Supplementary Materials:

A direct comparison of cross-sections for SO_2 sulfur isotopologues is made between estimated cross-sections from Lyons [4,5] and low-resolution measured cross-sections from Endo et al. [8]. The comparison demonstrates that the shifted spectra from Lyons [4,5] correctly capture vibrational band shifts for the isotopologues. This agreement occurred because Lyons [4,5] used a harmonic extrapolation of the ab initio band shifts from Ran et al. [18]. This is an important point because the Lyons spectra [4,5] do not use the correct vibrational progression for the bands. However, the self-shielding and mutual-shielding isotope fractionation effects are dependent only on the band shifts, not on the specific quantum numbers of the upper state. For a discussion of the correct vibrational quantum number assignments, see Kumar et al. [17].

Supplemental Figures

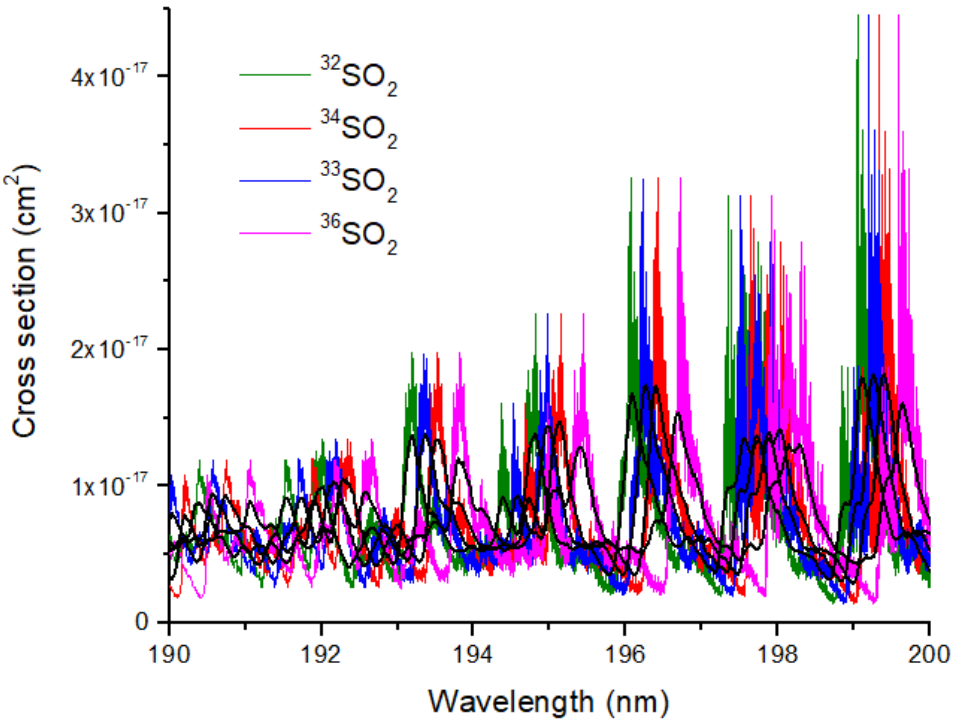


Figure S1a. Simulated and measured SO_2 cross-sections for 4 isotopologues. The simulated cross-sections were constructed from measured $^{32}SO_2$ cross-sections with band shifts applied for the sulfur isotopologues [4],[5]. The band shifts were determined by a harmonic fit low-resolution ab initio

calculations from Ran et al. [18]. The black curves are more recent low-resolution (25 cm^{-1}) measurements of isotopic cross sections from Endo et al. [8]. These results demonstrate that the estimated vibronic band shifts [4],5] are a good approximation to the true band shifts.

