Supplementary of

The key role of atmospheric absorption in the Asian Summer Monsoon response to dust emissions in CMIP6 Models

Alcide Zhao et al.
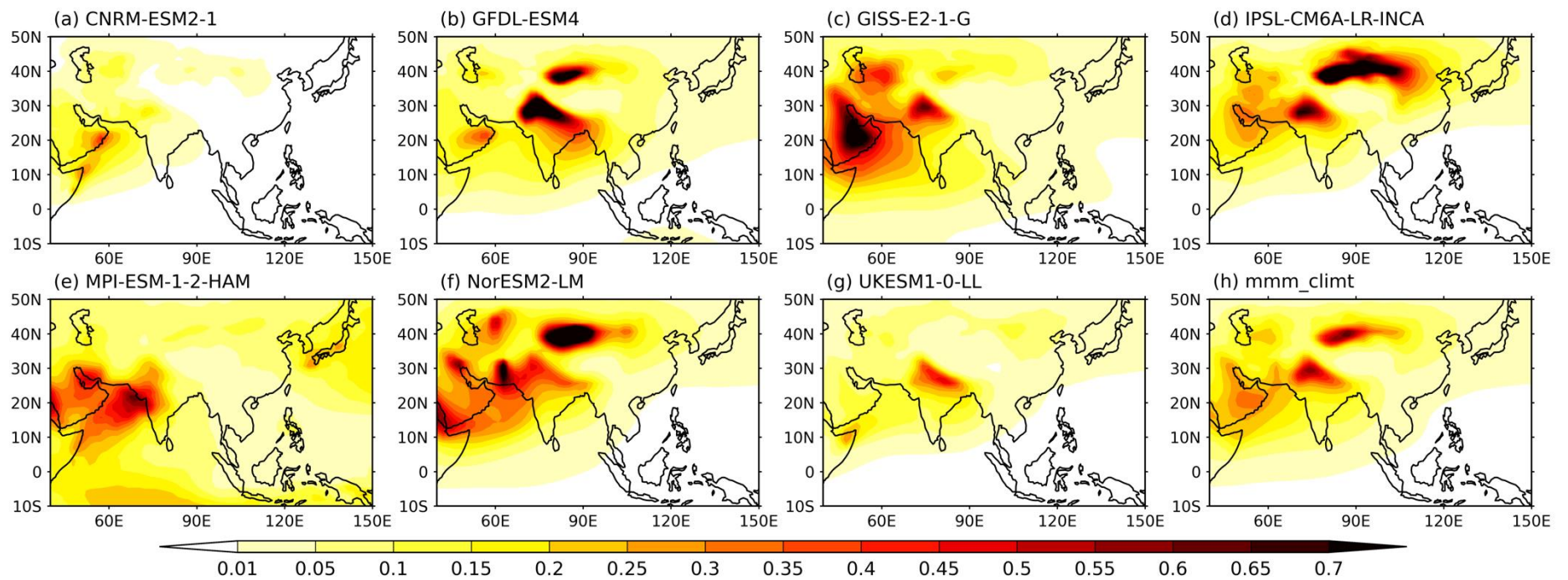
Figure S1. Models' simulated JJA climatology of dust aerosol optical depth (DOD) from the piClim-control.
