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Observations Of The Ultraviolet Nitric Oxide (NO) Nightglow With SPICAV On Board Venus Express During Stellar Occultations

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Ultraviolet nightglow have been detected on Venus for the first time by Barth and al., in 1968, from Mariner 5, then identified like to be nitric oxide nightglow by Feldmann and al., and by Stewart and Barth, in 1979, with Pioneer. SPICAV (SPectroscopy for the Characteristics of the Atmosphere of Venus), on board Venus Express spacecraft, currently in orbit around Venus, also see them. We descibe here a forward model allowed to reproduce this nitric oxide nightglow. It is a first approach in a better understanding of the dynamic phenomena of the venusian thermosphere. When working in the spectrometric mode with the slit, SPICAV has shown that the Venus nightglow contains essentially Lyman-a and nitric oxide (NO) emission, well studied by Gerard et al. (2008b). What we show here is that, when SPICAV is used in the stellar occultation mode (without the slit), quite often an emission is present at the limb, in addition to the stellar spectrum. A forward model of the NO emission observed without the slit, when compared to the data, confirms that indeed this limb emission is due to NO nightglow. This observing mode without the slit is 50 times more sensitive than with the slit, owing to the larger subtended FOV. Terefore, its systematic extraction from stellar occultations will extend the data base of NO emission already collected in the limb spectroscopic mode (Gerard et al., 1981 and 2008b). This emission, due to recombinaison of N and O atoms produced on the dayside of Venus, and transported to the nightside, allows to study the Solar to Anti-solar thermospheric circulation (above 100 km). The comparaison with the forward model allows to derive the emission intensity, the altitude of the layer, and its scale height. Owing to the large number of star occultations recorded, and higher sensitivity, the systematic extraction of NO emission parameters from stellar occultations will add a large number of NO observations as tracers of the venusian thermospheric circulation, giving strong contraints on the thermospheric general circulation model (TGCM).