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# Ray-tracing simulation of gravity waves excited by tropical convection in comparison with SABER satellite observations

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Gravity waves (GWs) are known as a coupling mechanism between different atmospheric layers. They contribute to the wave-driving of the QBO and are also responsible for driving large scale circulations like the Brewer-Dobson circulation. One major and highly variable source of GWs is convection. Deep convection in the tropics excites GWs with prominent amplitudes and horizontal phase speeds of up to 90 m/s. These GWs propagate upward and, when breaking, release the wave's momentum, thus, accelerate the background flow. The direction and magnitude of the acceleration strongly depends on wind filtering between the convective GW source and the considered altitude. Both, the generation mechanism of GWs close to the top of deep convective towers and the wind filtering process during GW propagation largely influence the GW spectrum found in the tropical middle atmosphere and therefore magnitude and direction of the acceleration. We present the results of GW ray-tracing calculations from tropospheric (convective) sources up to the mesosphere. The Gravity wave Regional Or Global RAy-Tracer (GROGRAT) was used to perform the GW trajectory calculations. The convective GW source scheme from Yonsei University (South Korea) served as the lower boundary condition to quantify the GW excitation from convection. Heating rates, cloud top data, and atmospheric background data were provided by the MERRA dataset for the calculation of convective forcing from deep convection and for the atmospheric background for the ray-tracing calculations afterwards. In order to validate our ray-tracing simulation results, we compare them to satellite measurements of temperature amplitudes and momentum fluxes from the SABER instrument. Therefore, observational constrains from limb-sounding instruments have been quantified. Influences of orbit geometry, the instrument's observational filter, and the wavelength shift in the observed GW spectrum are discussed. Only by including convective GW sources, geographic structures in the observed global GW momentum flux distribution such as tropical maxima above continents and the Asian monsoon are matched by our model.