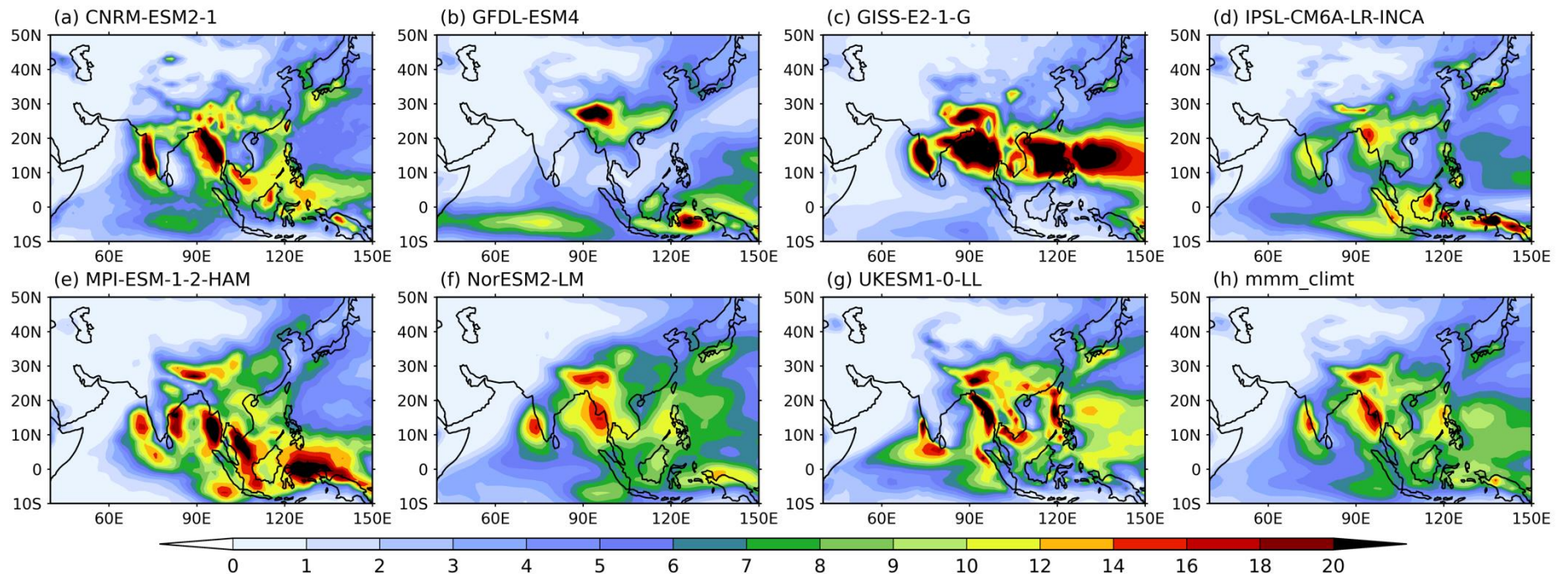
Figure S2. Model's simulated JJA climatology of precipitation (mm day^{-1}) derived from the piClim-control.
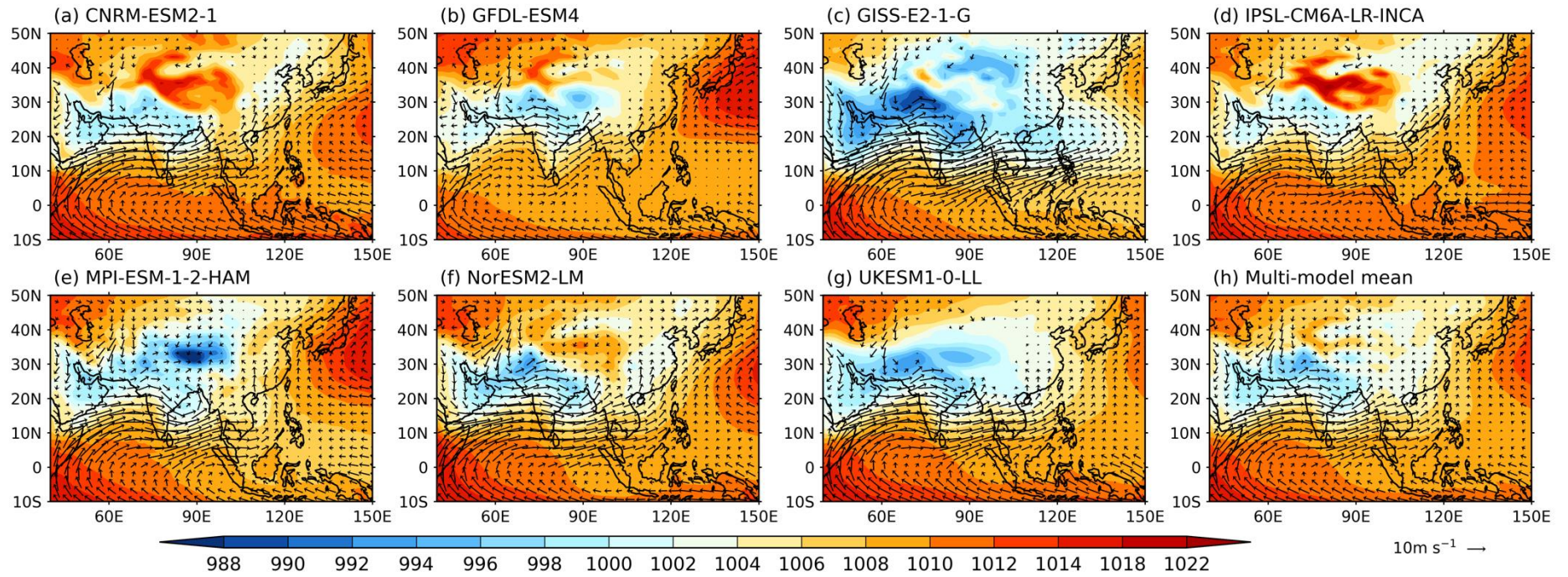
Figure S3. Model's simulated JJA climatology of sea level pressure (colours, hPa) and 850-hPa winds (vectors, m s⁻¹) derived from the piClim-control.
