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Evaluating the Accuracy of Resolution-Limited Gravity Wave Simulations in the Mesosphere and Lower Thermosphere

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Mesoscale and global scale weather models fail to resolve the spatial scales necessary to characterize gravity wave (GW) influences in the mesosphere and lower thermosphere (MLT). GW parameterizations imposed by under-resolved models are known to reduce the accuracy of predicted wind and temperature fields at large scales [Pedatella et al., 2014], and many studies have shown the capacity for considerable improvement when resolution is increased down to O(10km) or better [Liu, 2016, and citations therein]. Understanding the physical consequences of under-resolved simulations can provide a metric for the accuracy of GW characterization anywhere in the atmosphere and have broad applicability to the larger atmospheric community. To that end, an anelastic numerical model is used to evaluate the accuracy of GW-induced dynamics as a function of imposed resolution, determining the resolution needed to characterize the large scale dynamics in a given environment.

References

Pedatella, N. M., Fuller-Rowell, T., Wang, H., Jin, H., Miyoshi, Y., Fujiwara, H., … Goncharenko, L. (2014). The Neutral dynamics during the 2009 sudden stratosphere warming simulated by different whole atmosphere models. Journal of Geophysical Research A: Space Physics, 119(2), 1306–1324. https://doi.org/10.1002/2013JA019421

Liu, H. L. (2016). Variability and predictability of the space environment as related to lower atmosphere forcing. Space Weather, 14(9), 634–658. https://doi.org/10.1002/2016SW001450