

The Influence of Instrumental Line Shape Degradation on the Partial Columns of O_3 , CO , CH_4 and N_2O Derived from High-Resolution FTIR spectrometry

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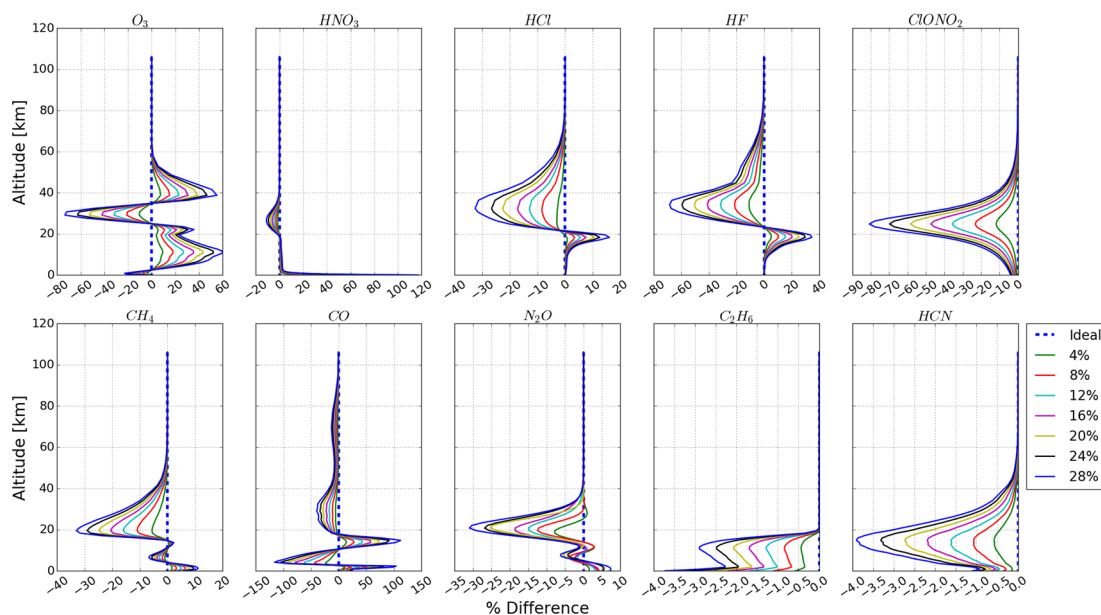


Figure S1. Sensitivity of profile with respect to positive modulation efficiency (ME) deviation for current NDACC mandatory gases (Sun et al., 2018). “4%” represents the ME amplitude deviation is 4%. The nomenclature for other plot labels is straightforward. The results are deduced from the spectra recorded at Hefei on 16 February 2016.

