

All-Sky Twilight Polarization Measurements: Mesosphere Boltzmann Temperatures and Meteoric Dust Detection

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The analysis of wide-field polarization CCD-measurements of the twilight sky background started in 2011 is presented. Observations cover the whole twilight and night period in spectral band with effective wavelength equal to 540 nm. The procession procedure includes the separation of single and multiple scattering and retrieval of polarization scattering functions of the atmospheric medium up to 85 km. These functions are found in wide range of scattering angles which is difficult for lidar or space limb techniques.

The single scattering field is close to Rayleigh one for the most part of observation dates. This helps to find the Boltzmann temperature profiles in the upper mesosphere, including the summer mesopause [1]. The temperature values have the single measurement accuracy about 5K, they are compared with present satellite data. Depolarization effect is occasionally seen, reaching the maximum during Perseids activity epoch in 2013 [2]. The scattering functions analysis helps to find the dust layer altitude in mesosphere (81-83 km) and to estimate the particles size.

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[1] Ugolnikov O.S., Maslov I.A. Summer mesosphere temperature distribution from wide-angle polarization measurements of the twilight sky // *Journal of Atmospheric and Solar-Terrestrial Physics*, V.105-106, P.8-14, 2013.

[2] Ugolnikov O.S., Maslov I.A. Mesosphere light scattering depolarization during the Perseids activity epoch by wide-angle polarization camera measurements // *Planetary and Space Science*, V.92, P.117-120, 2014.