Geophysical Research Abstracts
Vol. 18, EGU2016-8708, 2016
EGU General Assembly 2016

Gravity wave forcing during the austral stratospheric polar vortex breakdown as simulated by LMDz

Alvaro de la Camara (1,2), François Lott (2), Valerian Jewtoukoff (2), Riwal Plougonven (2), and Albert Hertzog (2)

(1) National Center for Atmospheric Research, Boulder, United States (acamara@ucar.edu), (2) Laboratoire de Meteorologie Dynamique du CNRS, Paris, France

The austral stratospheric final warming date is often predicted with substantial delay in most climate models, a systematic error that is generally attributed to insufficient parameterized gravity wave (GW) drag in the stratosphere around 60°S. This bias is not present in the LMDz general circulation model, a property that we use to analyze the contribution of the different types of waves in the model. For this purpose, the resolved and unresolved wave forcing of the middle atmosphere during the austral spring are examined in LMDz and reanalysis data, and a good agreement is found between the two datasets. The role of parameterized orographic and nonorographic GWs in LMDz is further examined, and it is found that orographic and nonorographic GWs contribute evenly to the GW forcing in the stratosphere, unlike many other climate models in which orographic GWs are the main contributor. This result is shown to be in good agreement with GW-resolving operational analysis products. We will demonstrate that the significant contribution of the nonorographic GWs is related to the fact that the source-related nonorographic GW parameterizations used in LMDz produce very intermittent momentum fluxes, in qualitative agreement with recent observations. This yields sporadic, high-amplitude events during which the GWs break in the stratosphere and force the circulation at lower altitudes than more homogeneously distributed nonorographic GW parameterizations do.