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Ice supersaturation as seen from TOVS

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Abstract. We have analysed the upper tropospheric humidity with respect to ice (UTHi) data product obtained from the Television Infrared Observation Satellite (TIROS) Operational Vertical Sounder (TOVS) instrument onboard the National Oceanic and Atmospheric Administration NOAA-14 polar orbiting satellite. While in the production of the official UTHi product values in excess of 100% are ignored, we do not so - in view of many recent results obtained from a variety of other in-situ and remote sensing instruments showing that ice supersaturation frequently occurs in the upper troposphere. We show that TOVS is able to detect ice supersaturation at the correct locations (however, only in less than one percent of its soundings, presumably because of TOVS's low vertical resolution), and that the supersaturation follows the well known exponential behaviour. We conclude that values of UTHi in excess of saturation should not be considered a measurement error anymore. The similar re-analysis of TOVS data back to 1979 could give important insights into trends of upper tropospheric humidity.

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