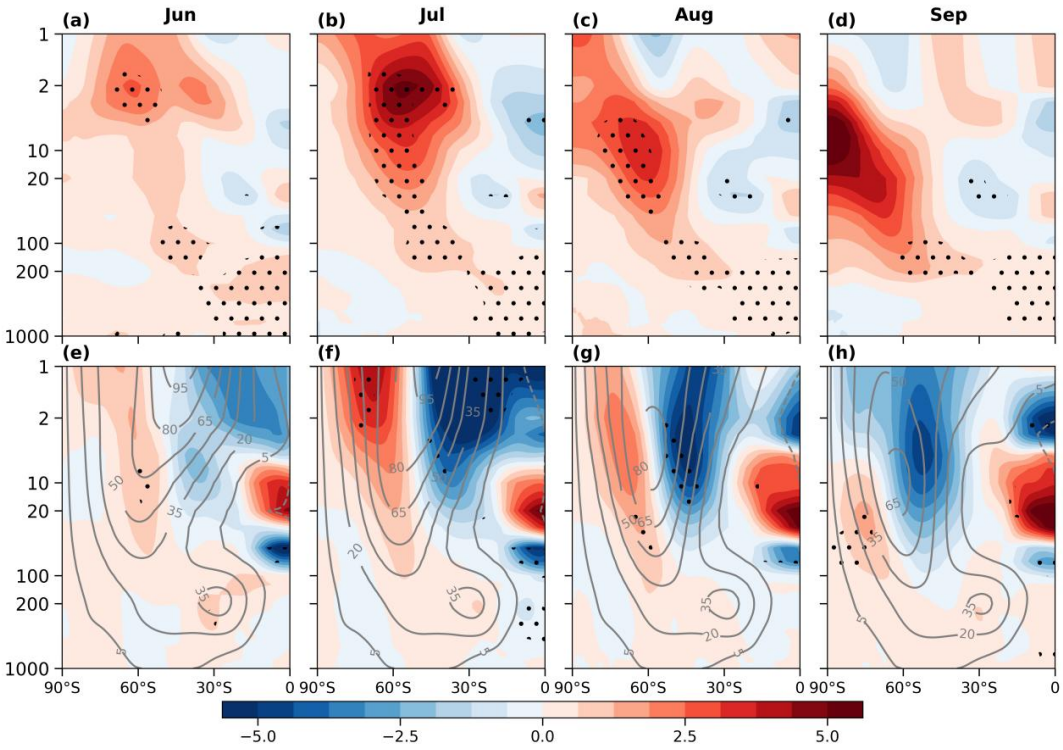

Figure R1. Composite differences between warm and cold stratospheric years (±0.75σ) from June to September. (a-d) zonal–mean temperatures profile (shaded, unit: K). (e-h) zonal–mean zonal winds profile (shaded, unit: m/s); The climatological mean of zonal-mean zonal winds is computed from 1991-2020 (contour, unit: m/s). Black dots indicate regions statistically significant at the 95 % confidence level.

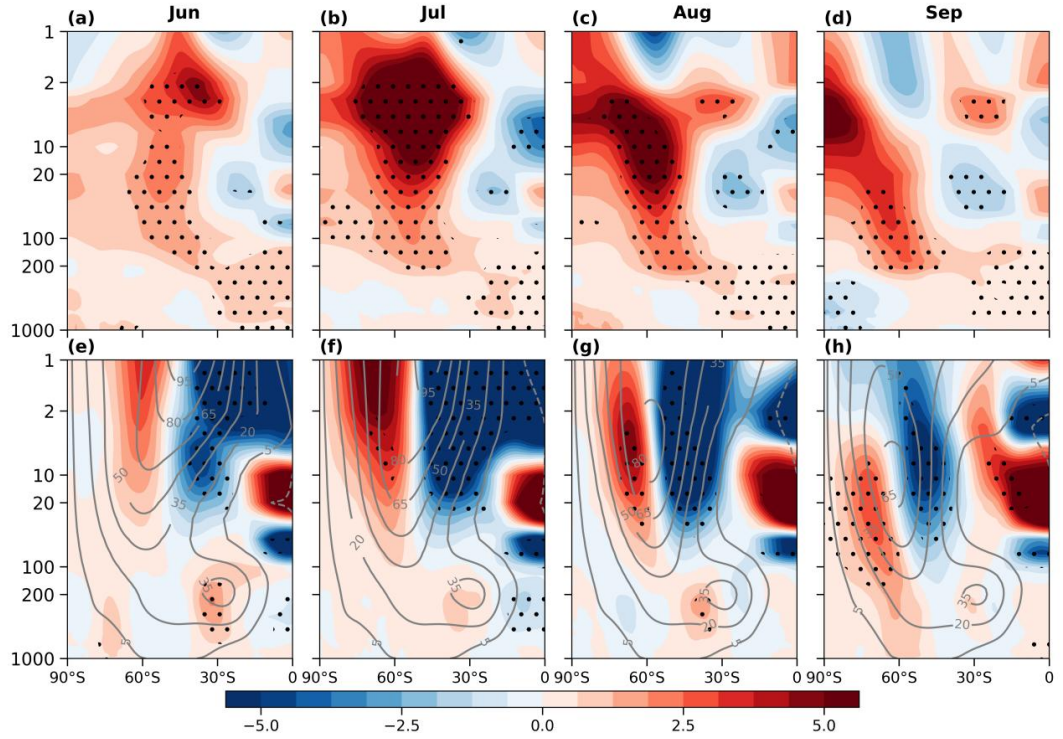

Figure R2. Composite differences between warm and cold stratospheric years (±1σ)

from June to September. (a-d) zonal–mean temperatures profile (shaded, unit: K). (e-h) zonal–mean zonal winds profile (shaded, unit: m/s); The climatological mean of zonal-mean zonal winds is computed from 1991-2020 (contour, unit: m/s). Black dots indicate regions statistically significant at the 95 % confidence level.