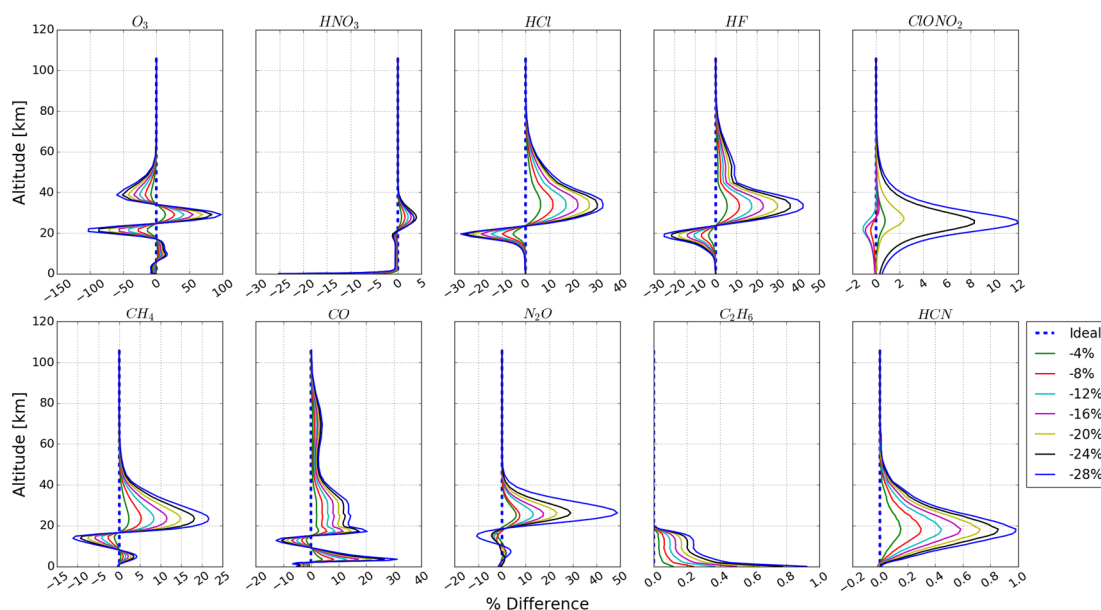


Figure S2. The same as Figure S1 but for negative ME deviation (Sun et al., 2018).

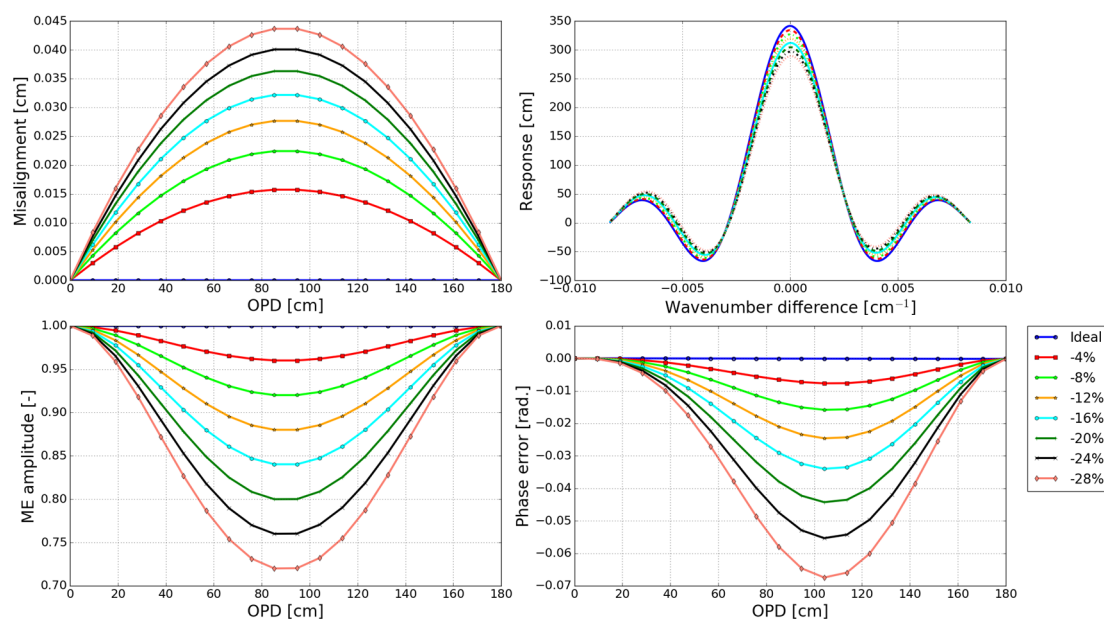


Figure S3. Simulated negative ME deviations along with optical path difference (OPD) (Sun et al., 2018). Top left demonstrates the misalignment, top right is the resulting instrumental line shape (ILS), bottom left is the resulting ME amplitude, and bottom right is the resulting phase error (PE).

