Diverse dynamical response to orographic gravity wave drag hotspots - a zonal mean perspective

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In the extratropical atmosphere, Rossby waves (RWs) and internal gravity waves (GWs) propagating from the troposphere mediate a coupling with the middle atmosphere by influencing the dynamics herein. In the current generation chemistry-climate models (CCMs), RW effects are well resolved while GW effects have to be parameterized. Here, we analyze orographic GW (OGW) interaction with resolved dynamics in a comprehensive CCM on the time scale of days. For this, we apply a recently developed method of strong OGW drag event composites for the three strongest northern hemisphere OGW hotspots. We show that locally-strong OGW events considerably alter the properties of resolved wave propagation into the middle atmosphere, which subsequently influences zonal winds and RW transience. Our results demonstrate that the influence of OGWs is critically dependent on the hotspot region, which underlines the OGW-resolved dynamics interaction being a two-way process.