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# Validation of NH3 satellite observations by ground-based FTIR measurements

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Global emissions of reactive nitrogen have been increasing to an unprecedented level due to human activities and are estimated to be a factor four larger than pre-industrial levels. Concentration levels of $NO_x$ are declining, but ammonia (NH3) levels are increasing around the globe. While NH3 at its current concentrations poses significant threats to the environment and human health, relatively little is known about the total budget and global distribution. Surface observations are sparse and mainly available for north-western Europe, the United States and China and are limited by the high costs and poor temporal and spatial resolution. Since the lifetime of atmospheric NH3 is short, on the order of hours to a few days, due to efficient deposition and fast conversion to particulate matter, the existing surface measurements are not sufficient to estimate global concentrations. Advanced space-based IR-sounders such as the Tropospheric Emission Spectrometer (TES), the Infrared Atmospheric Sounding Interferometer (IASI), and the Cross-track Infrared Sounder (CrIS) enable global observations of atmospheric NH3 that help overcome some of the limitations of surface observations. However, the satellite NH3 retrievals are complex requiring extensive validation. Presently there have only been a few dedicated satellite NH3 validation campaigns performed with limited spatial, vertical or temporal coverage. Recently a retrieval methodology was developed for ground-based Fourier Transform Infrared Spectroscopy (FTIR) instruments to obtain vertical concentration profiles of NH3. Here we show the applicability of retrieved columns from nine globally distributed stations with a range of NH3 pollution levels to validate satellite NH3 products.