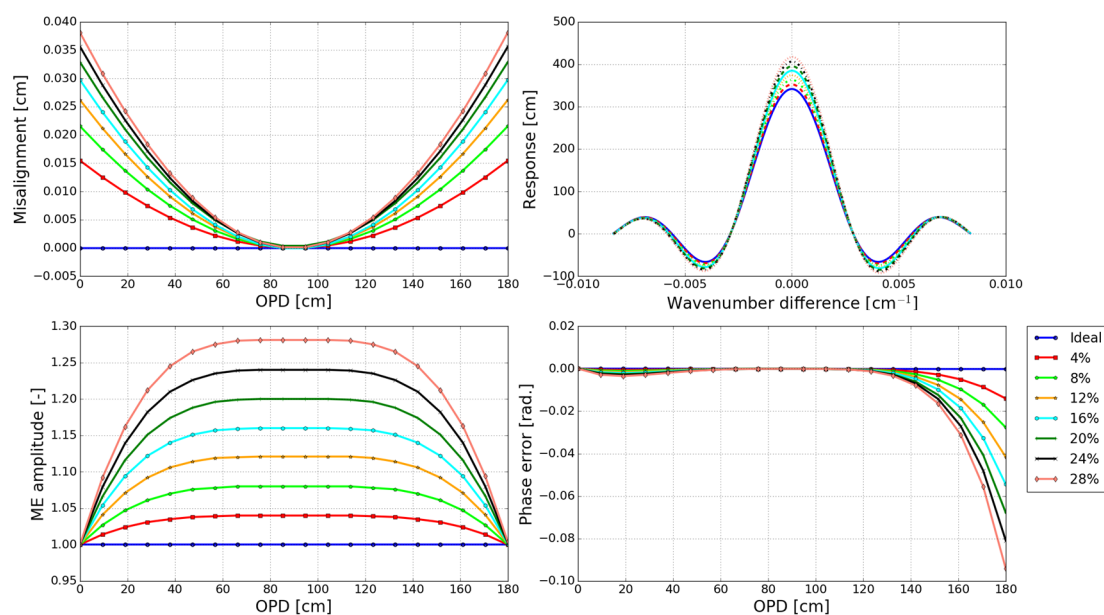


Figure S4. Simulated positive ME deviations along with OPD (Sun et al., 2018). Top left demonstrates the misalignment, top right is the resulting ILS, bottom left is the resulting ME amplitude, and bottom right is the resulting PE.

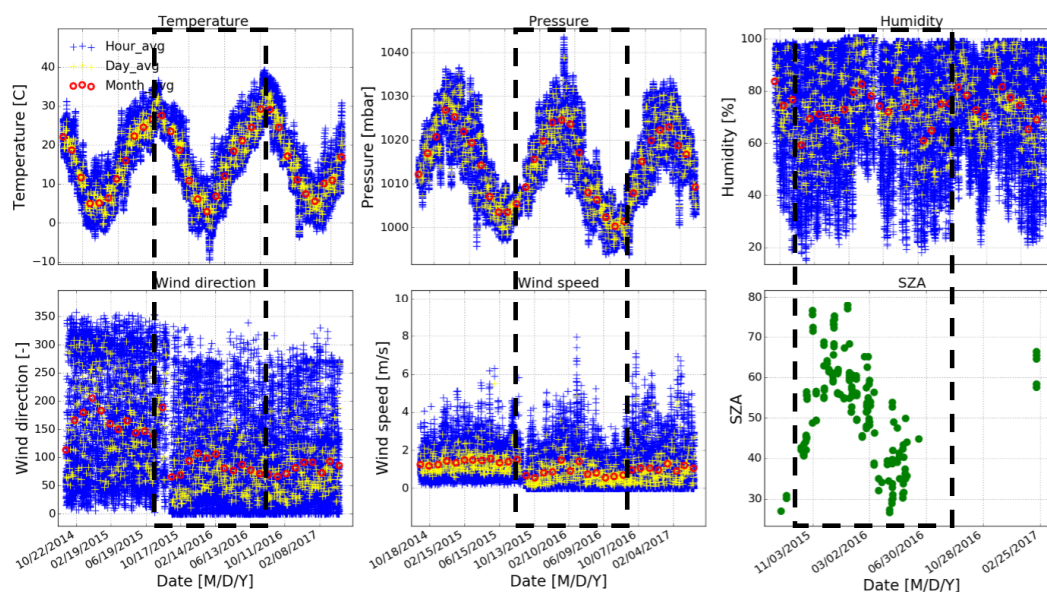


Figure S5. The meteorological data and solar zenith angles (SZAs) record at Hefei. Large span of all these parameters are shown within the period from August 2015 to August 2016 (Sun et al., 2018).

