Supplement of

Would El Niño enhance or suppress the migrating diurnal tide in the MLT region?

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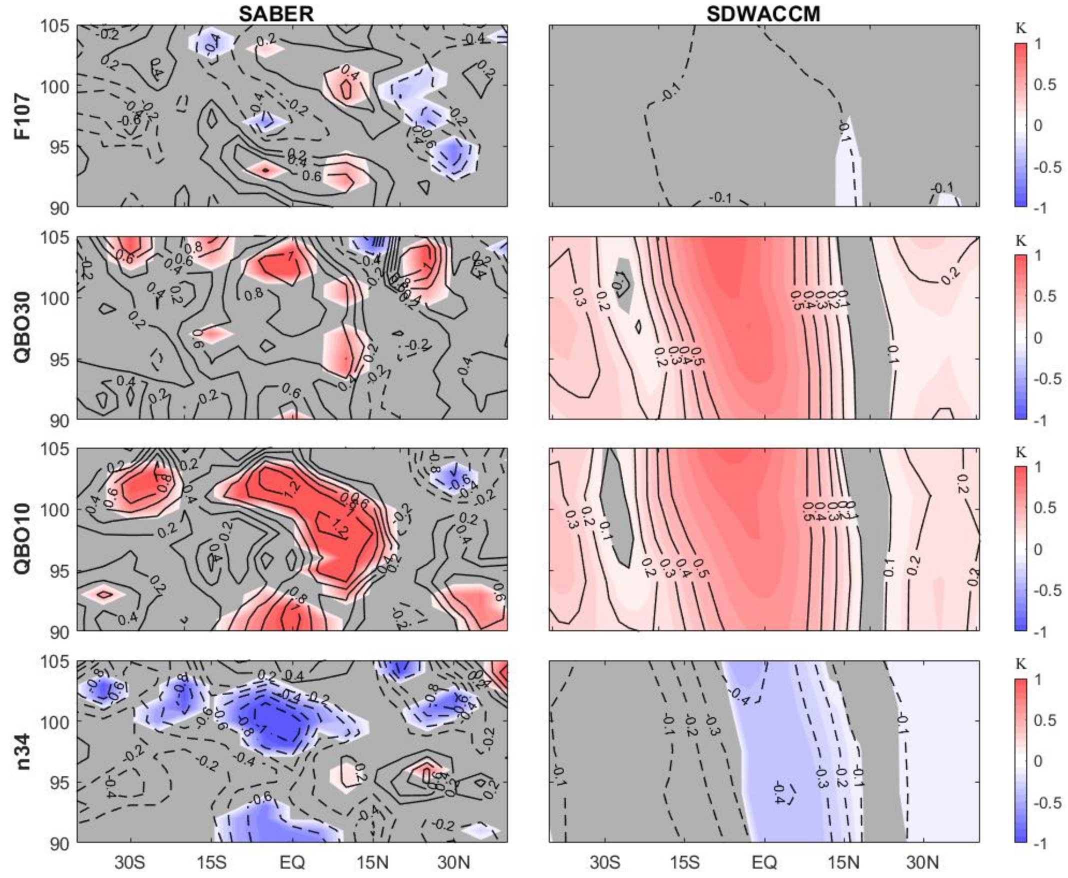

Figure S1. The DJF linear regression coefficient of DW1 responses F107, QBO10, QBO30, NIÑO 3.4 in SABER (the left column) and SD-WACCM (the right column).

Figure S1 shows the linear regression coefficients of DW1 response to normalized F107, QBO10, QBO30 and n34. Red represents positive response and blue represents negative; the gray regions denote confidence levels below 95% for F-test.

