SEPARATION OF THE EVAPOTRANSPIRAION INTO TRANSPIRATION AND SOIL EVAPORATION USING GROUND MEASUREMENTS DATA AND TWO-SOURCE ENERGY BALANCE MODEL

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Transpiration (evaporation from canopy) is one of the major factors, which along with the soil fertility, the amount of fertilizer and water regime affects the plant production process. The paper presents the results of testing of the two-source energy balance model (TSEB) for separation of evapotranspiration into transpiration and soil evaporation. The energy balance components were calculated. The turbulent heat flux above vegetation and soil was calculated using atmosphere stratification correction and the underlying surface aerodynamic parameters. The latent heat flux above the soil was calculated using the soil aerodynamic resistance, the latent heat flux above the crop canopy was calculated using the Priestley-Taylor and Penman-Monteith equations. The Penman-Monteith equation includes stomatal resistance. The data were obtained for maize crop in the Leningrad region (59°52`57`` s.M., 30°42`28`` z.D.) by automated mobile field agrometeorogical complex (AMFAC). Measurements were conducted under the partial (14.07.2016) and full (03.08.2016) canopy cover condition in the V6 and VT growth stages of maize with projective cover f_c = 0,4; f_c = 0,8 and leaf area index LAI=3,2; LAI =4,2, respectively. The results of transpiration and soil evaporation calculation using TSEB model were shown, as well as the values of the parameters calculated at different canopy growth stages, in similar weather conditions, taking into account the crop projective cover. The calculations were performed using radiometric temperature of vegetation and soil, which can be used with a combination of ground-based and remote sensing (RS) data. Separation of evapotranspiration into transpiration and soil evaporation can be used in the agrotechnology, in the environmental monitoring.

Keywords: transpiration, soil evaporation, energy balance, aerodynamic resistance, radiometric temperature.