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Nighttime O(^{3}P) and OH densities in the MLT obtained by self-consistent two-channel retrievals from SABER/TIMED observations

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We applied a new non-LTE model [Panka et al, 2017] of nighttime OH(v) to the self-consistent two-channel retrieval of nighttime O(^{3}P) and OH densities in the MLT from SABER/TIMED observations of 2.0 and 1.6 μm limb emissions. The new model involves v = 0 – 9 vibrational levels (including the ground level missed in previous studies) and is the first one which accounts for the new OH(v$\geq$5)+O(^{3}P)$\Rightarrow$O(^{1}D)+OH(v') mechanism of Sharma et al. [2015] and Kalogerakis et al. [2016] as an essential multi-quantum process. Compared to other retrievals which utilized absolute values of volume emission rates (VERs), our iterative algorithm fits the relative distribution of VERs in the SABER 2.0 and 1.6 μm channels, which is independent on the total OH production rate. We compare our O(^{3}P) results with retrievals from both SABER and other observations as well as models. The total OH densities obtained in this study are compared in detail with those of WACCM. Further development of the OH(v) non-LTE models (with accounting for the production and loss of vibrationally excited OH), as well as implications of the model and self-consistent OH/O(^{3}P) data for chemical heating and infra-red radiative cooling calculations for the MLT are discussed.