Figure S2. Hough functions

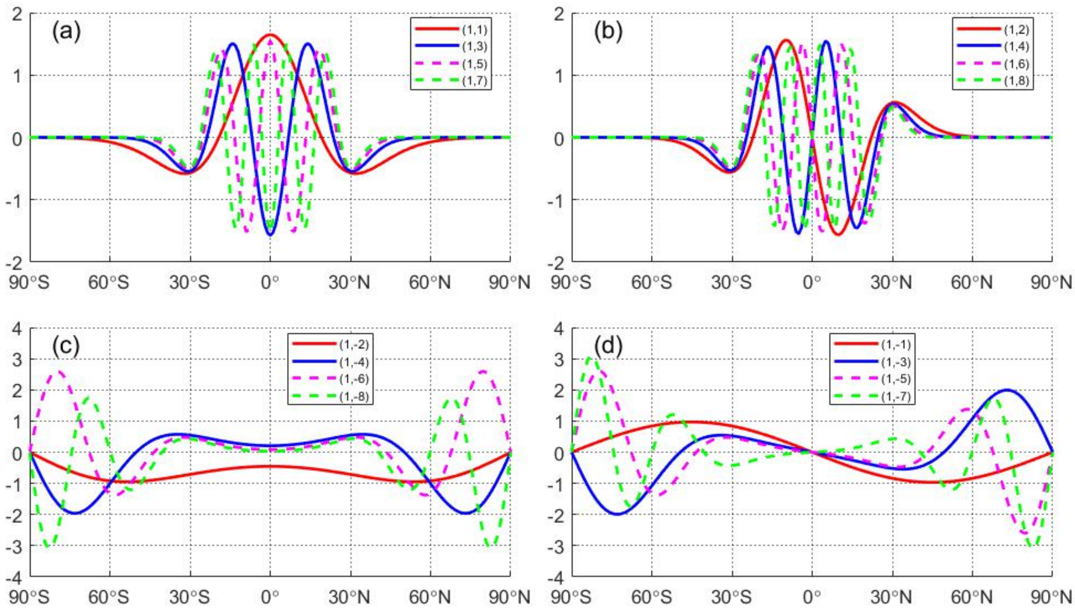

Figure S2. The latitudinal structure of 16 sets of normalized Hough functions for diurnal tides. Figures a and b are Propagating modes, and Figures c and d are trapped modes. Figures a and c are symmetric modes, and Figures b and d are antisymmetric modes.

Figure S2 shows the latitudinal structure of 16 sets of normalized Hough functions for diurnal tides. Figures S2a (S2b) is symmetric propagating modes (antisymmetric propagating modes), and Figures S2c (S2d) is symmetric trapped modes (antisymmetric trapped modes).

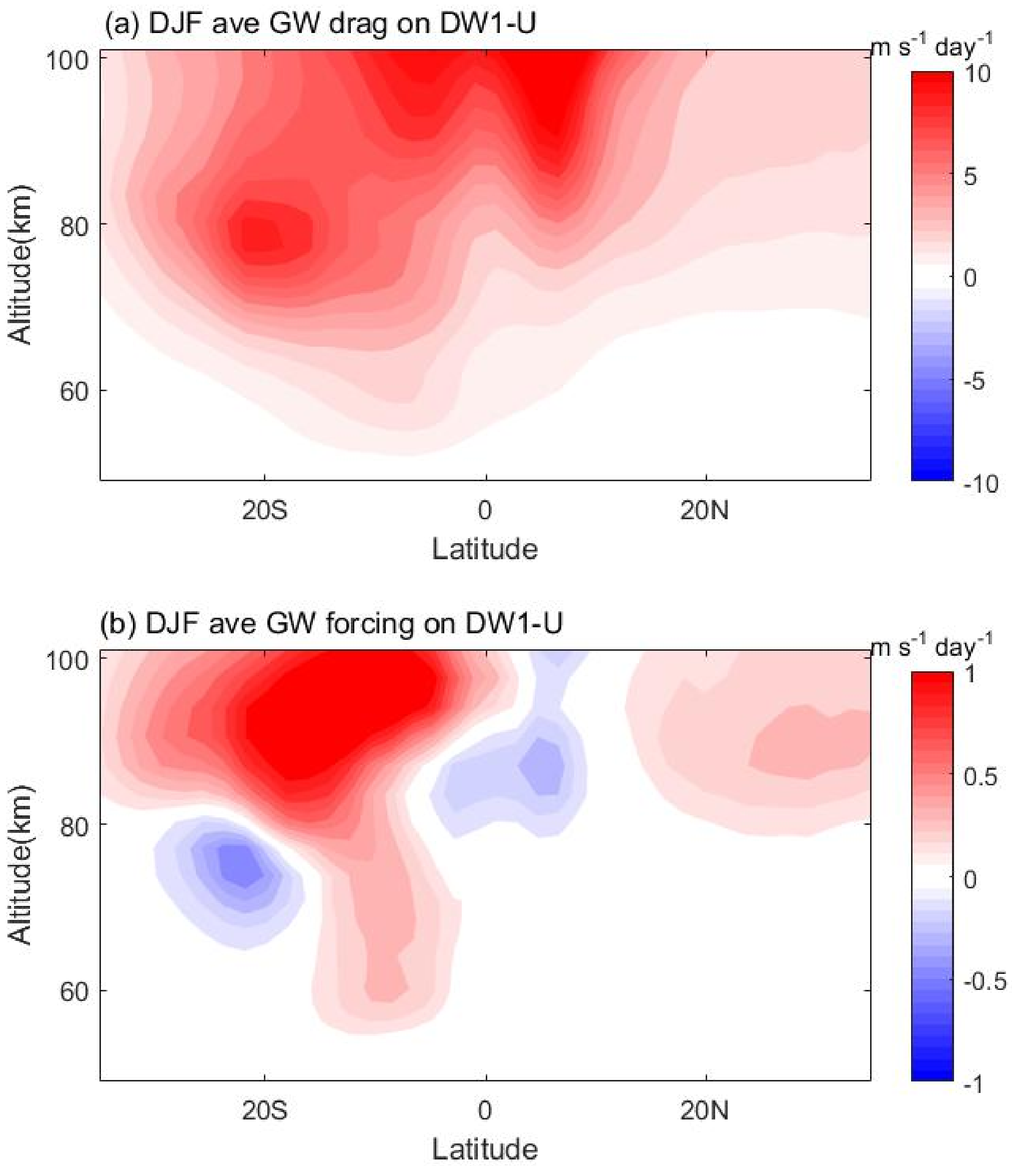

Figure S3. (a) Gravity Wave (GW) drag due to convection on the amplitude of DW1 tidal U during the winter (DJF). (b) The same as (a), but for GW forcing.

