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On Oxygen Airglow Chemistry - Empirical Values of Branching Ratios in the Three-Body Recombination Reaction

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Oxygen airglow emissions like O(1S) greenline and O_2 atmospheric bands have been broadly studied and provided valuable information on the chemistry and dynamics in the MLT region. For example, they have been used to derive atomic oxygen densities, airglow excitation parameters, dynamical activity, and wave parameters. Thus, accurate knowledge of oxygen airglow chemistry is essential for the derivations of these quantities. Using an optimization scheme known as the Covariance Matrix Adaptation Evolution Strategy (CMA-ES) with our MACD-00 model, we simulated simultaneous volume emission rate (VER) of the oxygen airglow emissions that would match various satellite airglow observations from OXYGEN/S35, S310.10, NASA Flight 4.339, ETON flights P229H and P230H, OASIS, SOAP/WINE, MULTIFOT, and WINDII to determine the branching ratios in the three-body recombination reaction for the oxygen airglow chemistry. We will present our recent published results of Amaro-Rivera et al. [2018] and the latest results using the SCIAMACHY oxygen airglow data in this study.