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Flow-dependent predictability of wintertime Euro-Atlantic weather regimes in medium-range forecasts

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This study assesses the medium-range flow-dependent forecast skill of Euro-Atlantic weather regimes: the positive and negative phases of the North Atlantic Oscillation (NAO+ and NAO-), Atlantic ridge (ATLR), and Euro-Atlantic blocking (EABL), for extended winters (November–March) in the periods 2006/2007–2013/2014 and 1985/1986–2013/2014 using The Interactive Grand Global Ensemble (TIGGE) and the National Oceanic and Atmospheric Administration (NOAA)'s Global Ensemble Forecasting System (GEFS) reforecast datasets, respectively. The models show greater-than-observed (smaller-than-observed) frequencies of NAO- and ATLR (NAO+) with forecast lead time. The increased frequency of NAO- is not due to its excess persistence but due to more frequent transitions mainly from ATLR, but also from NAO+. In turn, NAO+ is under-persistent. The models show the highest probabilistic skill for forecasts initialised on NAO- and the NAO- forecasts during the TIGGE period. However, the GEFS reforecast during the period 1985/1986–2013/2014 revealed that these recent high skills reflect the occurrence of four long-lasting (>30 days) NAO- events in 2009/2010–2013/2014 and that the skill for forecasts initialised on NAO- before 2009/2010 (the longest duration was 22 days and the second-longest 16 days) was the lowest. The longer the NAO- events persist, the higher the skill of forecasts initialised on NAO-. The skill dependency on regime duration is less clearly observed for the other regimes. In addition, the GEFS reforecast also revealed that the highest skill of the NAO- forecasts during the period 1985/1986–2013/2014 is attributed to the higher skill of the NAO- forecasts during the active NAO- periods. The EABL forecasts initialised on ATLR show the lowest skill, followed by the NAO- (EABL) forecasts initialised on NAO+ or ATLR (NAO+). These results suggest that the recent models still have difficulties in predicting the onset of blocking.

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