Figure S3 show the GW drag and GW forcing on the amplitude of DW1 tidal U during the winter. The amplitude of the DW1 zonal GW drag caused by convection has obvious hemispheric asymmetry: the magnitude is much smaller in the Northern Hemisphere than in the Southern Hemisphere. The DW1 GW forcing of the DW1 tide is positive in the southern subtropical upper mesosphere and negative below there (60−80 km) (Figure S3b) during boreal winter. Meanwhile, the tropical average (10°S-10°N) GW forcing of the DW1 tide is positive in the mesosphere (80-100 km) during boreal winter.

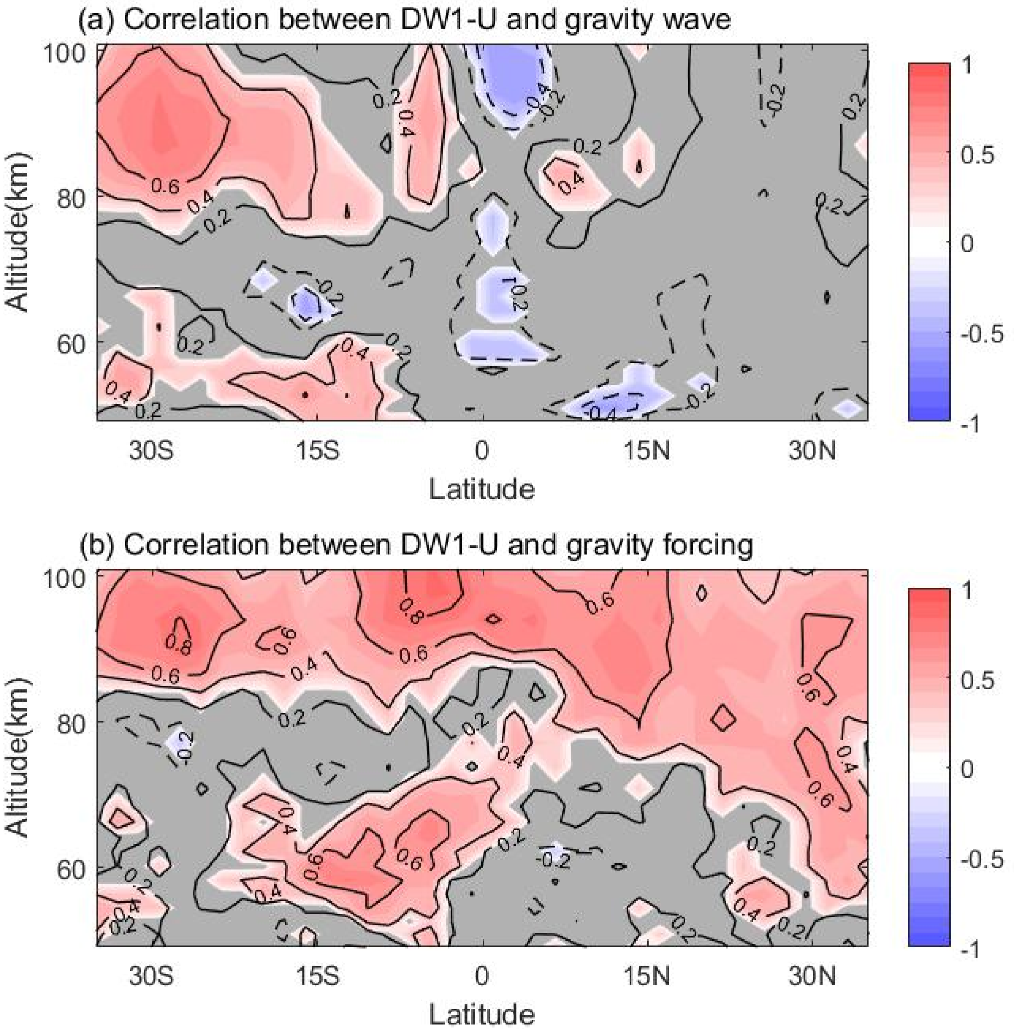

Figure S4. (a) Correlation between DW1 U and GW from 1979 to 2014 winter (DJF). (b) Correlation between DW1 U and GW forcing from 1979 to 2014 winter (DJF).

Figure S4 shows the correlation between DW1 U and GW drag (forcing) from 1979 to 2014 winter. The correlation between DW1 U and GW drag from 1979 to 2014 winter (DJF) is only significant in the southern subtropical upper mesosphere, while the correlation between DW1 U and GW forcing is over 0.7 in the equatorial MLT, which means GW forcing is clearly modulate the tide, especially in the Southern subtropics.