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Integrated water vapor above Ny Ålesund, Spitsbergen: a multi-sensor intercomparison

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Abstract. Water vapor is an important constituent of the atmosphere. Because of its abundance and its radiative properties it plays an important role for the radiation budget of the atmosphere and has major influence on weather and climate.

In this work integrated water vapor (IWV) derived from the measurements of three satellite sensors, GOME, SCIAMACHY and AMSU-B, two ground based sensors, a Fourier-transform spectrometer (FTIR), a microwave radiometer for O_3 (RAM) and IWV inferred from GPS zenith path delay (ZPD) measurements, are compared to radio-sonde measurements above Ny Ålesund, 79° N. All six remote sensors exploit different principles and work in different wavelength regions.

All remote sensing instruments reproduce the sonde measurements very well and are highly correlated when compared with the radio-sonde measurements.

The ground-based FTIR shows very little scatter of about 10%. The GPS performs similar to the FTIR at all times except for very low IWV, where the scatter exceeds 50% of the measured IWV. The other remote sensing instruments show scatter of about 20% (standard deviation). The ground-based RAM performs similar to the satellite instruments, despite the fact that the retrieval of IWV is just a by-product of this ozone sensor.

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