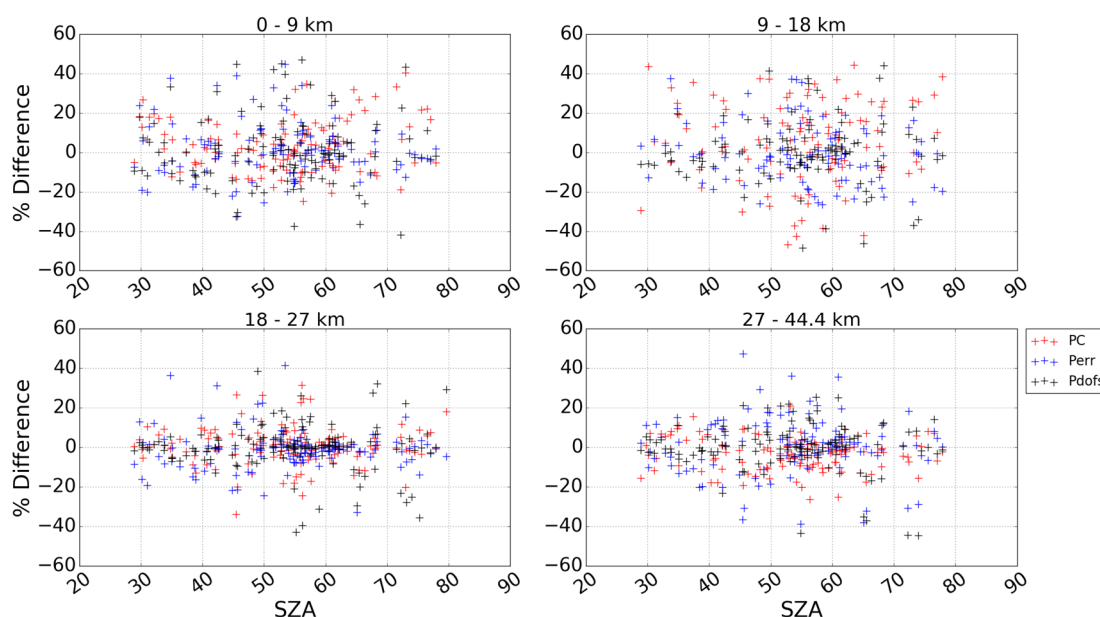


Figure S6. Variability of fractional difference in partial column, partial error, and partial DOFs of O_3 at each partial layer as a function of SZA from August 2015 to August 2016 where ILS j with a maximum ME deviation of 4% is used.

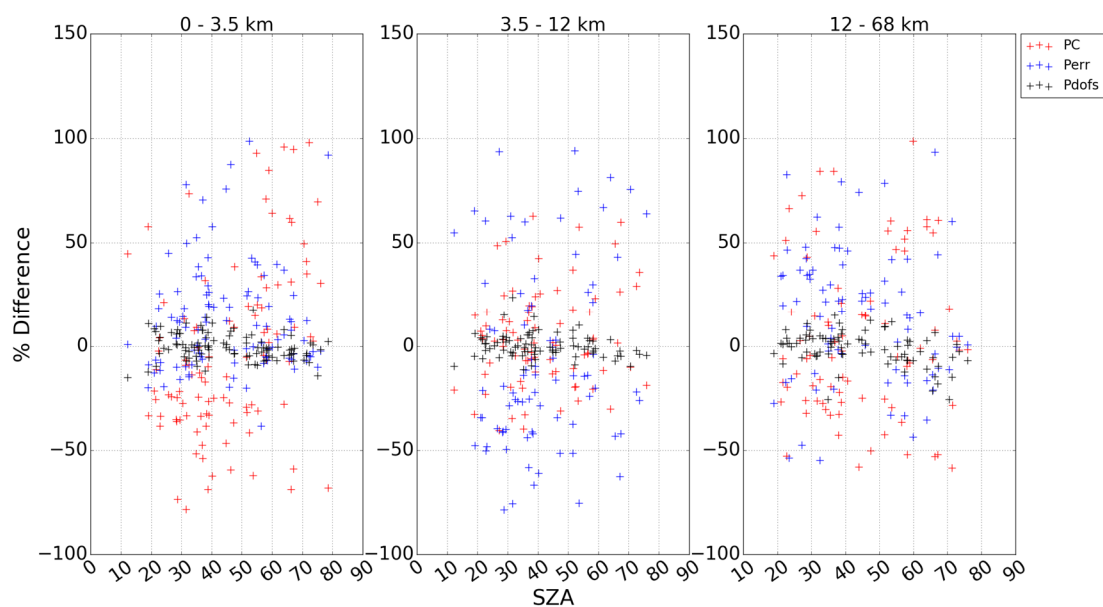


Figure S7. The same as Figure S6 but for CO.

