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Stratospheric and Upper Tropospheric Water Vapor Observations in Sodankylä

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An intercomparison campaign of balloon borne water vapor instruments took place in Sodankylä in the period of January 29 - February 26, 2004. This research was motivated by the need to improve the quality of water vapor measurements in the lower stratosphere and upper troposphere by balloon-borne instruments. In Sodankylä altogether thirty five balloon payloads were launched during the given period. The payloads included RS80-A, RS-90 and RS-92 type radiosondes manufactured by Vaisala Oy, FN- sonde (a modified version of RS-90 radiosonde by Lindenberg Observatory, Germany) and a chilled mirror hygrometer by Meteolabor, Switzerland (SW-sonde). 12 larger payloads included RS80-A, RS80-H, RS-92, FN-sonde, SW-sonde, NOAA or CFH frost-point hygrometer and FLASH-B Lyman alpha hygrometer. Here we first focus on the performance of two relatively new instruments: FLASH-B hygrometer and RS-92 radiosonde. We compare data from both instruments with the measurements by NOAA frost-point hygrometer and the chilled mirror hygrometer manufactured by Meteolabor, all flown in the same payload. RS-92 is the newest radiosonde type by Vaisala Oy, the manufacturer of the majority of operational radiosondes. Wider use of this instrument is expected to improve the UT humidity measurements by radiosonde network. FLASH-B is a Lyman- alpha fluorescence hygrometer that has been developed by the Central Aerological Observatory in Moscow, Russia. In Sodankylä 14 flights of the instrument were performed and the results indicate that the instrument is capable of good measurements in the stratosphere. Secondly, we present a sequence of lower stratospheric water vapor profiles measured by FLASH and NOAA instruments. During January-February 2004 both inside and outside vortex air was sampled

by balloon payloads, including a vortex filament at an altitude of 21-22 km on February 17, 2004. The latter event was also resolved by ECMWF analysis of PV and water vapor distribution.