Supporting Information for Topography dominates the hemispheric asymmetry of Stratospheric Sudden Warmings

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Introduction

In the Supporting Information, we show details of the simulations which are not shown in the main manuscript.

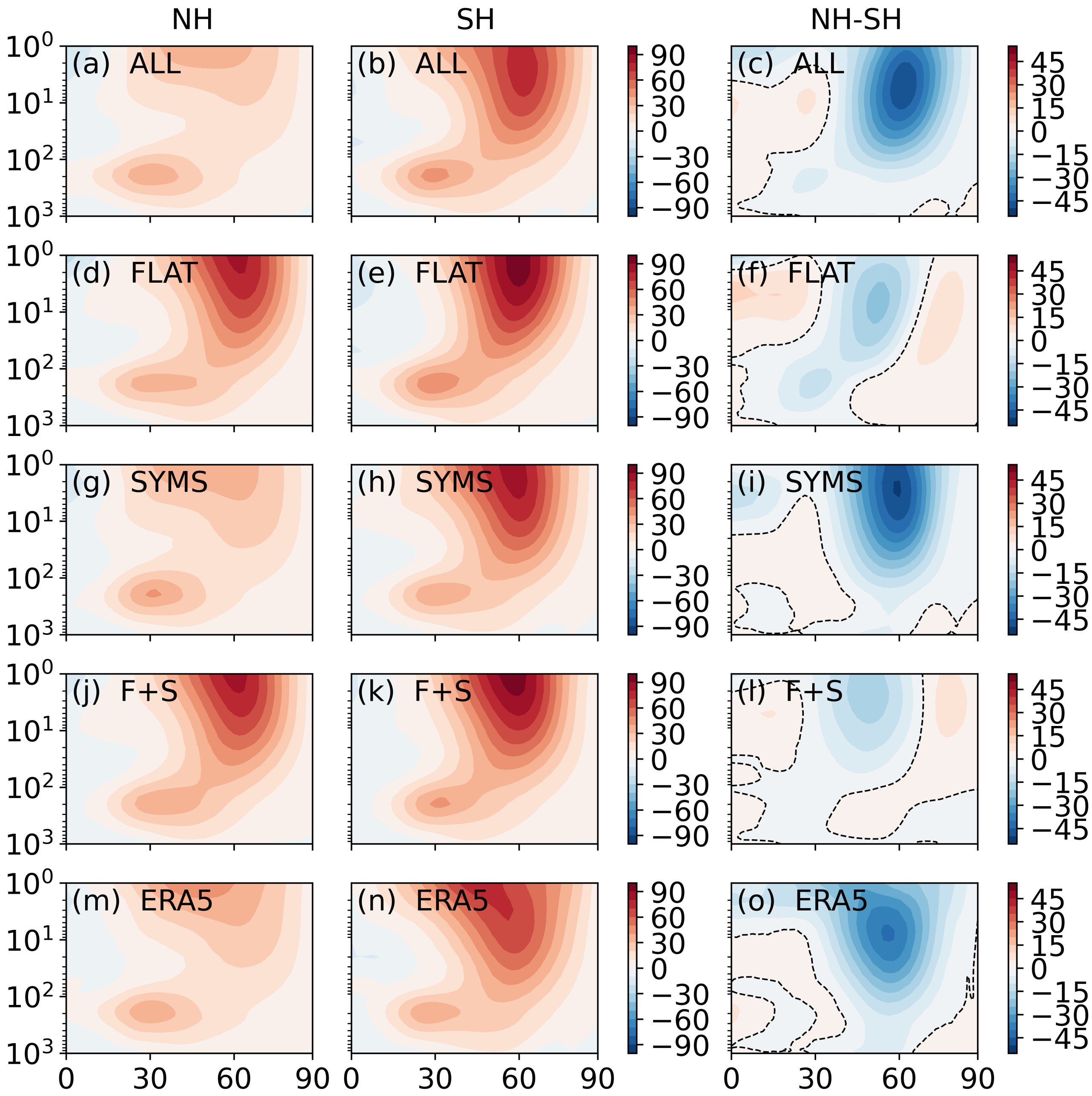

Figure S1. Zonal mean zonal wind ($\overline{u}$, m s^{-1}) in NH (left column), SH (middle column), and the difference between NH and SH (right column) in SSW related season (NH: Nov-Mar, SH: May-Sep) in the climate model forced with observationally derived climatological surface energy fluxes for (a)-(c) climatology (ALL), (d)-(f) flattened topography (FLAT), (g)-(i) symmetrized surface energy fluxes (SYMS), (j)-(l) flattened topography and symmetrized surface energy fluxes (F+S) simulations, and (m)-(o) ERA5 reanalysis.

