The impact of source-related nonorographic gravity wave parameterizations on the circulation of the middle atmosphere

Alvaro DE LA CÁMARA[1], and François LOTT[2]

[1] *National Center for Atmospheric Research, Boulder CO, U.S.A.*
[2] *Laboratoire de Météorologie Dynamique du CNRS, Paris, France.*

Relating the launched gravity wave (GW) stress in nonorographic GW (NGW) parameterizations to the intensity of their sources introduces GW intermittency, a pronounced seasonal cycle, and allows the GW stress to change in a changing climate. We will present results regarding these issues using the LMDZ general circulation model, which incorporates novel NGW schemes where the stress is coupled to the source intensity, namely convection (Lott and Guez, 2013), and fronts and jet imbalances (de la Cámara and Lott, 2015).

Our results show that the source-induced NGW intermittency helps LMDZ to simulate a stratospheric final warming in the Southern Hemisphere with a realistic timing (de la Cámara et al. 2016); therefore contributing to significantly reduce the cold pole bias in climate models. We will also show that the source-induced seasonal cycle of GW stress modulates the residual circulation, especially in the Northern Hemisphere. Warmer climate simulations show that the GWD has a stronger seasonality when linked to the GW sources, but no dramatic amplification of climate change in the stratosphere is found due to the changes in nonorographic GW specifications.

Key words: GW parameterization, stratospheric final warming, seasonal cycle, Brewer-Dobson circulation.

References

de la Cámara, A., and F. Lott, 2015: *Geophysical Research Letters*, **42**, 2071-2078.

de la Cámara, A., and Coauthors, 2016: *Journal of Atmospheric Sciences*, doi:10.1175/JAS-D-15-0377.1, in press.

Lott, F., and L. Guez, 2013: *Journal of Geophysical Research: Atmospheres*, **118**, 8897-8909.