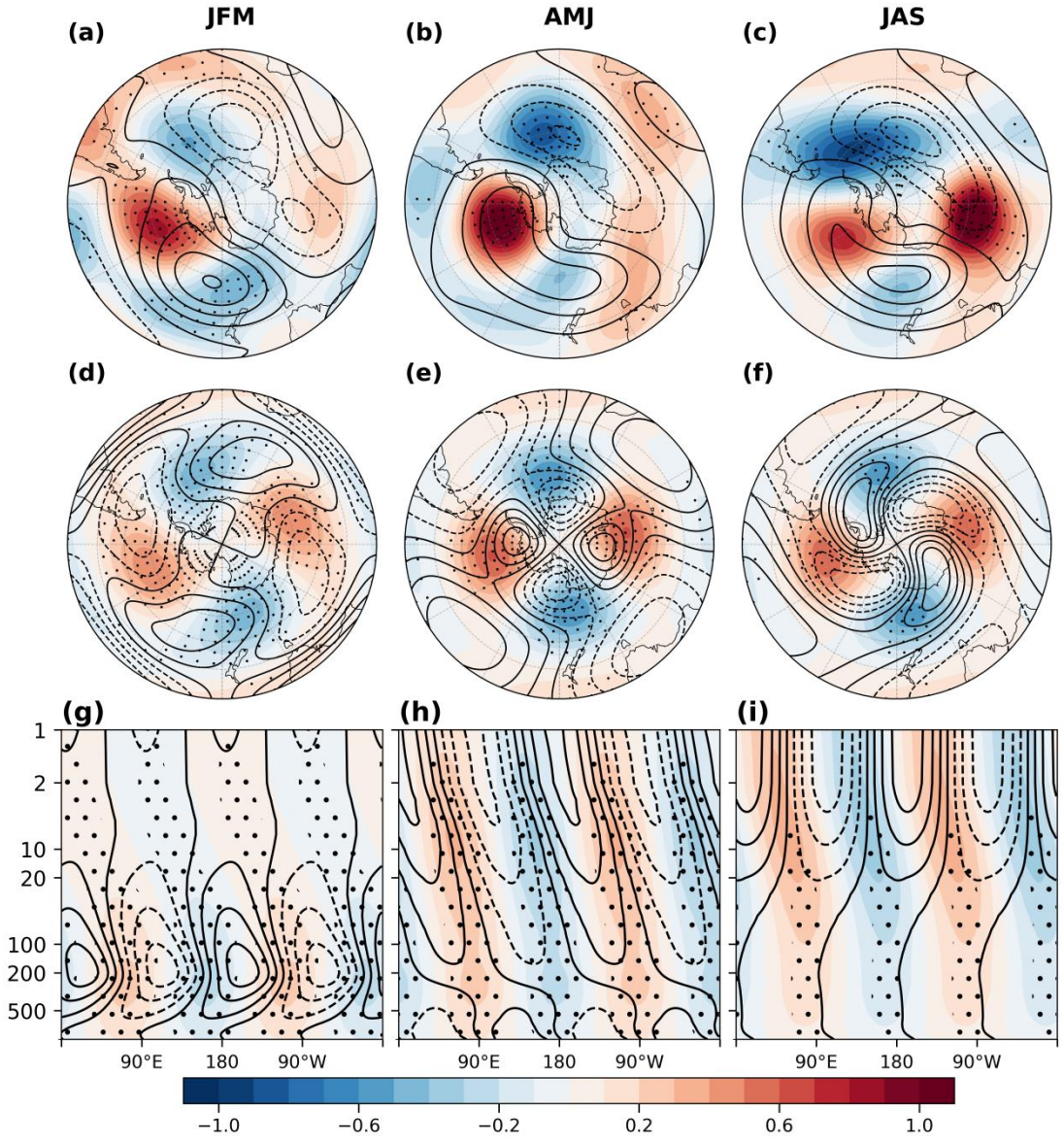

Figure R3. (a-c) Composite differences of geopotential heights at 100 hPa (shaded, unit: 5 dagpm) for three-month means of (a) January–March, (b) April–June and (c) July–September, where the climatological geopotential heights at 100 hPa is calculated from 1991–2020 (contours, unit: dagpm), (d-f) same as (a-c), but for wave-2 of geopotential heights at 100 hPa, and (g-i) same as (a-c), but for wave-2 of geopotential heights at 1000–1hPa averaged from 45 °S–75 °S (shaded, unit: 30 dagpm). Black dots indicate the regions statistically significant at the 95 % confidence level.