Aurora at planets lacking global magnetic fields

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Auroral emission is a beautiful visual reminder of the interaction of the upper atmosphere of a planet with its magnetosphere and plasma environment. Aurora are typically associated with planets having global magnetic fields, such as Earth, Jupiter, and Saturn. However, auroral emission has also been reported at Venus and (recently) Mars. Venus lacks any significant intrinsic magnetic field, and Mars has strong crustal magnetic fields in the outer layers of its crust that are remnants of a long-ceased dynamo. Mars and Venus, then, provide us with an opportunity to learn the importance of a magnetosphere in the solar wind - magnetosphere - ionosphere coupling responsible for the acceleration of plasma and subsequent auroral emission.

In this talk I will review the observations of auroral emission at Venus and at Mars, and how the characteristics and occurrence of the emissions compare to those at Earth. I will then review the observations at Mars of the different particle distributions that could be responsible for this emission, and the manner in which these particles could be accelerated. Finally, I will discuss the outstanding questions about aurora at Mars and Venus and the observations and modeling efforts required to answer them.