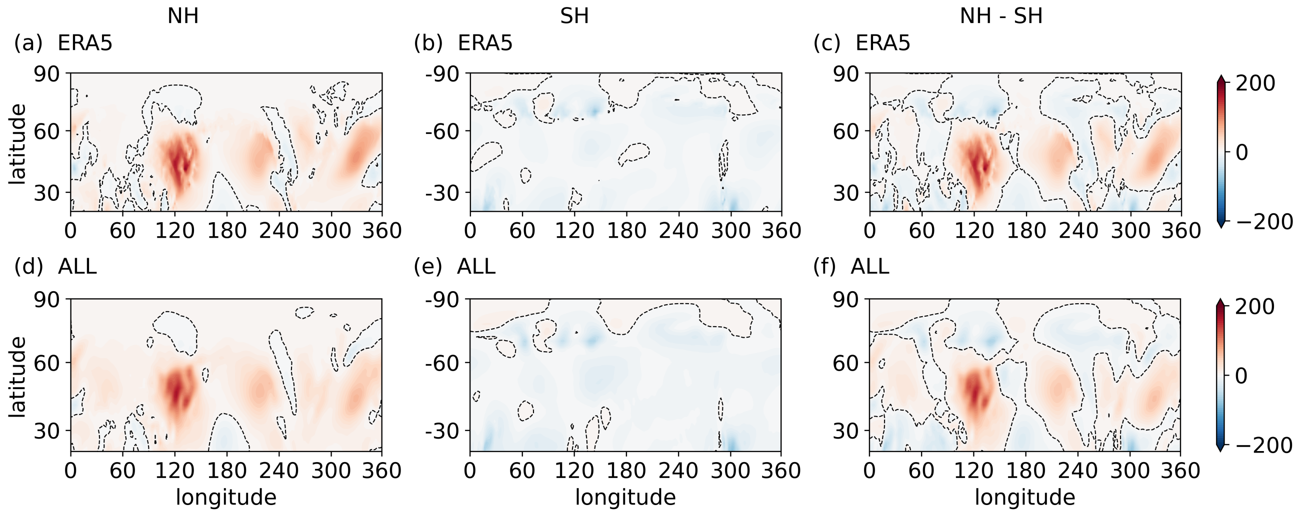

Figure S2. Vertically integrated monthly mean eddy heat flux ($\overline{V^{*}T^{*}}$, Km s^{-1}) in (first column) Northern Hemisphere and (second column) Southern Hemisphere in SSW related season (NH: Nov-Mar, SH: May-Sep), and (third column) the difference of the absolute value in Northern and Southern Hemisphere in (a)-(c) ERA5 reanalysis and (d)-(e) the climate model forced with observationally derived climatological surface energy fluxes.

