

MODELLING THE ANNUAL DYNAMICS OF MOISTURE RESERVES IN ONE-METER SOIL LAYER

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The article presents a single-layer balance model, designed to calculate the dynamics of moisture reserves in the snow cover and in the meter soil layer with a ten-day step during the year. The model is focused on the standard meteorological information, is easily algorithmized, and requires minimal pre-calibration. A distinctive feature of this model is that when carrying out long-term calculations, there is no need to set the amount of moisture reserves annually at the beginning of the growing season, which is especially important for the problem of assessing the impact of climate change on moisture supply. The identification of the model parameters was carried out using data from observations of soil moisture under winter wheat at the Gigant meteorological station in the Rostov region for the period 1971–1986. The model reproduces 81% of the dispersion of productive moisture reserves on the dependent material (the correlation coefficient is 0.90) and from 44 to 92% on the independent material. It has been established that the calculation scheme was stable with respect to the initial values of soil moisture. When setting the initial moisture reserves with an error from –10 to +10%, the calculation error did not exceed 5 mm. The possibility of using the model for long-term forecasting of soil moisture reserves at the beginning of spring with an accuracy acceptable for practice was demonstrated. It was found that year-round soil moisture modeling made it possible to calculate long-term series of moisture reserves and thus to monitor the impact of climate change on the moisture supply of agricultural crops, as well as to assess the frequency of soil droughts in the region.

Keywords: year-round modelling, reserves of productive moisture, soil, long-term forecasting.