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Contribution of equatorial planetary waves to the temperature structure near the tropical tropopause

K. M. Grise (1) and D. W. J. Thompson (2)

(1) McGill University, Department of Atmospheric and Oceanic Sciences, Montreal, Canada (kevin.grise@mcgill.ca), (2) Colorado State University, Department of Atmospheric Science, Fort Collins, Colorado, USA

The seasonal cycle and variability of temperatures in the tropical lower stratosphere are commonly linked to the breaking of planetary-scale Rossby waves in the extratropical stratosphere. However, several studies have demonstrated that forcing from quasi-stationary equatorial planetary waves may also play a role. In this study, the authors examine COSMIC GPS radio occultation temperature profiles and ERA-Interim reanalysis data to diagnose the influence of the equatorial planetary waves on the temperature structure of the tropical lower stratosphere. In the long-term mean, equatorial planetary waves modulate tropical lower stratospheric temperatures up to an altitude of $\sim$21 km. In contrast, variability in the equatorial planetary waves is linked to much shallower structures. For example, an enhancement of the climatological-mean pattern of equatorial planetary waves is associated with a sharp zonal-mean cooling within a narrow $\sim$1 km layer near the tropical tropopause. Preliminary results indicate that the equatorial planetary waves may have a similar influence on the seasonal cycle of temperatures in this narrow layer. The results are contrasted to the temperature structures associated with variations in extratropical planetary wave forcing.