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Decadal trends of column-integrated water vapor from the NDACC-FTIR network

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The mid-infrared solar absorption FTIR instruments of the Network of the Detection of Atmospheric Composition Change (NDACC) provide the hitherto unused possibility to retrieve trends of atmospheric water vapor around the globe. Measurements of many of the NDACC FTIR sites cover meanwhile a time span of more than 1 decade. We have shown recently that trends in integrated water vapor can be retrieved from these existing long-term measurement time series with unprecedented accuracy and precision (Sussmann et al., 2009; Vogelmann et al., 2010).

Our study utilizes data from 7 FTIR stations with more than 10 years of measurements each, namely: Ny Alesund (78.92 N, 11.92 E, 0.020 km a.s.l.), Thule (76.53 N, 68.74W, 0.225 km a.s.l.), Zugspitze (47.48 N, 10.98 E, 2.964 km a.s.l.), Jungfraujoch (46.5 N, 8.0 E, 3.580 km a.s.l.), Egbert (44.23 N, 79.78 W, 0.251 km a.s.l.), Wollongong (34.41 S, 150.98 E, 0.030 km a.s.l.), and Lauder (45.04 S, 169.68 E, 0.370 km a.s.l.).

The presentation is on ongoing work showing details of our strategy for harmonized retrieval of integrated water vapor from NDACC routine FTIR measurements. This is a challenge due to the strongly differing different water vapor column levels at the different sites (depending on latitude, altitude, and season). First retrieved trends will be discussed in terms of statistical significance. The paper gives also first results on the correlation of integrated water vapor trends with co-located surface temperature trends. The strict correlation observed above sea in earlier work seems not to be fulfilled above land. Possible explanations will be discussed both in terms of trend analysis statistics effects and geophysical reasons.

References

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