

Seminar über Microwave Physics and Atmospheric Physics

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Titel: Stratospheric gravity waves excited by a propagating Rossby
wave train - A DEEPWAVE Case Study

Stratospheric gravity waves observed during the DEEPWAVE research flight RF25 over the Southern Ocean are analyzed and compared with numerical weather prediction (NWP) model results. The quantitative agreement of the NWP model output and the tropospheric and lower stratospheric observations is remarkable. The high-resolution NWP models are even able to reproduce qualitatively the observed upper stratospheric gravity waves detected by an airborne Rayleigh lidar. The usage of high-resolution ERA5 data - partially capturing the long internal gravity waves - enabled a thorough interpretation of the particular event. Here, the observed and modeled gravity waves are excited by the stratospheric flow past a deep tropopause depression belonging to an eastward propagating Rossby wave train. In the reference frame of the propagating Rossby wave, vertically propagating hydrostatic gravity waves appear stationary; in reality, of course, they are transient and propagate horizontally at the phase speed of the Rossby wave. The subsequent refraction of these transient gravity waves into the polar night jet explains their observed and modeled patchy stratospheric occurrence near 60°S. The combination of both unique airborne observations and high-resolution NWP output provides evidence for the one case investigated in this paper. As the excitation of such gravity waves persists during the quasi-linear propagation phase of the Rossby wave's life cycle, a hypothesis is formulated that parts of the stratospheric gravity wave belt over the Southern Ocean might be generated by such Rossby waves trains propagating along the mid-latitude wave guide.

Zeit: Freitag, 6. Mai 2022, 10:15 Uhr

Ort: Raum A97, ExWi, Sidlerstrasse 5, 3012 Bern
<https://unibe-ch.zoom.us/j/97081325603?pwd=d0ozME5xOS9pQVNxallLem81VHQyZz09>
Meeting ID: 970 8132 5603
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