



Effects of non-orographic gravity wave drag on seasonal and medium-range forecasts in a global forecast model

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The spectral parameterizations of non-orographic gravity wave drag (GWD) induced by convection and front have been implemented in a global atmospheric forecast model with low top near 0.3 hPa. The spectral convective GWD parameterization replaces the existing one that considers only a stationary part of GWs induced by convection. The effects of spectral frontal GWD parameterization are considered additionally. When the new convective and frontal GWD parameterizations are used, the Rayleigh friction, which was applied above 2 hPa to mimic the effects of the missing GWD in the model with the stationary convective GWD only, is removed. Including the new GWD parameterizations improves the seasonal simulation of zonal-mean zonal wind in both the stratosphere and troposphere. The improvements are induced not only by the GWD change but also by the changes in other forcing terms such as resolved wave forcing that interact with the GWD. The experiments for medium-range forecasts are also conducted and improved skill scores on wind speed are achieved with the new GWD, especially in the winter upper stratosphere and tropical upper troposphere.