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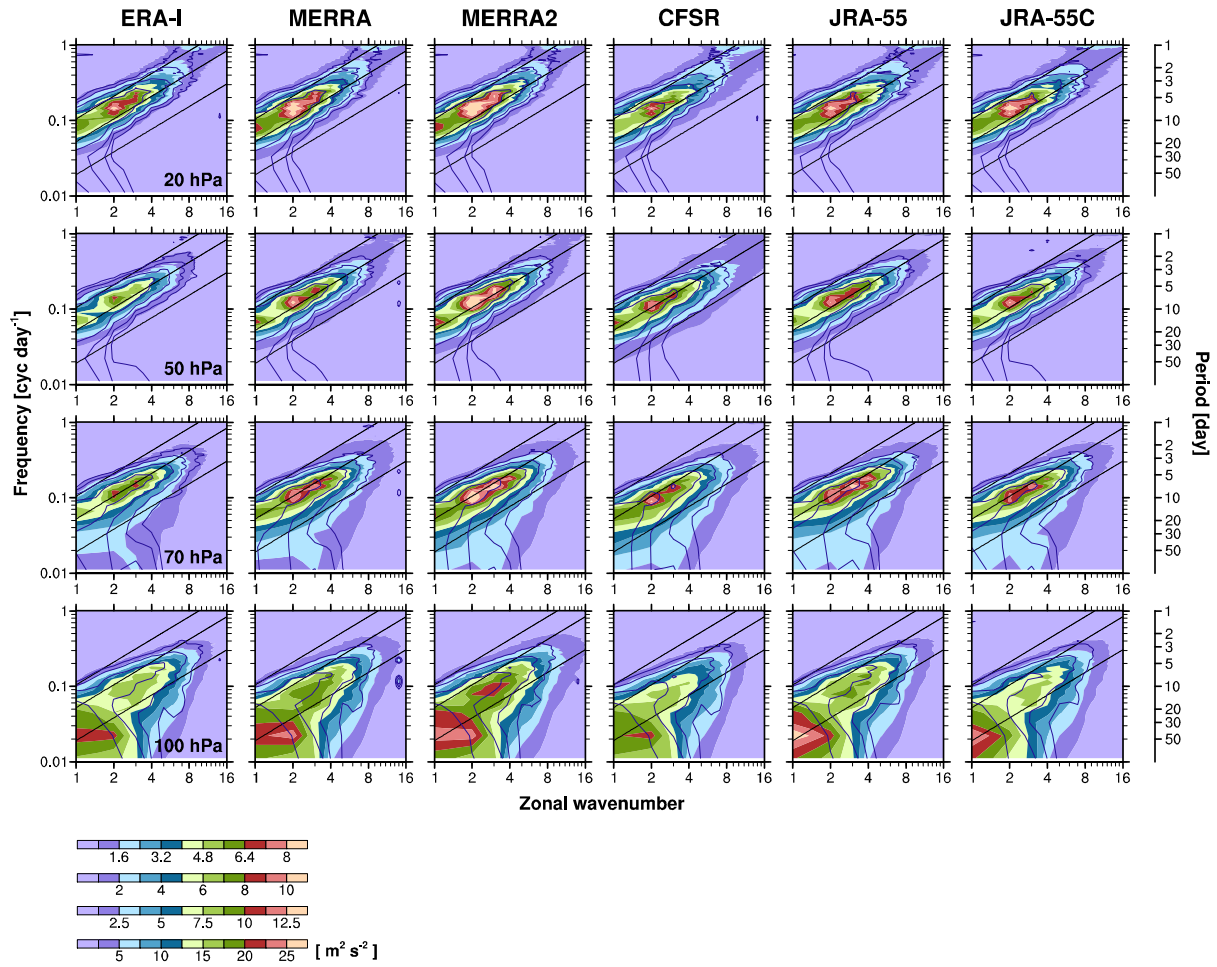
*Supplement of*

## **Comparison of equatorial wave activity in the tropical tropopause layer and stratosphere represented in reanalyses**

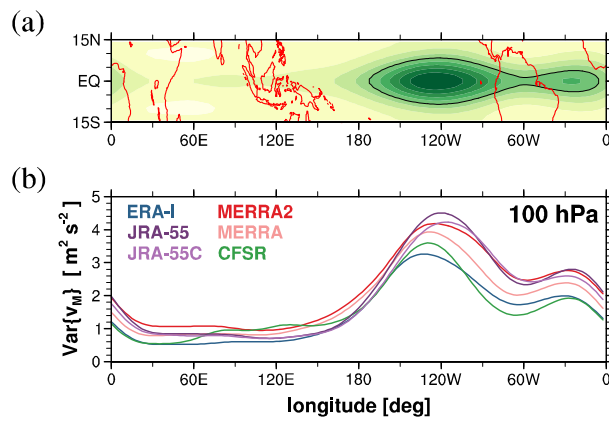
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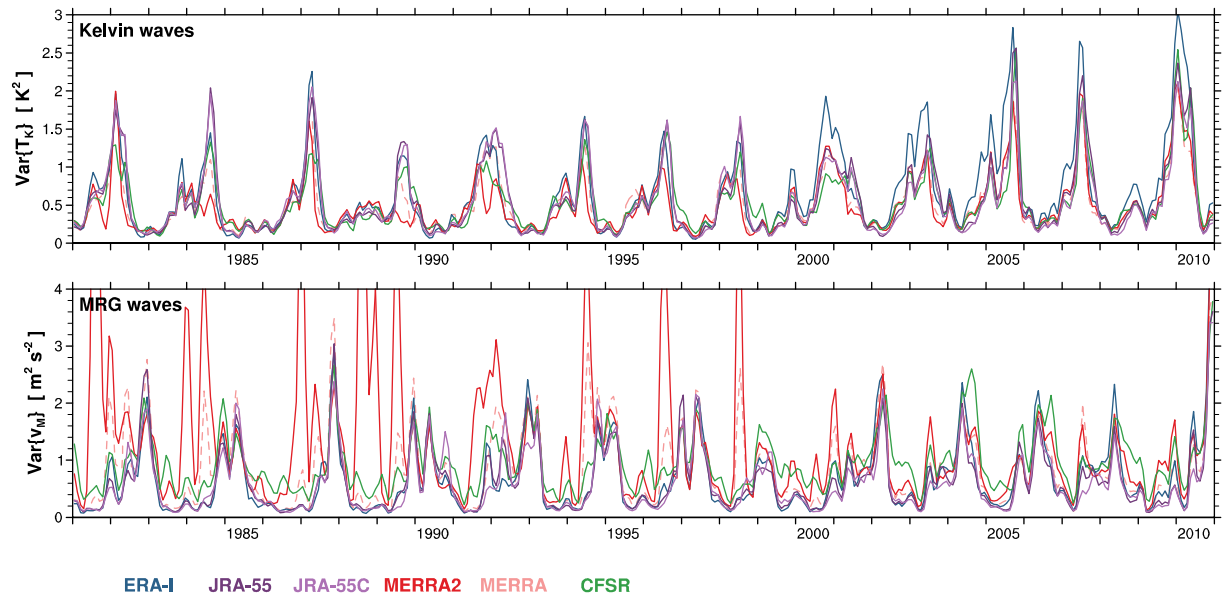
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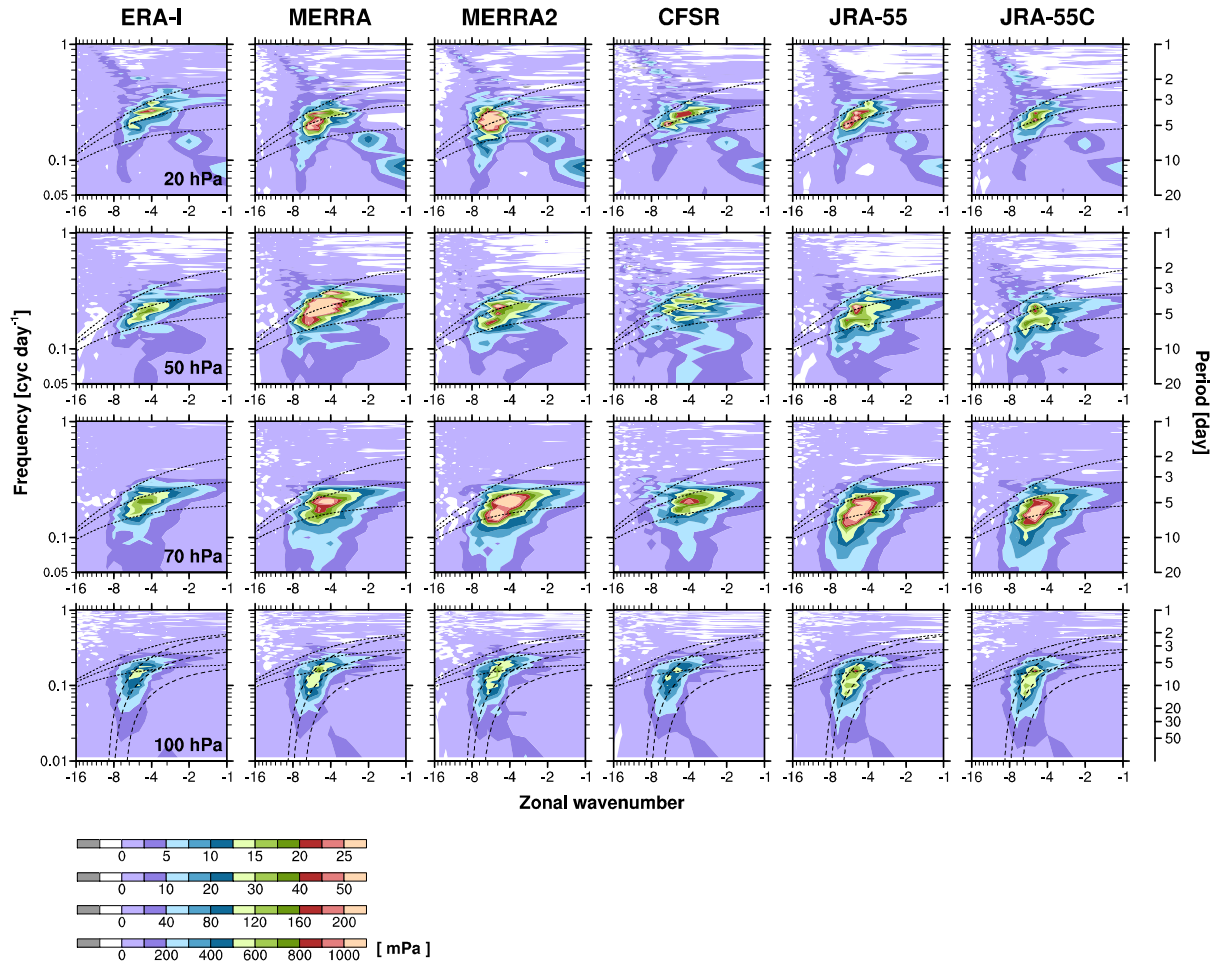
**Figure S1.** The same as in Fig. 1 except for the zonal wind.



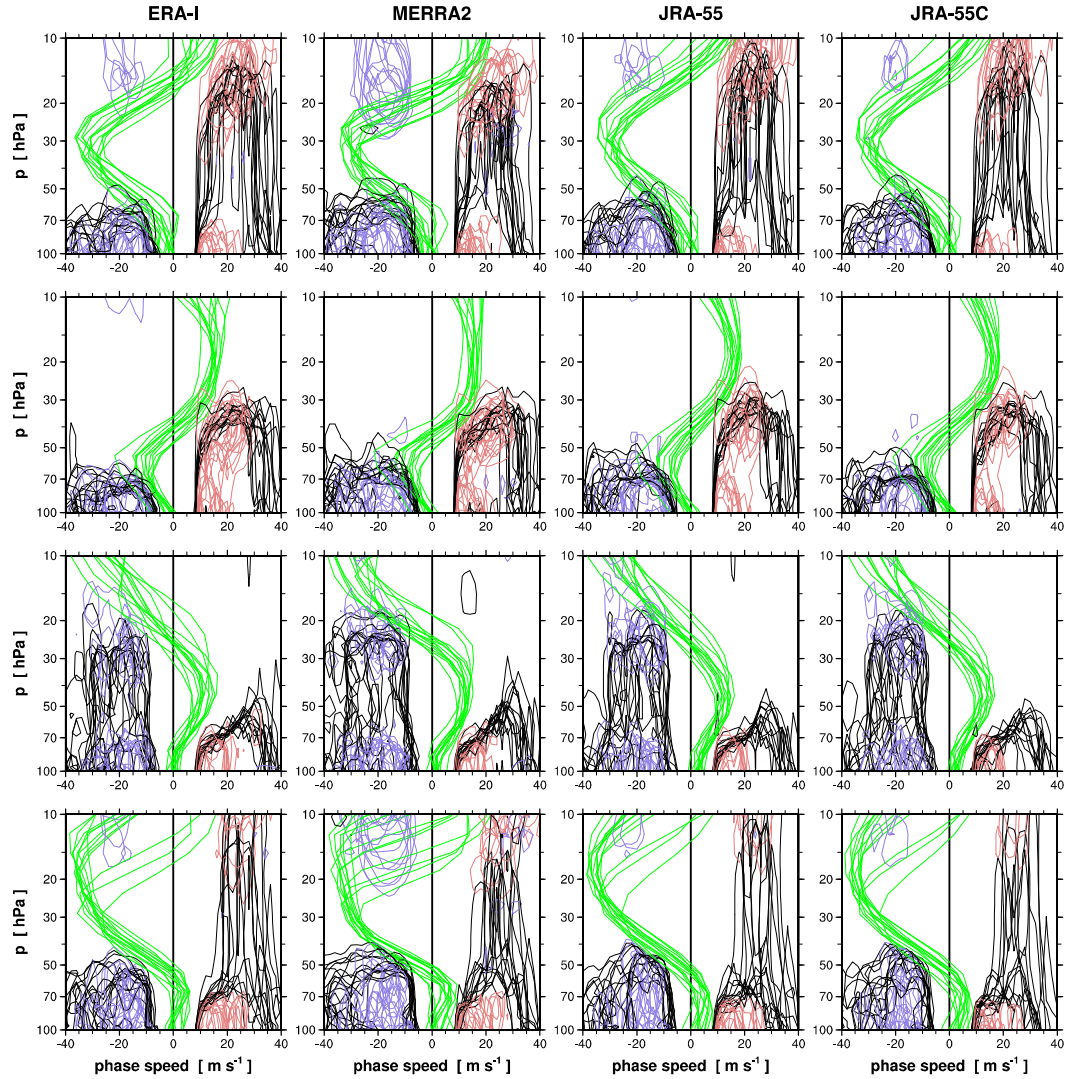