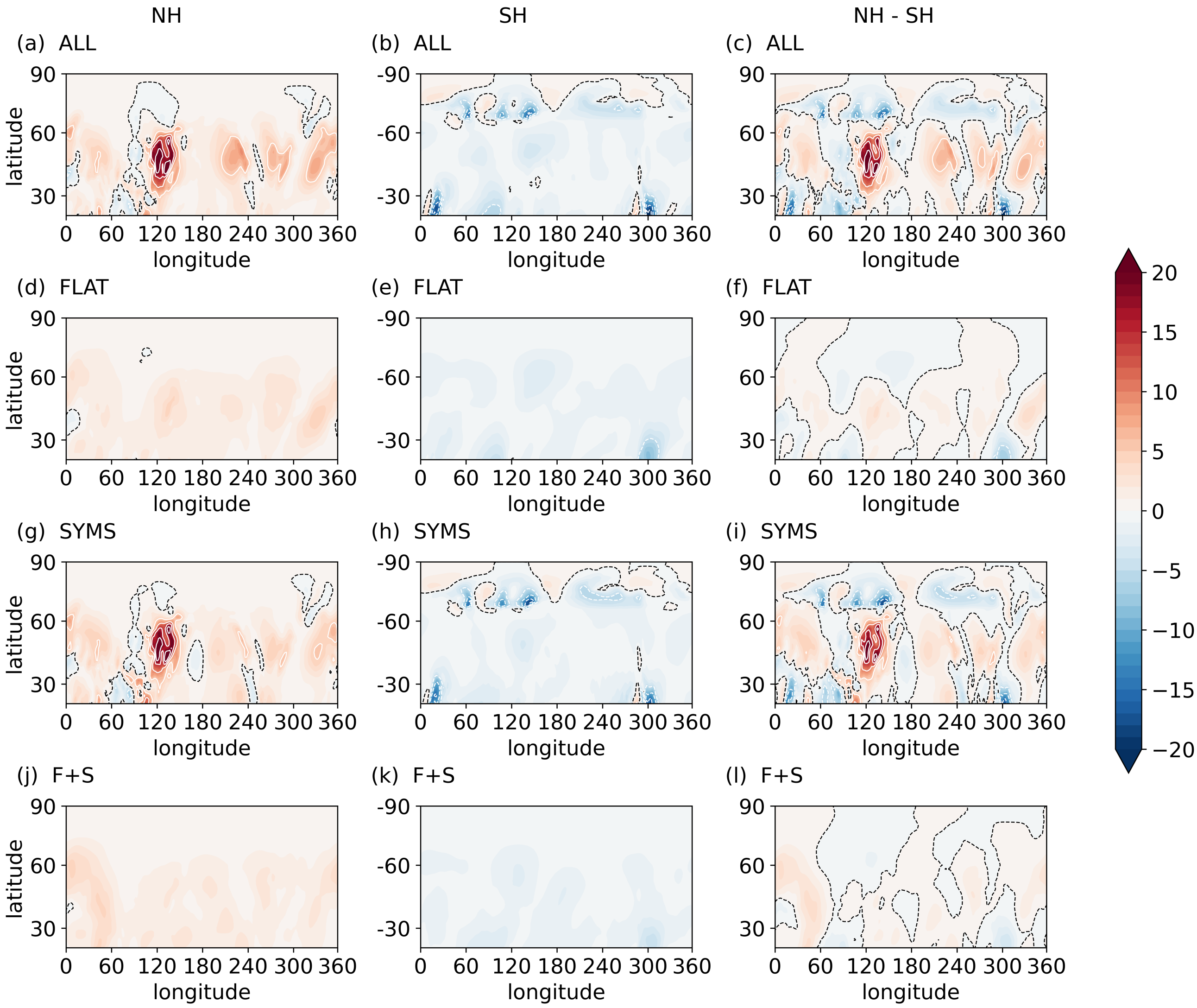

Figure S3. Monthly mean eddy heat flux ($\overline{V^{*}T^{*}}$, Km s^{-1}) at 850 hPa in (left column) Northern Hemisphere, (middle column) Southern Hemisphere in SSW related season (NH: Nov-Mar, SH: May-Sep) and (right column) the difference of Northern and Southern Hemisphere in the climate model forced with observationally derived climatological surface energy fluxes for (a)-(c) climatology (ALL), (d)-(f) flattened topography (FLAT), (g)-(i) symmetrized surface energy fluxes (SYMS), and (j)-(l) flattened topography and symmetrized surface energy fluxes (F+S) simulations.

