

Hot oxygen atoms in the Martian upper atmosphere

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The population of hot oxygen atom in the Martian upper atmosphere is examined with a newly calculated hot O production rates for both the solar maximum and minimum conditions. The hot oxygen production rates are the result of the dissociative recombination of O_2^+ ions. These calculations took into account the calculated vibrational distribution of O_2^+ and the new measured branching ratios. Furthermore, these calculations also considered the variation of the dissociative recombination cross section with the relative speed of the participating ion and electron, the rotational energy of the O_2^+ ions and the spread of velocity of the ion and electron. These production rates were next used in a two-stream model to obtain the energy dependent flux of hot oxygen atoms as a function of altitude. Finally the calculated flux at the exobase was input into an exosphere model, based on Liouville's theorem, to calculate the hot oxygen densities as a function of altitude and the resulting escape flux.