



Long-term changes in solar shortwave and UV irradiance due to clouds and aerosols according to measurements and modelling in Northern Eurasia

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Long-term changes in solar shortwave and UV irradiance since the middle of 20 century due to aerosol and cloudiness were analyzed according to different kinds of data including ground-based and satellite datasets on cloud and aerosol characteristics, WRDC and ERA Interim archives, as well as the results of solar irradiance reconstruction model (Chubarova, 2008) and INM-RSHU chemical-climate model (CCM) (Galín, Smyshlyaev, Volodin, 2007). The retrievals of solar shortwave and UV irradiance from different sources were tested against long-term measurements of Moscow State University Meteorological Observatory since 1954 and some other long-term datasets. The solar irradiance trends due to cloud amount, cloud optical thickness and aerosol optical thickness were considered. The trends in aerosol optical thickness (AOT) from the aerosol climatology (Kinne et al., 2013) were compared with the AOT changes from satellite data and the AERONET long-term dataset. The analysis of the INM-RSHU CCM cloud transmission (CT) showed a good agreement with the measurements, but the CT trends due to cloudiness were much smaller than those obtained from direct measurements and ERA-INTERIM dataset according to which statistically significant positive CT trend were evaluated over several regions of Eastern Europe, Siberia and Far East in spring and summer. In addition, we made the comparisons with the INM-RSHU CCM results with accounting and not accounting for aerosol indirect response. The work was supported by RFBR grant number 18-05-00700.

References:

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