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Ozone (O₃) is crucial for studies of air quality, human and crop health, and radiative forcing. Spectroscopic remote sensing techniques have been extensively employed to investigate ozone globally and regionally. Infrared intensities of ≤1% accuracy are desired by the remote sensing community. The accuracy of the current state-of-the-art infrared ozone intensities is on the order of 4-10%, resulting in ad hoc intensity scaling factors for consistent atmospheric retrievals. The large uncertainties on the infrared ozone intensities arise from the fact that pure ozone is very difficult to generate and sustain in the laboratory. Best estimates have employed IR/UV cross beam experiments to determine the accurate O₃ volume mixing ratio of the sample through its standard cross section value at 254 nm.

This presentation reports our effort to improve the absolute accuracy of ozone intensities in the 9-11 μm region via a transfer of the precision of the rotational dipole moment onto the infrared measurement (MW/IR). Our approach was to use MW/IR cross beam experiments and determine the O₃ mixing ratio through alternately measuring pure rotation ozone lines from 692 to 779 GHz. The uncertainty of these pure rotation line intensities is better than 0.1%. The sample cell was a slow flow cross cell and the total pressure inside the sample cell was maintained constant through a proportional–integral–derivative (PID) flow control. Five infrared O₃ spectra were obtained, with a path length of 3.74 m, pressures ranging from 30 to 120 mTorr, and mixing ratio ranging from 0.5 to 0.9. A multi spectrum fitting technique was employed to fit all the FTS spectra simultaneously. The results show that we can determine intensities of the 9.6 μm band with absolute accuracy better than 4%. 