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Impact of Recent Laboratory N_2 Data to our Understanding of Thermospheric Nitric Oxide (NO) JUSTIN YONKER, KARTHIK VENKATARAMANI, SCOTT BAILEY, Virginia Tech — In spite of its status as a minor species, NO plays key roles in many upper atmospheric processes. As the only heteronuclear molecule, its fundamental, Δv=1 emission cools the thermosphere (z>100 km). Its low ionization potential ensures that NO^+ is the end product of the ion-neutral chemistry in the ionospheric E-region. And in the presence of excess atomic oxygen, NO will catalytically destroy ozone. The production of NO is initiated when N_2 is ionized, dissociated, or excited by the solar EUV irradiance (λ <100 nm). In the mesosphere and lower thermosphere (MLT), much of the irradiance is contained in the highly variable soft x-ray region (1< λ <20 nm). The resulting photoelectrons produce additional ionization as well as excitation of metastable, chemically-reactive species like the first electronically excited N_2 state, $N_2(A^3\Sigma_u^+)$. This talk will incorporate recent laboratory data on the N_2 photoabsorption and electron-impact cross-sections into a 1D photochemical reaction-diffusion model of the thermosphere. It is shown that spin-forbidden (ΔS=1) excitation to the N_2 triplet manifold enables neutral N_2 to participate in the NO production. Additional physical and chemical uncertainties relevant to NO production and loss are also presented.

Justin Yonker
Virginia Tech

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