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Global Occurrence Frequencies of Stratospheric Gravity Waves from Atmospheric Infrared Sounder Observations

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Convective waves are an important driver of the equator-to-pole circulation in the stratospheric summer hemisphere, but their nature is not well known. Previous studies showing tight relationships between deep convection and gravity waves mainly focus on tropical latitudes. For mid-latitudes most analyses are based on case studies. Here we present new global-scale occurrence frequency analyses of gravity waves and deep convection. The study is based on observations during the years 2003 to 2010 made by the Atmospheric Infrared Sounder (AIRS) onboard NASA's Aqua satellite. The statistics cover about 350 billion individual AIRS radiance measurements. For this study we optimized existing detection algorithms for deep convection and stratospheric gravity waves in IR nadir sounder data in order to become more sensitive at mid- and high latitudes. Seasonal day- and night-time maps with high horizontal resolution (0.5 x 0.5 degrees) reveal multiple hotspots of stratospheric gravity wave activity. Additional information on deep convection and orography is used to perform a simple classification of wave types. The results give a global view of gravity wave occurrences in the stratosphere and insight into their sources below.