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On small-scale variability of ozone in the stratosphere

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The information about small-scale natural variability of ozone fields is very important for validation, data assimilation and multi-instrument data analyses. To obtain this, very accurate (with uncertainty significantly smaller than the natural variability) and closely collocated in time and space ozone measurements are required. Such measurements are found in the dataset by the GOMOS (Global Ozone Monitoring by Occultation of Stars) and MIPAS (Michelson Interferometer for Passive Atmospheric Sounding) instruments on board the Envisat satellite.

In this work, we study the small-scale ozone variability at distances up to a few hundreds of kilometers. We found that ozone variations for separation distances up to ~300 km are nearly isotropic in latitudinal and longitudinal directions. The rms difference in ozone in two points grows with separation distance and can be as large as 4-6% at ~500 km distance. Among the considered locations/seasons, the ozone variability is the largest at high latitudes in winter and the smallest in the tropics.