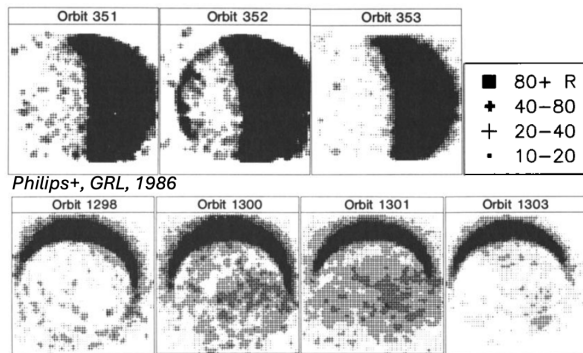


PREDICTING CO CAMERON-BAND AURORAL EMISSION AT VENUS USING VENUS EXPRESS

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Introduction:

Venus and Mars are similar in many aspects, such as a CO₂ dominant atmosphere and an induced-like magnetosphere. Various types of auroral emissions have been observed at Mars by the Mars Express and MAVEN missions. Auroral emissions have also been made at Venus by Pioneer Venus Orbiter (PVO) and also ground-based telescopes. Meanwhile, Xu et al. [2022, GRL] empirically established a linear relation between auroral electron fluxes and the CO Cameron-band emissions using the combination of auroral observations and superthermal electron observations from MAVEN.

**Methodology:**

By utilizing this empirical relation, we independently predict and analyze the possible CO Cameron-band emission brightness at Venus using the electron observations from the Venus Express mission. By comparing our predictions with the observations by PVO, we can infer whether the superthermal (10-1000 eV) electrons are responsible for the auroral emissions and if so, characterize the source electrons and their possible dependence on upstream drivers. Our results predict that using an emission detection threshold of 50 Rayleigh, the overall detection probability is ~8%. This low detection probability is not caused by needing additional electron acceleration as the case of Earth, but mainly limited by the magnetic access of precipitating electrons to the lower atmosphere. This study is particularly useful for future Venus mission design.

Acknowledgments:

This study uses Venus Express electron pitch angle distribution data archived on PDS: <https://doi.org/10.17189/m6w1-6q39>.

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