DOI: https://doi.org/10.37162/2618-9631-2024-4-109-127

Freezing precipitation in European Russia in 1979-2022 and its reproduction by the ERA5 reanalysis / Leonov I.I., Sokolikhina N.N., Lavrenteva A.I. // Hydrometeorological research and forecasts, 2024, no. 4 (394), pp. 109-127.

The quality of reproduction of freezing precipitation by the ERA5 reanalysis in European Russia is assessed. The analysis was performed using the data of the main 3-hour observations of weather phenomena and the ERA5 atmospheric reanalysis data with a step of 0.25° in space and 1 hour in time. The maps of the average number of days with freezing precipitation in the form of drizzle, rain, and their combination were drawn for the period from 1979 to 2022. Similar maps of the average number of days with freezing rain were obtained from the ERA5 data on the precipitation type. It is shown that the ERA5 successfully reproduces individual cases of high-intensity freezing precipitation formed under the stratification of the "warm nose" type. When comparing the reanalysis data on the number of simulated cases of freezing rain with observational data from 214 meteorological stations, the coefficient of determination R^2 was 0.291 for freezing rain and 0.14 for freezing drizzle. The low values of the coefficients of determination are related to the fact that the formation of freezing rain in the ERA5 is possible only in the presence of a melting layer, due to which the predominant number of cases of freezing precipitation occurring in a completely cold atmosphere is not reproduced by the reanalysis. The ERA5 data on the precipitation type are most useful for analyzing the conditions of high-intensity freezing rain formed according to the "classic mechanism".

Keywords: severe weather events, ice accretion, icing, freezing precipitation, freezing rain, ice pellets, glaze ice, reanalysis, ERA5

Tab. 1. Fig. 7. Ref. 21.