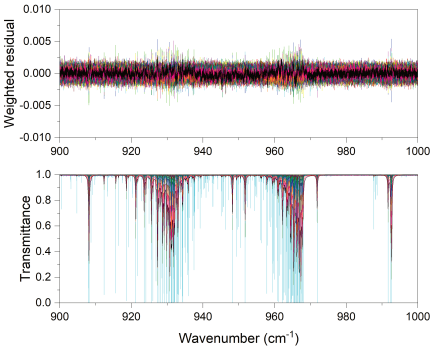
NEW QUANTITATIVE MEASUREMENTS AND SPECTROSCOPIC LINE PARAMETERS OF AMMONIA FOR ATMOSPHERIC REMOTE SENSING

DANIEL J. L. COXON, JEREMY J. HARRISON, *National Centre for Earth Observation, University of Leicester, Leicester, United Kingdom*; D. CHRIS BENNER, V. MALATHY DEVI, *Department of Physics, College of William and Mary, Williamsburg, VA, USA*.



Ammonia is the most abundant alkaline atmospheric gas. It is emitted by a range of anthropogenic sources, most notably through the use of nitrogen-based fertilizers in agriculture. Ammonia plays a major role in the formation of $PM_{2.5}$, which can significantly affect human health.[a] It also contributes to visibility degradation and to the atmospheric deposition of nitrogen on sensitive ecosystems.

The interpretation of satellite remote sensing measurements to determine the amounts of trace gases such as ammonia in the atmosphere requires accurate radiative transfer calculations. These in turn are heavily reliant on accurate spectroscopic line parameters, which are best derived from high quality laboratory measurements.

The HITRAN 2020 database reports line parameters for ammonia that are derived from both theoretical calculations and laboratory measurements.[b] In this work, we report the measurement of new, high-resolution infrared spectra of pure and air-broadened ammonia. Using a multispectrum fitting approach, we determine new spectroscopic line parameters for the NH_3 0100 00 0 s $\leftarrow$ 0000 00 0 a and 0100 00 0 a $\leftarrow$ 0000 00 0 s bands (using HITRAN notation), including the first reported values of self and foreign pressure-induced shifts.

[a] K. E. Wyer *et al.*, *J. Environ. Manage.* 2022, 323, 116285.

[b] I.E. Gordon *et al.*, *J. Quant. Spectrosc. Radiat. Transfer* 2022, 277,107949.