



Comparison of cloud liquid water path values derived from ground-based and space-borne remote observations in the sub-Arctic region of Europe

Vladimir Kostsov (1), Anke Kniffka (2), Dmitry Ionov (1), and Martin Stengel (3)

(1) St.Petersburg State University, Faculty of Physics, Atmospheric Physics Dept., St.Petersburg-Petrodvorets, Russian Federation (vlad@troll.phys.spbu.ru), (2) Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology, Karlsruhe, Germany, (3) Satellite-based Climate Monitoring, Deutscher Wetterdienst, Offenbach, Germany

Tropospheric clouds are a very important component of the climate system and of the hydrological cycle in Arctic and sub-Arctic. Liquid water path (LWP) is one of the key parameters of clouds urgently needed for a variety of studies including the snow cover and climate modelling at Northern latitudes. A joint analysis of the LWP values obtained from observations by the SEVIRI satellite instrument and from ground-based observations by the RPG-HATPRO microwave radiometer near St.Petersburg, Russia (60N, 30E) has been made. The SEVIRI-derived LWP measurements are part of the climate data record CLAAS 2 (CLOUD property dAtAset using SEVIRI – Edition 2), that was created by the Satellite Application Facility on Climate Monitoring (CM SAF) based on SEVIRI measurements on the geostationary MSG satellites. The time period of selected datasets spans two years (Dec 2012 – Nov 2014) excluding winter months, since the specific requirements to SEVIRI observations restrict measurements at Northern latitudes in winter when the solar zenith angle is too large. The radiometer measurement site is located very close to the shore of the Gulf of Finland, and the SEVIRI measurements have shown considerable differences between the LWP values over land and over water areas in the region under investigation. Therefore, special attention has been paid to the analysis of the LWP distributions derived from SEVIRI observations at scales from 15 km to 150 km in the vicinity of St.Petersburg. A good agreement between the daily median LWP values obtained from the SEVIRI and the RPG-HATPRO observations has been shown: the rms difference has been estimated as 13 g/m^2 for a warm season and 33 g/m^2 for a cold season. During seven months (February – May, and August – October), the SEVIRI and RPG-HATPRO instruments revealed similar diurnal variations of LWP while considerable discrepancies between the diurnal variations obtained by the two instruments have been detected in June and July. Analysis of the SEVIRI and the RPG-HATPRO LWP values on the long time scale has been done involving the AVHRR and MODIS measurements of LWP as the independence data sources. The AVHRR and MODIS data records were both created in the framework of the ESA CCI “Clouds” (ESA Climate Change Initiative, subproject “Clouds”)