**Figure S2.** The same as in Fig. 3 except for the 100-hPa symmetric meridional wind filtered for  $-10 \leq k < 0$  and  $0.033 \leq \omega < 0.1$  cyc day<sup>-1</sup>.



**Figure S3.** Monthly time series of variances of (upper) temperature for the Kelvin waves ( $T_{\text{Kelvin}}$ ) and (lower) meridional wind for the MRG waves ( $v_{\text{MRG}}$ ) at 10 hPa averaged over  $15^\circ\text{N}$ – $15^\circ\text{S}$ . The MERRA results are from the standard-level datasets (dashed), and the others from the model-level datasets (solid). See the text in Section 3.1 for the definitions of  $T_{\text{Kelvin}}$  and  $v_{\text{MRG}}$ .



**Figure S4.** The same as in Fig. 10 except for  $\langle F_\phi \rangle$  of antisymmetric modes over  $5^\circ\text{N}$ – $5^\circ\text{S}$ , where  $\langle F_\phi \rangle$  is the latitudinal average of the equatorward EP flux,  $\text{sgn}(-\phi)F_\phi$ , and  $\phi$  the latitude.



**Figure S5.** Spaghetti plots for 13 individual QBO cycles within the period of 1981–2010: contours for the Kelvin wave EP flux divergence of  $0.3 \text{ m s}^{-1} \text{ month}^{-1}/(\text{m s}^{-1})$  (red), for the MRG wave EP flux divergence of  $-0.06 \text{ m s}^{-1} \text{ month}^{-1}/(\text{m s}^{-1})$  (blue), and for the Kelvin and MRG wave  $F_z$  of  $-0.008$  and  $0.0003 \text{ mPa}/(\text{m s}^{-1})$ , respectively, as a function of phase speed, during the four QBO phases shown in Fig. 11. The zonal-mean zonal-wind profiles are also plotted (green).