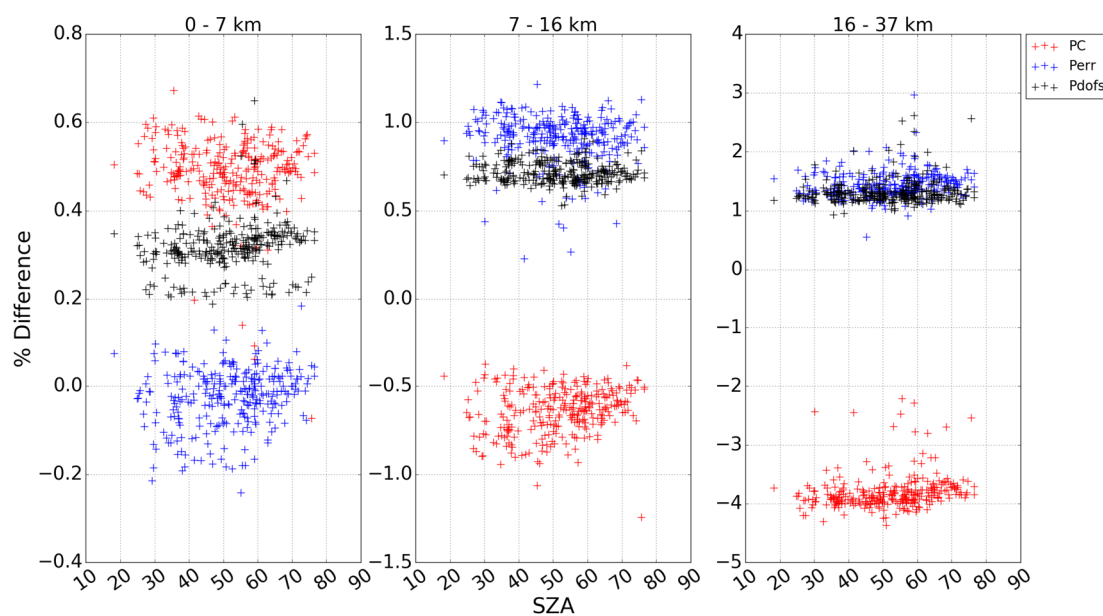


Figure S8. The same as Figure S6 but for CH₄.

