

On the Quality and Usage of the UARS MLS HNO₃ Measurements

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Although measurement of HNO₃ was not a primary objective of the Upper Atmosphere Research Satellite (UARS) Microwave Limb Sounder (MLS), a significant HNO₃ feature situated just outside the spectral region used to measure ozone imposes a slope through the 205-GHz band that is used to retrieve profiles of gas-phase HNO₃ in the lower stratosphere. HNO₃ became a standard MLS data product with the release of the version 4 (V4) MLS data set. The V4 HNO₃ data have been utilized in a number of scientific studies, and general information on the V4 HNO₃ quality, resolution, and suitability for various studies (in particular investigations of polar stratospheric clouds) can be found in Santee et al. [JGR 103, 13285, 1998] and Santee et al. [JGR 104, 8225, 1999]. Version 5 (V5) MLS data are now available. This poster will briefly describe the changes in the retrieval algorithms between V4 and V5 of relevance to the HNO₃ measurements and will report the vertical resolution, precision, and accuracy of the V5 HNO₃ data. After the MLS V5 data set was produced it was discovered that emissions from the HNO₃ v-9 and v-7 excited vibrational states, which were omitted from the V5 retrieval system, are significant in the spectral region in which MLS HNO₃ is being retrieved. Neglecting the contributions from these lines caused the retrieved MLS V5 values to significantly overestimate HNO₃ abundances at some levels in the stratosphere. An empirical correction to the MLS V5 HNO₃ data set has been derived and will be described in detail. The correction is a linear, strongly temperature-dependent scaling of the original V5 HNO₃ values. For example, the correction leads to reductions in the reported V5 HNO₃ mixing ratios of about 4-8% at 100 hPa, 10-20% at 32 hPa, and 25-35% at 10 hPa, depending on the latitude and season. Comparisons between both V4 and V5 MLS data and various correlative data sources will be shown.

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