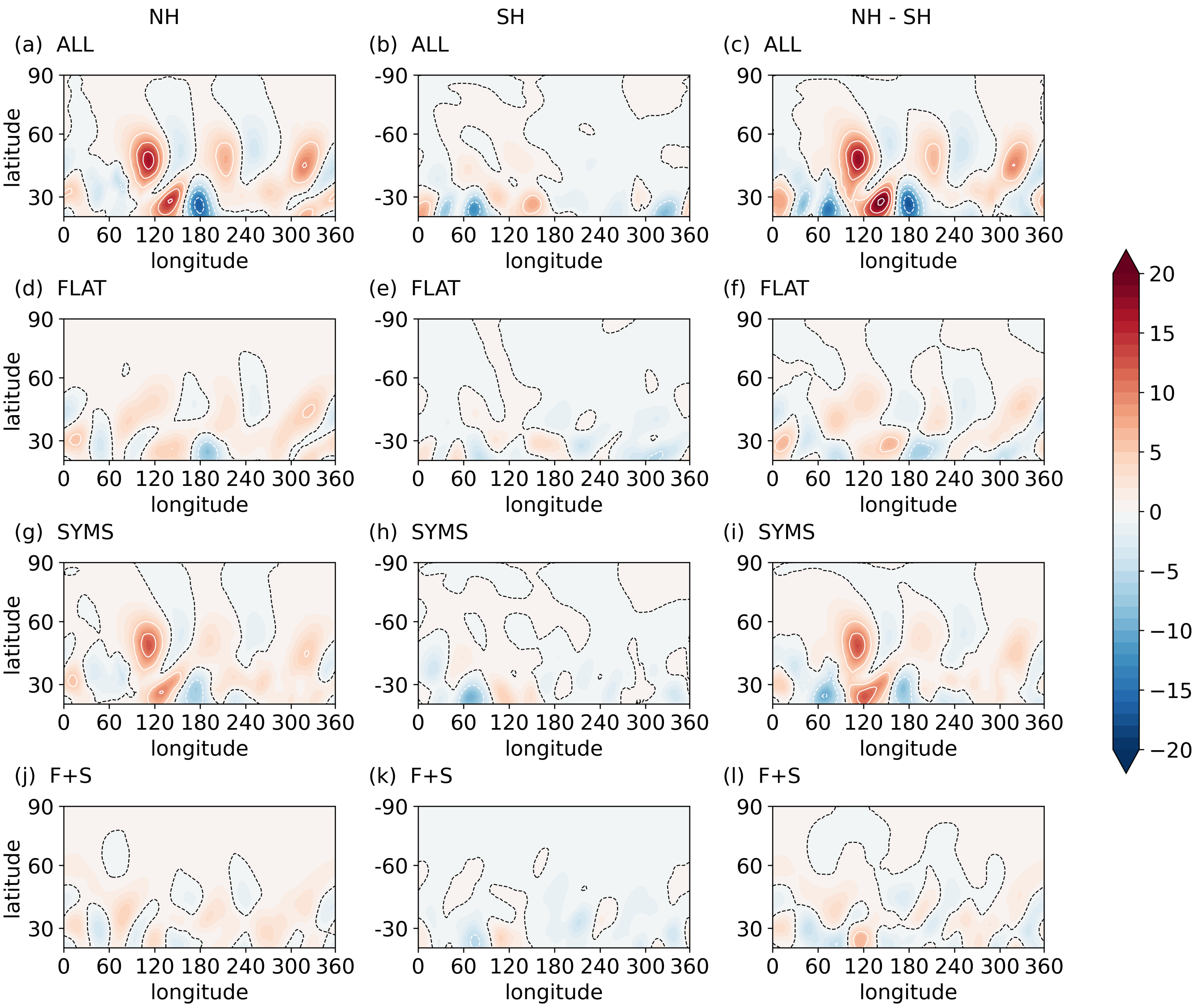

Figure S4. As in Figure S3, but for monthly mean eddy heat flux ($\overline{V^*T^*}$, Km s^{-1}) at 300 hPa.

