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O2 nightglow emission detection in the atmosphere of Mars, identified by the OMEGA/MEx investigation

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Along its 6 years of operation to date, OMEGA/Mars Express has acquired hundreds of limb profiles of the Martian atmosphere, with a kilometre-scale sampling, at a variety of location and local times. In many of them, O2 emission is observed by its (a1g $-$ X3g $-$) transition at 1.27μm. A particular occurrence of interest has been acquired during local night, at altitudes $\sim$ 50 km . This first detection of O2 nightglow emission will be presented, and discussed in terms of atmospheric circulation. This emission is most likely the signature of the recombination of oxygen atoms, similar to the corresponding emission observed in the Venus night side. On the day side, CO2 and N2 are photo-dissociated in the thermosphere ; O and N atoms are transported by thermospheric circulation to the night side, where air is descending again. In this descent, the O2 emission for recombination is observed, as well as the NO nightglow previously reported by SPICAM in the UV. The newly observed O2 emission is therefore produced in the night side by a totally different mechanism than the Martian day side emission at 1.27 μm, due to photo-dissociation of ozone.