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Venus Express observations of the Venus O_2 and NO nightglow: distribution and constraints on vertical transport

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Observations have been carried out in the infrared with VIRTIS and the ultraviolet with SPICAV to measure the distribution of the O_2 ($^1\Delta_g$) nightglow emission at 1.27 μm and the nitric oxide gamma and delta bands between 190 and 300 nm. These observations were collected in the tangent limb mode, which maximizes the time period spent by the line of sight through the airglow layer. The O_2 ($^1\Delta_g$) emission is excited by three-body recombination of O atoms produced on the day side and carried by the general thermospheric circulation to the night side. It is very variable in brightness and has a peak located between 95 and 100 km. The NO airglow is produced by radiative recombination of O atoms with N(^{4}S) resulting from N_2 photodissociation and reaches a maximum near 110 km. We combine the altitude and brightness information from the two emissions with simulations of a chemical diffusive model to determine the values of the vertical fluxes of O and N atoms and the strength of the eddy mixing which carries both types of atoms from above the turbopause into the recombination layer. We find that O fluxes on the order of a few 10^{12} atoms/cm^2 s and N fluxes about 10^{10} atoms/cm^{2}s can reproduce the observations. The variability of the airglow emissions and the altitude-brightness relation will also be discussed and compared with model predictions.