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Detection of martian nightglow NO bands in UV and implications for atmospheric transport

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We have observed for the first time the detection of light emissions in the night side of the atmosphere of Mars by the SPICAM UV spectrometer. The UV spectrum of this nightglow is composed of the (expected) Hydrogen Lyman αgmission (121.6 nm), and of the γ and δgands of nitric oxide (NO, 190-270 nm) produced when N and O atoms combine to produce the NO (nitric oxide) molecule. N and O atoms are produced by EUV photo-dissociation of O_2, CO_2 and N_2 in the dayside upper atmosphere, and transported to the night side. Observations were recorded at several orbits, requiring a special "limb grazing" mode to enhance signal. We found that the NO emission is brightest in the winter south polar night, which can be explained by continuous downward transport of air in this region permanently in the night at this season (Ls=74°, southern winter), and where CO_2 condenses at ground level. It offers a new way to study the general circulation mechanisms by remote sensing of the upper atmosphere from Mars orbiters.