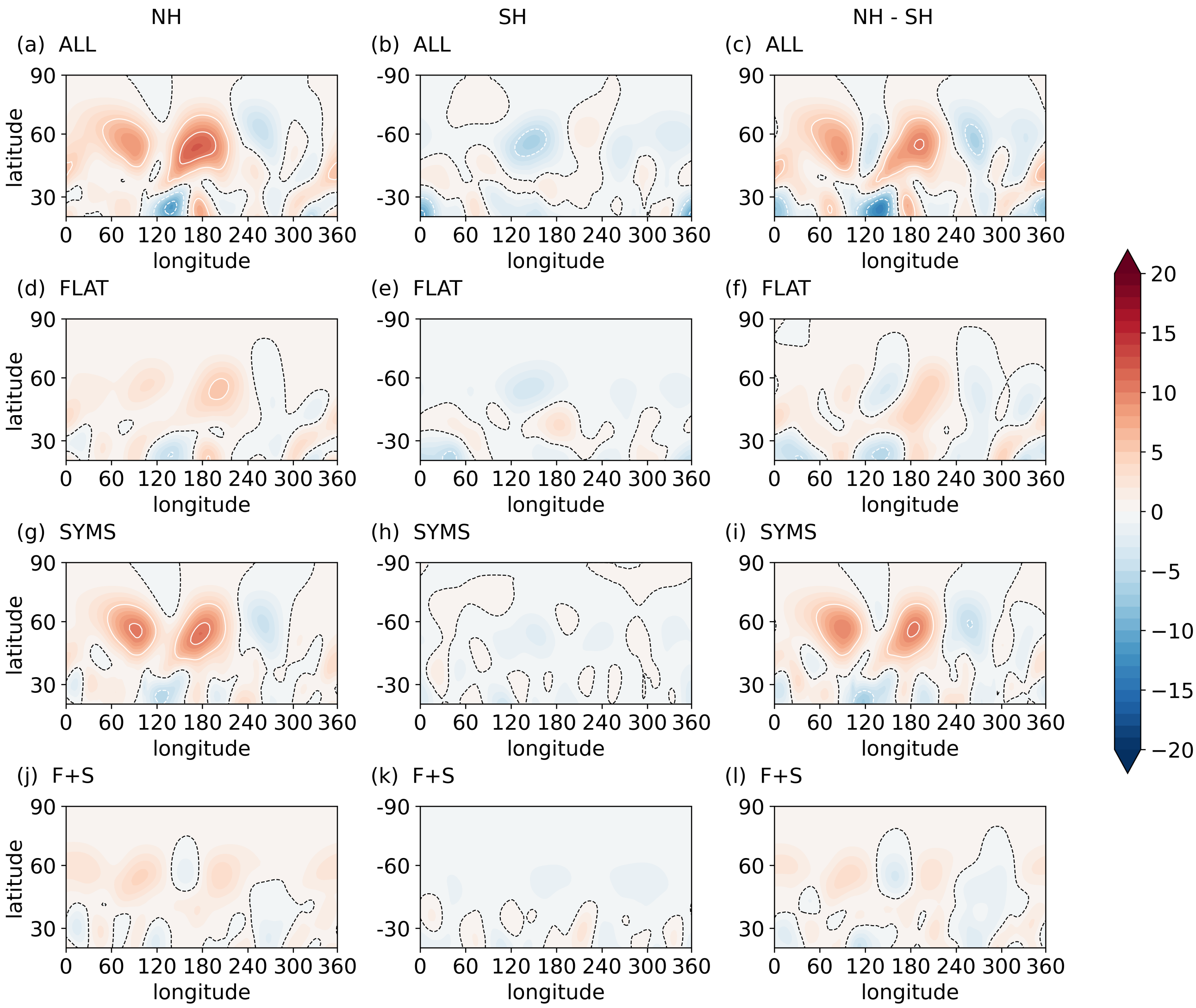

Figure S5. As in Figure S3, but for monthly mean eddy heat flux ($\overline{V^{*}T^{*}}$, Km s^{-1}) at 100 hPa.

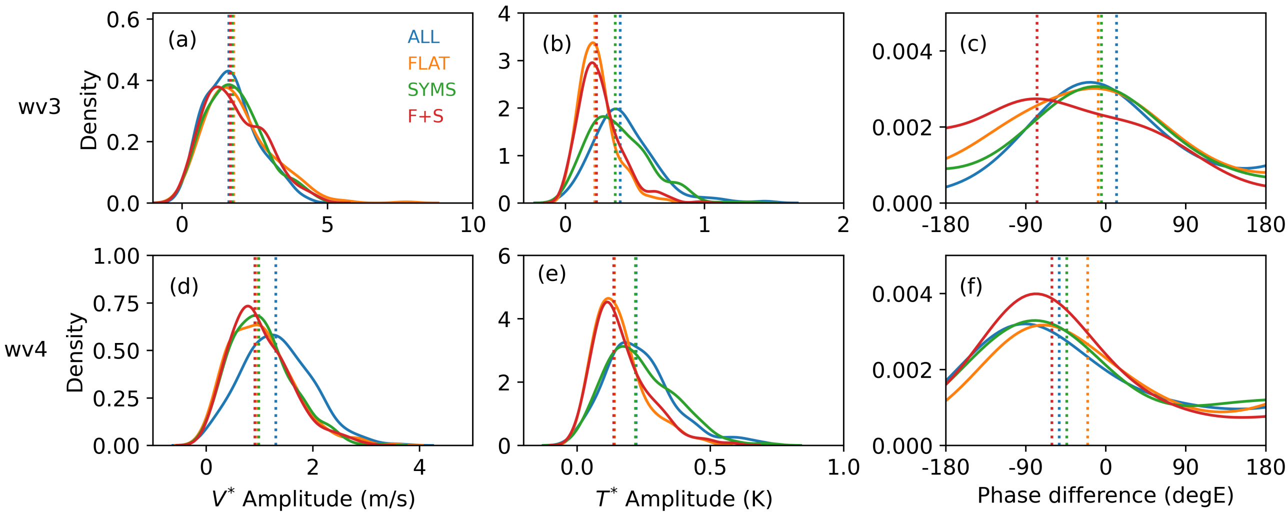

Figure S6. Probability distribution of the three parameters of monthly mean eddy meridional wind (V^*, m s^{-1}) (first and thrid row) and monthly mean eddy temperature (T^*, K) (second and fourth row) (a)-(f) wave-3 and (g)-(l) wave-4 component at 60°N and 100 hPa in SSW related season (Northern Hemisphere: Nov-Mar): the wave amplitudes (the first column), the wave phase (the second column), and the wave tilt (phase at 125 hPa minus phase at 70 hPa) (the third column) for (a)-(c) climatology (ALL), (d)-(f) flattened topography (FLAT), (g)-(i) symmetrized surface energy fluxes (SYMS), and (j)-(l) flattened topography and symmetrized surface energy fluxes (F+S) simulations.