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On the variability of temperature profiles in the stratosphere: implications for validation

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Defining space-time collocation criteria for validation of measurements requires the information about natural variability of geophysical parameters. In this work, we analyzed the variability of small-scale structure of temperature field in the stratosphere using temperature profiles from radio-soundings at Sodankylä with small time difference between sonde launches. We found that the small-scale structures in temperature profiles become different when the horizontal separation of measurements exceeds 20-30 km. The set of the collocated temperature profiles has allowed obtaining experimental estimates of the horizontal structure function of temperature fluctuations. The spectral analysis of the profiles has shown that vertical wavenumber spectra of temperature fluctuations are similar, even for profiles separated significantly in space and in time (a few hundreds of kilometers, a few hours). Implications of these results for validation of high-resolution profiles are also discussed.