Can we improve gravity wave parameterizations by imposing sources at all altitudes in the atmosphere?

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A multiwave non-orographic gravity wave (GW) scheme is adapted to represent waves of small intrinsic phase speed and sources located at all altitudes in the troposphere and middle atmosphere. Using reanalysis data, these changes impose larger amplitude saturated waves everywhere in the middle atmosphere, which permits to produce more realistic GW vertical spectra than when the phase speeds are large and the sources are in the troposphere only. The same scheme, tested online in the Laboratoire de Météorologie Dynamique Zoom (LMDz) general circulation model, performs at least as well as the operational non-orographic GW scheme. Some modest benefits are seen, for instance, in the equatorial tilt with altitude of the winter jets in the middle atmosphere. Although the scheme includes the effects of inertial waves, which are more and more often detected in the mesosphere, the configuration that gives a reasonable climatology in LMDz hinders the vertical propagation of these parameterized waves and do not generally reach mesospheric altitudes.