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Effect of stratospheric sudden warmings on the predictability of the tropospheric NAM

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Impact of the stratospheric sudden warmings (SSWs) on the predictability of the tropospheric Northern Annular Mode (NAM) variability was examined for recent nine winters from 2001/2 to 2009/10 when we had eight major SSWs during this period. The predictability has been examined through sets of numerical experiments using an atmospheric general circulation model of the Meteorological Research Institute that includes well-resolved stratosphere and land processes. It is found that the timing of occurrence of SSW sometimes becomes an important turning date for the predictability of tropospheric NAM variability. In fact, for winters of 2003/4, 2005/6 and 2009/10, the predictability is very good and is more than a few months if prediction is initialized before the occurrence of the SSWs. However, it turns to be rather worse if it is initialized after the SSWs. These winters are characterized by the occurrence of quasi-periodic stratospheric variability called the polar-night jet oscillation (PJO), and the waves that create the SSWs were planetary wave of mainly zonal wavenumber one. On the other hand, the SSW of 2008/9 was created by almost pure planetary wave of zonal wavenumber two. In this winter, the predictability becomes better and have more than a few months only when prediction is initialized after the SSW. Effect of the SSWs on the predictability of the tropospheric NAM and its origin are discussed.