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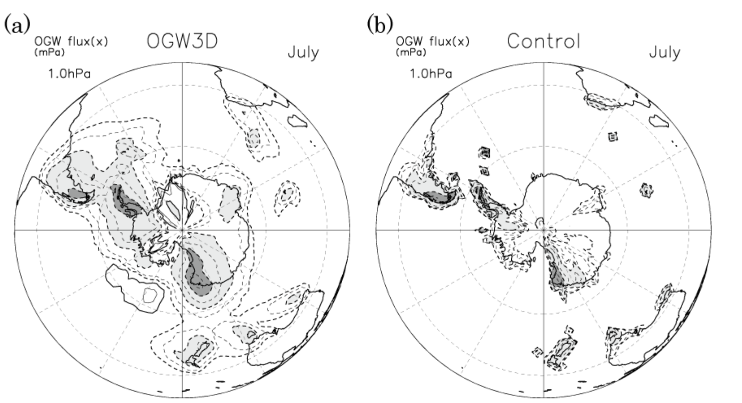

Figure 1, Climatology of orographic GW pseudomomentum flux at 1 hPa for July in (a) OGW3D and (b) CONTROL. The contour levels are ±0.1, 0.3, 1.0, 3.0, 10.0, and 30.0 mPa. The light and dark shadings are used for values less than -1.0 mPa and -10.0 mPa, respectively.

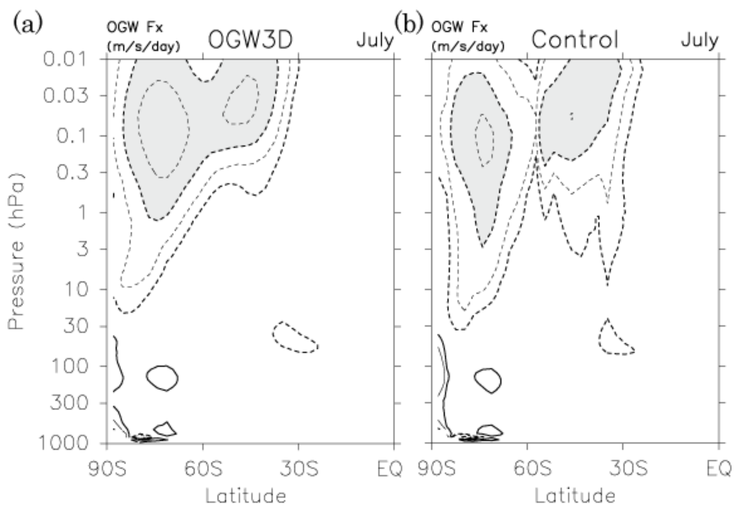

Figure 2, Climatology of zonal mean zonal component of orographic GW forcing for (a) OGW3D and (b) CONTROL. The contour levels are 0.1, 0.3, 1.0 and 3.0 m s^{-1} day^{-1}. The light shading indicates values smaller than -1.0 m s^{-1} day^{-1}.

- We developed a new orographic gravity wave parameterization(GWP) scheme, in which
  - Location and local wavenumbers of steady GW packets are calculated by integrating the ray tracing equations in the vertical.
  - GW forcing is calculated as the convergence of pseudomomentum flux, which includes the forcing due to horizontal refraction.
  - Horizontal inhomogeneity is approximated using Taylor series expansion, so that the calculation can be performed exclusively in each vertical column under the parallelization.
- We performed a pair of numerical experiments using the high-top version of MIROC-AGCM for 50 years, with the new GWP scheme (OGW3D) and the conventional scheme (CONTROL), respectively. Compared with CONTROL, in OGW3D simulated climatological GW forcing in the SH winter is expanded in horizontal (Fig. 1) and the well-known gap at 60°S is alleviated (Fig. 2). The climatological polar night jet seems not much influenced, suggesting the contribution of zonally asymmetric response like the enhancement of planetary waves.