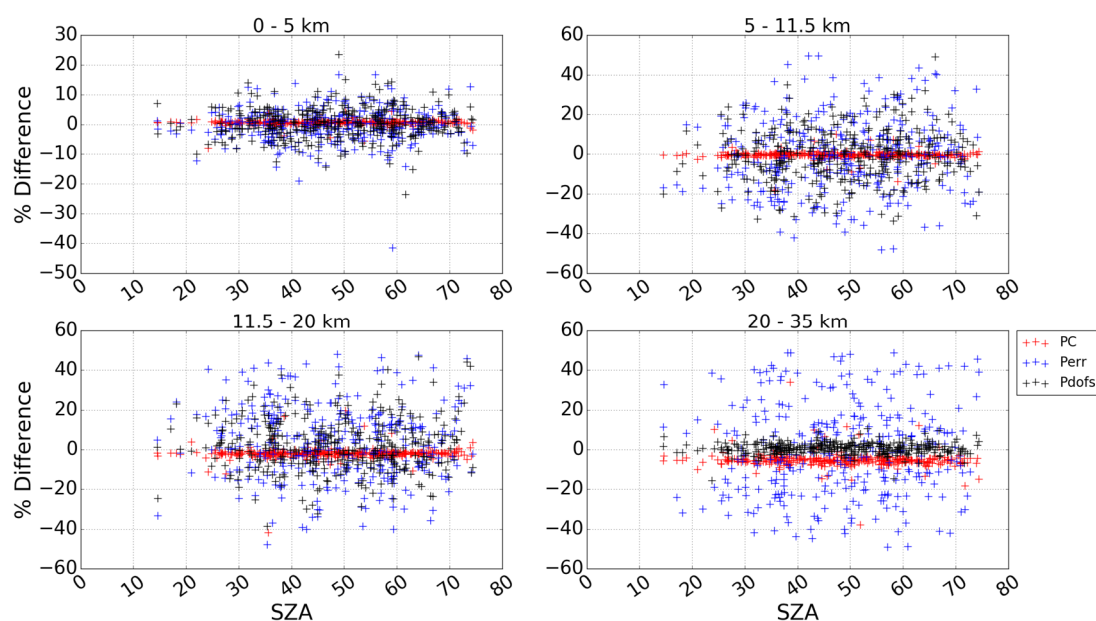


Figure S9. The same as S6 but for N_2O .

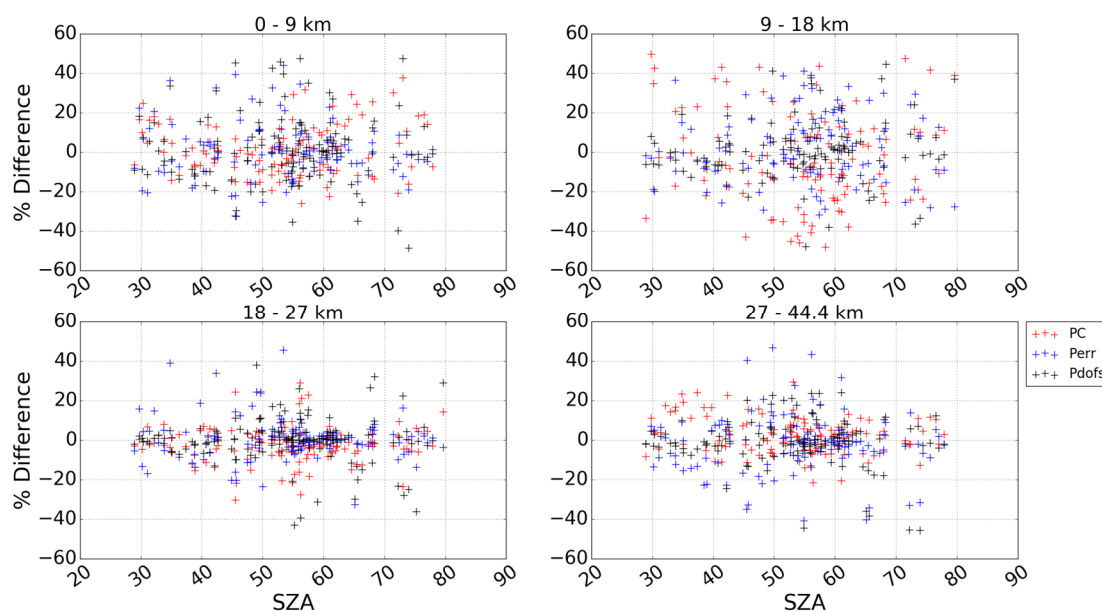


Figure S10. The same as S6 but for a maximum ME deviation of -4%.

