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The window of opportunity for subseasonal land cold extreme prediction over Eurasia

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Subseasonal prediction of extremes has emerged as a top forecast priority but remains a great challenge. In this work, we explored two physical modes controlling the subseasonal variation and prediction of land cold extremes over Eurasia: the so-called North Atlantic Oscillation (NAO) and the Eurasian Meridional Dipole mode (EMD). The ECMWF model has shown its skill in predicting the Eurasian land cold extremes 2-4 weeks in advance mainly because of the skillful prediction of NAO and EMD. Further, we separated these observed events into the good prediction and poor prediction groups for those two modes to reveal the potential factors influencing the subseasonal prediction of land cold extremes. It is found that the good prediction group has a stronger initial amplitude and longer persistence, while the poor prediction group has a relatively weaker initial amplitude but rapid intensification. For EMD, the predictability is mainly due to the skillful prediction of the Ural blocking which is further traced back to the stratospheric variations.