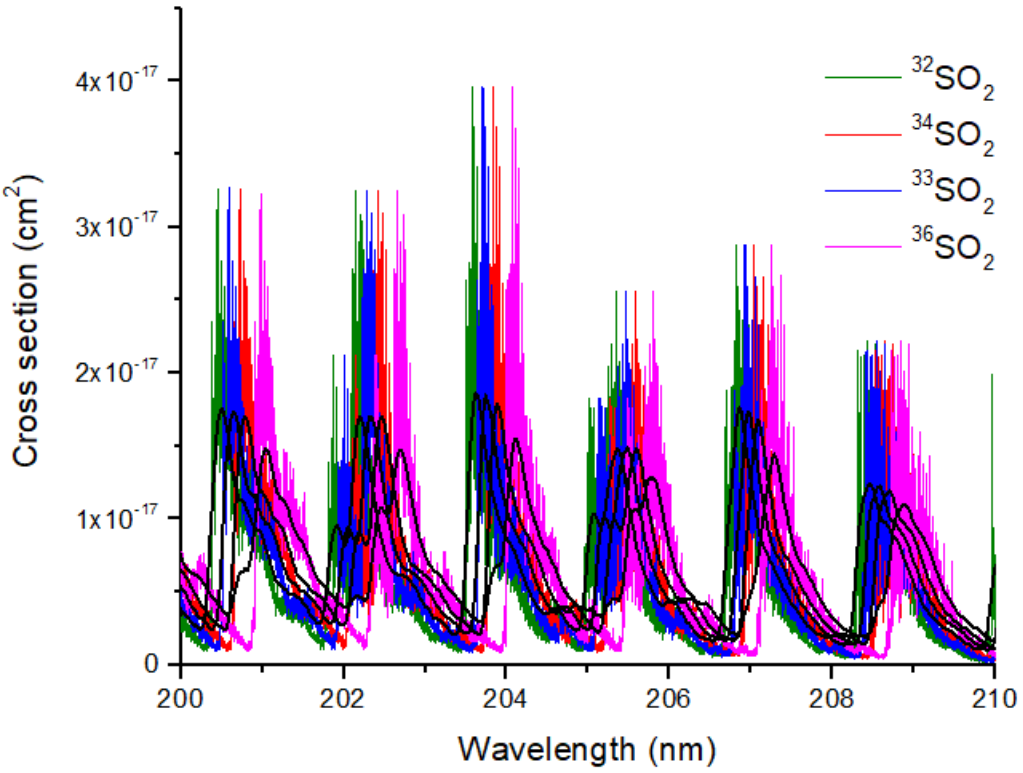


Figure S1b. SO_2 cross sections from 200 to 210 nm.

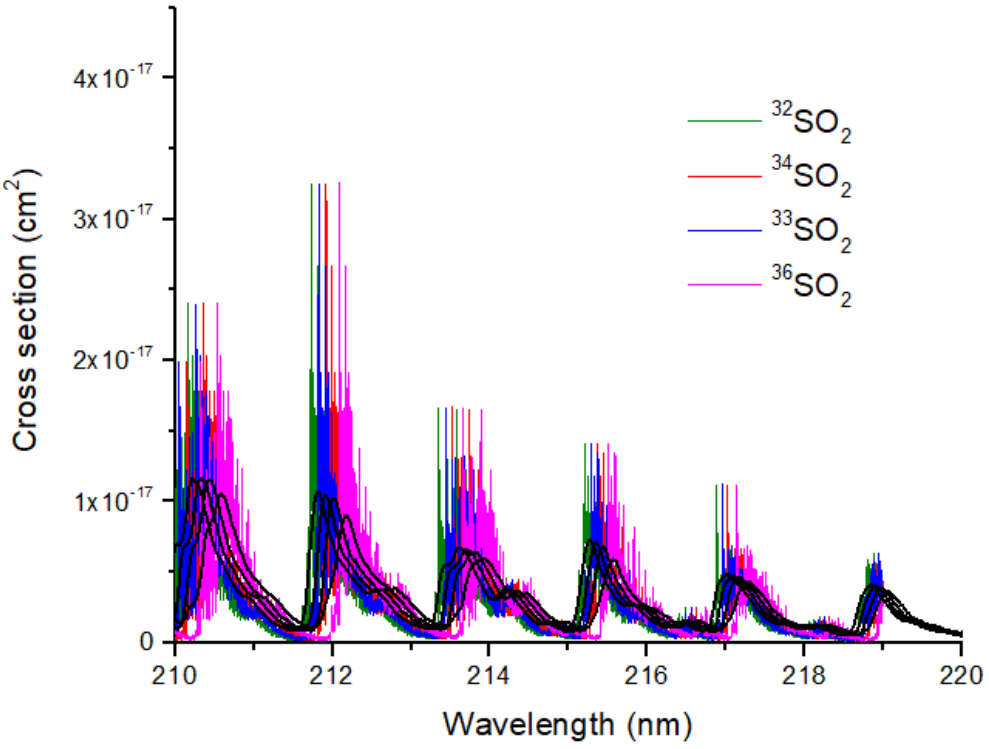


Figure S1c. SO_2 cross sections from 210 to 220 nm.