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Sulphur Dioxide: High resolution ultra-violet absorption cross sections at 200K and 160K

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Sulphur Dioxide plays an important role within the complex chemistry of both the upper atmosphere of Venus and the volcanically active Jovian moon Io. The lack of high resolution laboratory studies has prevented the full, accurate determination of absorption cross sections which are the basis for reliable photochemical models.

High resolution laboratory measurements are essential to resolve the complex and congested SO_2 spectrum to give accurate photoabsorption cross sections. Using the Imperial College UV Fourier Transform Spectrometer new high resolution ($\lambda/\delta\lambda \approx$ 450,000) measurements have been recorded over a range of temperatures and pressures. This high resolving power allows resolutions approaching those required to fully resolve the Doppler profile of SO_2 in the UV.

We present our latest results of high resolution photoabsorption cross section measurements of SO_2 at 200K across the wavelength range 220 - 325 nm. We also present preliminary results for high resolution cross sections at 160K across the wavelength range 190 - 220 nm.

These measurements compliment previous room temperature measurements obtained at Imperial College in the 190 - 220 nm and 220 - 328 nm ranges (Stark et al., JGR Planets 104, 16, 585 (1999) and Rufus et al., JGR Planets 108, 2, 5 (2003)). The spectral range also coincides with the wavelength regions being recorded by the Venus Express mission through the UV-IR spectrometer SPICAV (ESA-SCI(2001)6). Our new measurements will allow accurate analysis of the chemical processes in the upper

atmosphere of Venus.

These absorption cross section measurements will be the first to be acquired at high resolution for temperatures and pressures comparable to conditions observed within the middle atmosphere of Venus. This work was supported in part by NASA Grant NNG05GA03G, PPARC (UK), and the Leverhulme Trust.