Geophysical Research Abstracts, Vol. 7, 10209, 2005
SRef-ID: 1607-7962/gra/EGU05-A-10209

Dynamics of the microclimatic parameters of the ground atmospheric layer during the total solar eclipse on August 11, 1999

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Microclimatological measurements were conducted in the village of Ravnets, General Toshevo municipality, during the total solar eclipse (TSE) on August 11, 1999. Dynamics of the main microclimatic parameters during the eclipse has been investigated. Data are obtained and analyzed for the variation in the air temperature, the atmospheric pressure and the relative air humidity on the ground atmospheric layer at 0.1m, 0.5m, 1m and 2m above the Earth's surface as well as the soil temperature gradient at depths down to 10 cm. Wind velocity and direction were measured at 5m height.

The minimum the air temperature during the TSE was measured 7min 30sec after the total phase. Barometric pressure was changed from 729 mm/Hg - at the beginning of the eclipse (12h 40min) to 728,5 mm/Hg - 30sec after the end of the total phase (14h 12min 50sec). The relative humidity increases up to $\sim$68% at 14h 10min. immediately after the total phase, the humidity decreases and forms a secondary minimum (54%). After that it increases because of the dusty atmosphere and cool air penetration from the high troposphere, which is the optimum for condensation processes. Speed of the wind drops during the total phase and after that increases again. A polar diagram of the wind direction is made using measurements made in 10 min. It shows that the wind direction during the total phase changes and the wind begins to blow in the same direction as the direction of motion of the shadow. Microclimate during the total solar eclipse can be explained with the model of the radiative energy balance at absence of

a direct solar radiation.

Cloud structures in the form of narrow concentric arcs, equally detached from one another were observed after the beginning of the maximum phase. They were observed low above the horizon in WSW direction for 20 minutes and after that quickly dispersed. This cloudiness formation is probably connected with the formation of impact wave of air with low temperature and high humidity as a result of the lunar shadow motion in the atmosphere with supersonic velocity.

These examinations can contribute to understanding the physical mechanisms in the ground atmospheric layer in conditions of suddenly interrupted solar radiation influx.