

This thesis is concerned with the role of internal gravity waves (IGWs) in the stratospheric dynamics and variability demonstrating the effect of spatiotemporal distribution of their activity on the stratospheric dynamics and transport. The first part introduces a theoretical overview of the most recent as well as classical approaches used for description of the wave-mean interaction in the middle atmosphere. Methodology for an IGW analysis from the GPS radio occultation density data is described in the next chapter and the advantages of utilization of density data are listed. The third chapter presents results describing the peculiar dynamics and anomalous IGW activity in the Eastern Asia/Northern Pacific region. An important part is dedicated to a discussion of accuracy limits and usability of different IGW activity proxies. The possible impact of the localized IGW activity is investigated using a mechanistic middle and upper atmosphere model in the last chapter. Sensitivity simulations are used to demonstrate an important role of the spatial distribution of IGW activity for a formation of planetary waves and for the longitudinal variability of the Brewer-Dobson circulation. Implications for the middle atmospheric and climate change research are discussed along with consequences for parameterizations of IGWs in global climate models.