

Data Needs and Modeling of the Upper Atmosphere.

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Accurate atomic and molecular data is essential in modeling of the upper atmosphere. Feedback processes between many different species determine that successful modelling requires accurate values for reaction rates and electron impact cross sections. This is particularly the case when atmospheric processes, such as diffusion, also need to be considered. An example where basic data are essential is the combination of electron impact excitation rates of molecular nitrogen [1] and the rate of reaction of vibrationally excited nitrogen with O⁺ ions. This combination, along with ambipolar and molecular diffusion, is important in calculating the electron density in the ionosphere. Another example is infrared emission during an aurora. It was originally assumed that a chemiluminescent reaction was the only significant source of the (1,0) emission from the ground state of nitric oxide, but recent measurements [2] of the low-energy electron-impact excitation of NO have allowed calculations to show that the electron-impact component is significant [3]. Accurate electron cross sections for the excited states of N₂ are required in the calculation of auroral emissions [4]. These and other examples will be described and the need for more accurate data discussed.

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