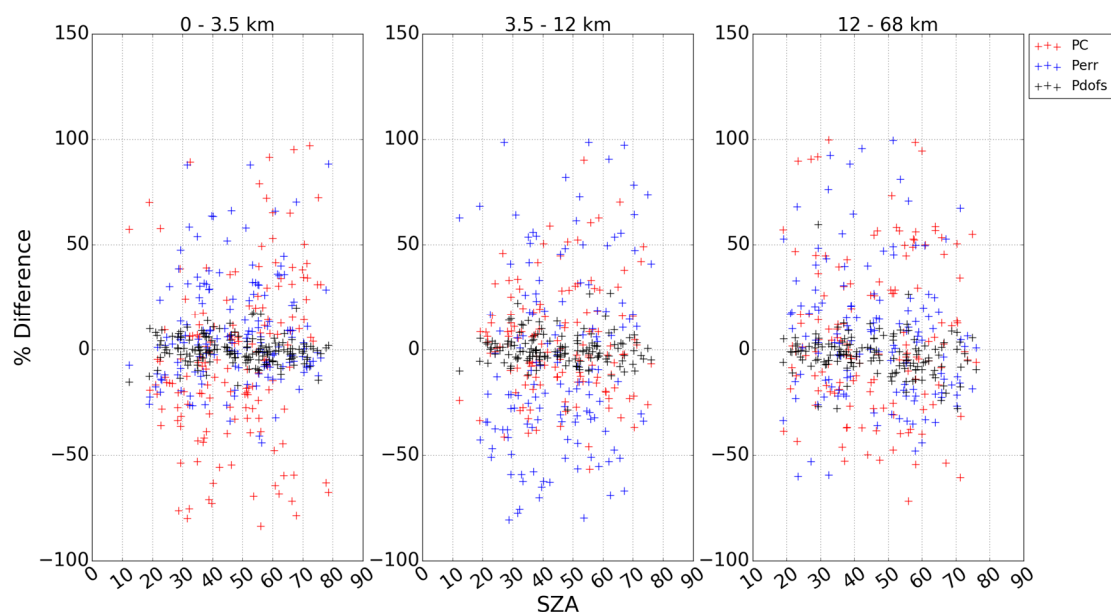


Figure S11. The same as S7 but for a maximum ME deviation of -4% .

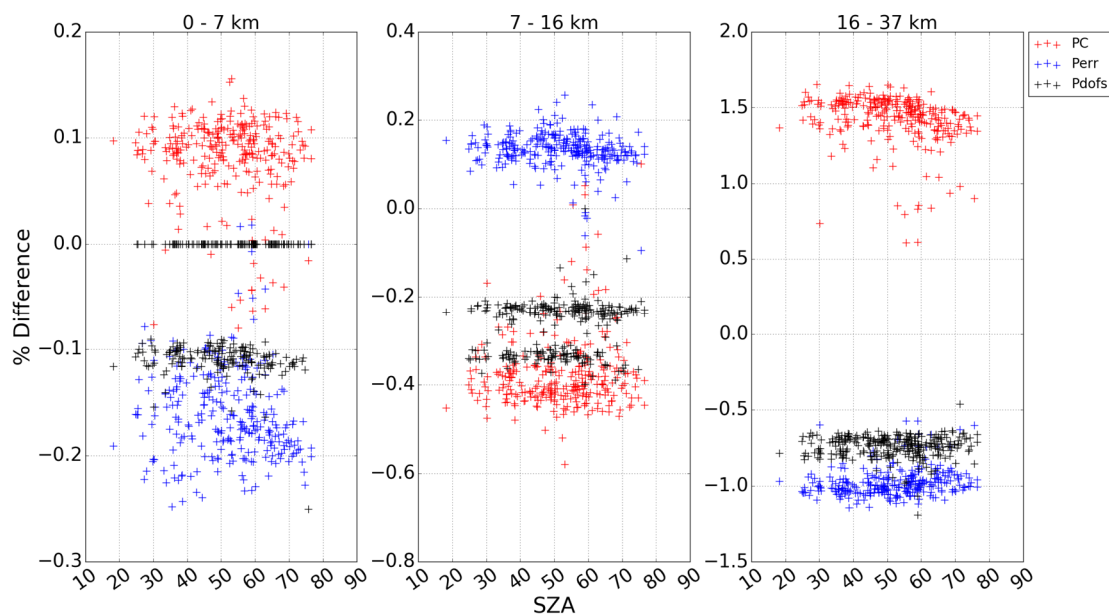


Figure S12. The same as S8 but for a maximum ME deviation of -4% .

References

Sun, Y.; Palm, M.; Liu, C.; Hase, F.; Griffith, D.; Weinzierl, C.; Petri, C.; Wang, W. and Notholt, J. The influence of instrumental line shape degradation on NDACC gas retrievals: total column and profile. *Atmos. Meas. Tech.* **2018**, *11*, 2879–2896. doi:org/10.5194/amt-11-2879-2018, 2018.



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