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## **Impact of satellite observations on forecasting sudden stratospheric warmings**

Observational impacts of satellite data assimilation on extended-range forecasts of sudden stratospheric warmings (SSWs) are investigated by conducting ensemble reforecast experiments starting from the Japanese novel reanalysis products: the Japanese 55-year reanalysis (JRA-55) and its equivalent assimilating conventional observations only (JRA-55C). A comparative examination on the reproducibility for SSWs between the two ensemble forecasts reveals that the impact of satellite observations is quite significant for forecasts starting 5 days before the SSW onset. The reproducibility of the SSW onset in JRA-55C forecasts is about 20% lower than that of JRA-55 forecasts, which correctly capture the onset timing of SSWs. Moreover, some of the forecasts of vortex-splitting SSWs show a sudden appearance of deep difference, which lasts over a few months in the lower stratosphere and significantly affects the surface climate. Such results highlight an important role of mesospheric and upper stratospheric initial conditions on forecasting the onset and development of SSWs.

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