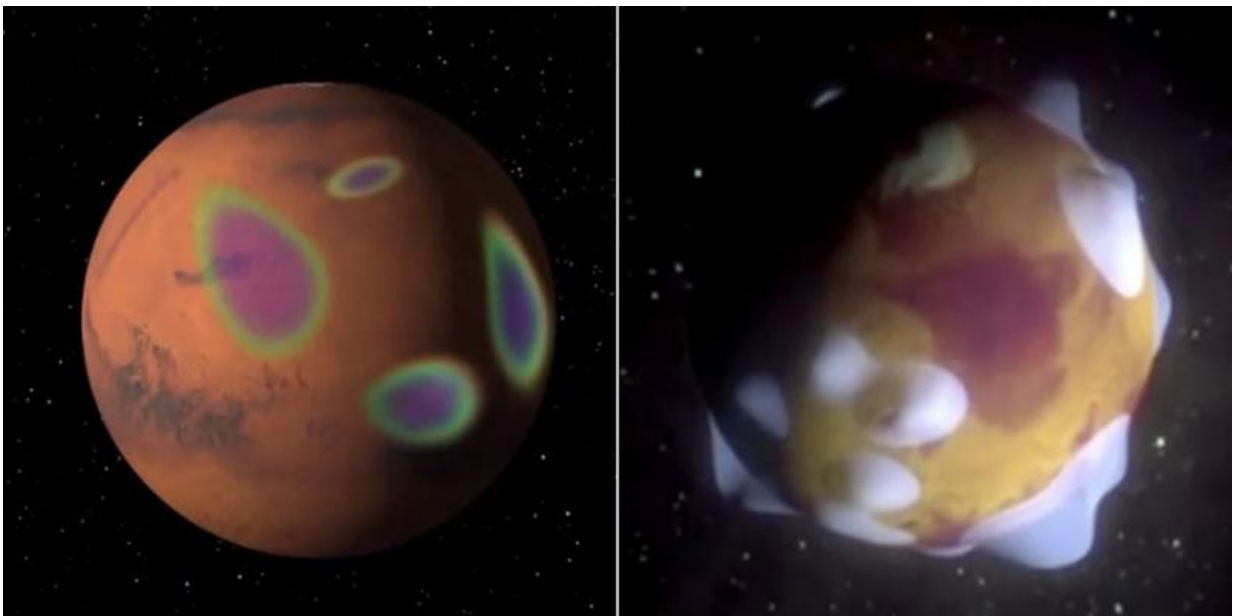


High-speed particles from the Sun, mostly electrons, strike oxygen and nitrogen atoms in Earth's upper atmosphere. As they return to their "relaxed" state, they emit light in characteristic colors. Credit: NASA

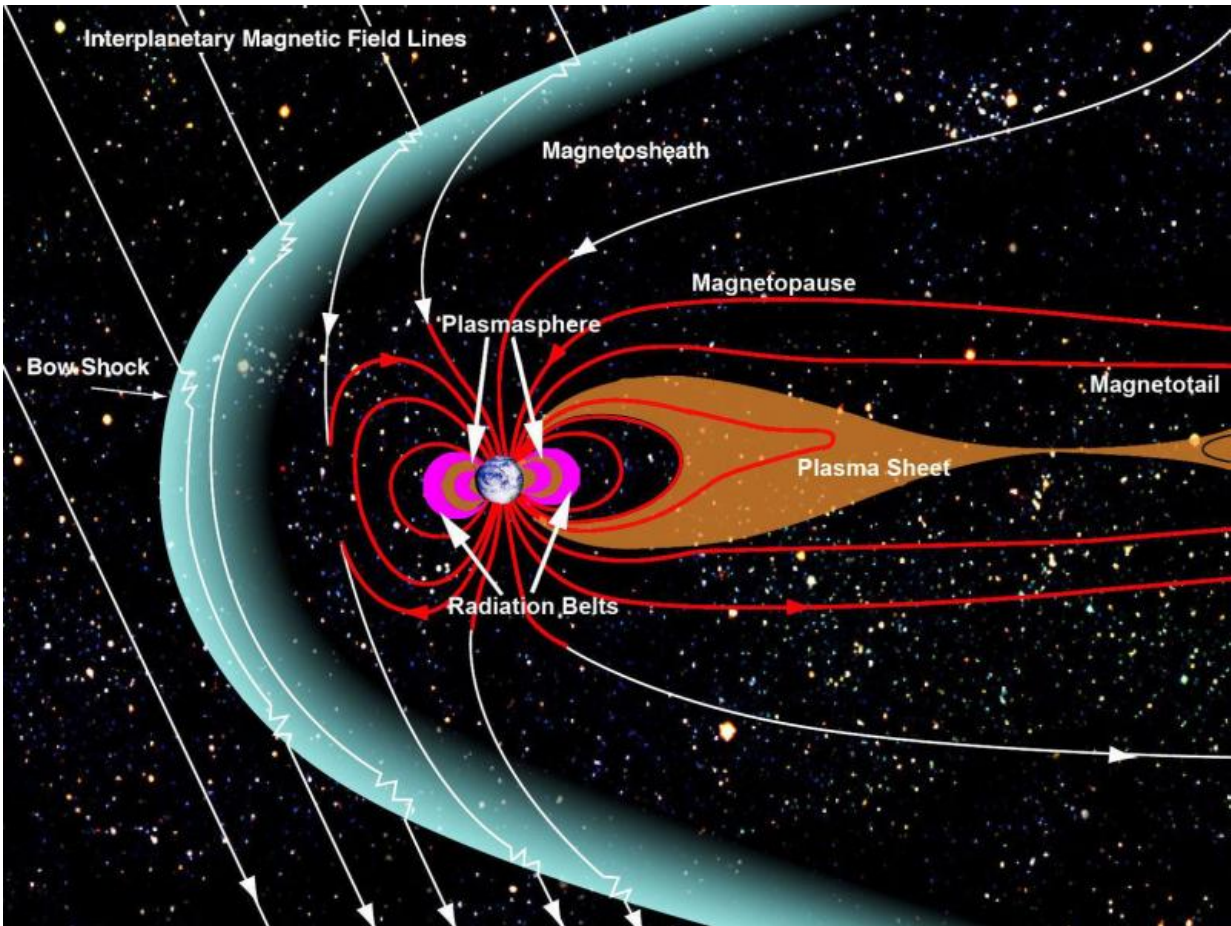
"The particles seem to precipitate into the atmosphere anywhere they

want," says Schneider. "Magnetic fields in the [solar wind](#) drape across Mars, even into the atmosphere, and the charged particles just follow those field lines down into the atmosphere."

Maybe one day, NASA or one of the other space agencies will send a lander with a camera that can shoot long time exposures at night. We'll call it the "Go Green" initiative.



Mars has magnetized rocks in its crust that create localized, patchy magnetic fields (left). In the illustration at right, we see how those fields extend into space above the rocks. At their “peaks”, auroras can form. Credit: NASA



Earth's magnetosphere, an area of space that's controlled by the planet's magnetic field, guides solar wind electrons and protons along magnetic field lines into the atmosphere in the polar regions to create auroras. The planet's field is created by electric currents generated in its outer nickel-iron core. Credit: NASA

Source: [Universe Today](#)

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