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VALIDATION OF THE CFSv2 MODEL TECHNOLOGIES FOR LONG RANGE WEATHER FORECASTS: LITHUANIA'S CASE

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The second version of the NOAA National Centers for Environmental Prediction's (NCEP's) Climate Forecast System (CFSv2) was made operational at NCEP in 2011. The objective of this paper is to assess the validation of long-range forecasts generated for the territory of Lithuania using the CFSv2, and to determine the atmospheric circulation patterns present at the time of conclusion of the respective long-range forecasts. Forecasts are from initial conditions of the last 30 days, with 4 runs from each day. Forecast ensembles consist of 40 members from initial a period of 10 days. The 1st ensemble is from the earliest 10 days, the 2nd ensemble from the second earliest 10 days, and 3rd ensemble from the latest 10 days.

This study covers the air temperature (measured at the height of 2 metres) and precipitation data collected in Lithuania from 18 meteorological stations during the period between 2012 and 2018, as well as long-range forecast data generated using the CFSv2 model. The study analyses the air temperature and precipitation amount obtained from two forecasts with different mean spatial – three-month mean and monthly mean – anomalies (anomalies are calculated respect to 1981–2010 climatology).

The validation of weather forecasts for Lithuania was performed in accordance with three criteria: the correspondence between the ranges of predicted anomalies and those actually observed within the territory of Lithuania; the state (plus/minus) of the predicted anomalies; and the absolute error of the respective predicted anomaly. Our study has found that long-range forecasts concluded 0-20 days in advance of the target month of season tend to be the most reliable. Atmospheric circulation patterns present at the time of conclusion of the long-range forecasts were studied by analysing the standardised NAO (North Atlantic Oscillation) and AO (Arctic Oscillation) indexes, as well as circulation types in accordance with the Hess-Brezowsky classification.

Assessment of the atmospheric circulation patterns favourable/unfavourable for the conclusion of weather forecasts has shown that the unreliability of forecasts was usually caused by the negative NAO and AO phases prevalent during the conclusion thereof, while reliable forecasts were typically determined by the positive phases of the same. Using the Hess-Brezowsky classification of atmospheric circulation patterns, forecasts of the monthly mean spatial anomalies with regards to air temperature and precipitation have been found to benefit from the presence of the westerly circulation subtypes during the conclusion thereof, while forecasts of three-month-mean spatial anomalies typically benefit from more frequent subtypes of meridional circulation.