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Estimates of the Earth surface influence on the accuracy of numerical prediction of air temperature in Belarus using the WRF model / Lysenko S.A., Zaiko P.O. // Hydrometeorological Research and Forecasting, 2021, no. 4 (382), pp. 50-68.

The spatial structure of land use and biophysical characteristics of land surface (albedo, leaf index, and vegetation cover) are updated using the GLASS (Global Land Surface Satellite) and GLC2019 (Global Land Cover, 2019) modern satellite databases for mesoscale numerical weather prediction with the WRF model for the territory of Belarus. The series of WRF-based numerical experiments was performed to verify the influence of the updated characteristics on the forecast quality for some difficult to predict winter cases. The model was initialized by the GFS (Global Forecast System, NCEP) global numerical weather prediction model. It is shown that the use of high-resolution land use data in the WRF and the consideration of the new albedo and leaf index distribution over the territory of Belarus can reduce the root-mean-square error (RMSE) of short-range (to 48 hours) forecasts of surface air temperature by 16–33% as compared to the GFS. The RMSE of the temperature forecast for the weather stations in Belarus for a forecast lead time of 12, 24, 36, and 48 hours decreased on average by 0.40°C (19%), 0.35°C (10%), 0.68°C (23%), and 0.56°C (15%), respectively. The most significant decrease in RMSE of the numerical forecast of temperature (up to 2.1 °C) was obtained for the daytime (for a lead time of 12 and 36 hours), when positive feedbacks between albedo and temperature of the land surface are manifested most.

Keywords: numerical weather prediction, WRF, digital land surface model, albedo, leaf area index, forecast model validation

Tab. 1. Fig. 5. Ref. 20.