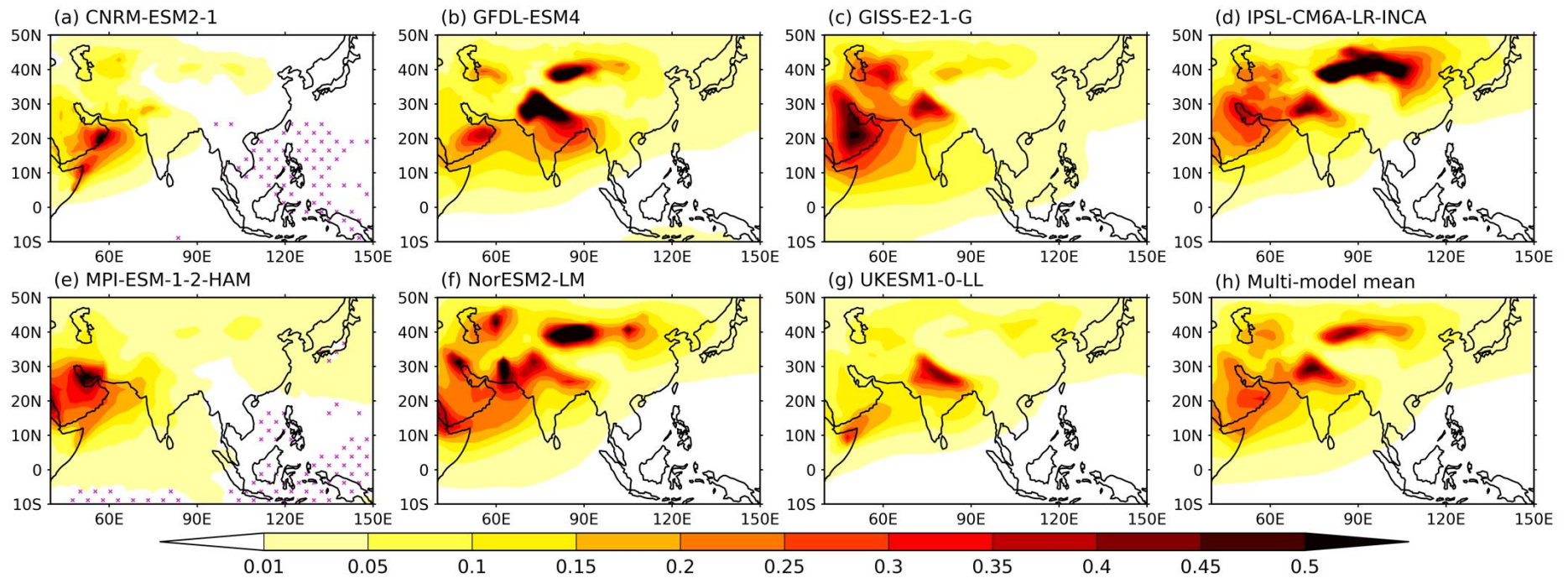
Figure S4. JJA mean changes in dust aerosol optical depth (DOD) due to doubled dust emissions in (a-g) individual models and (h) the multi-model mean. Purple hatches denote insignificant differences at the 10% level. Green hatches in (h) denote where ≤4 models have the same sign as the multi-model mean.
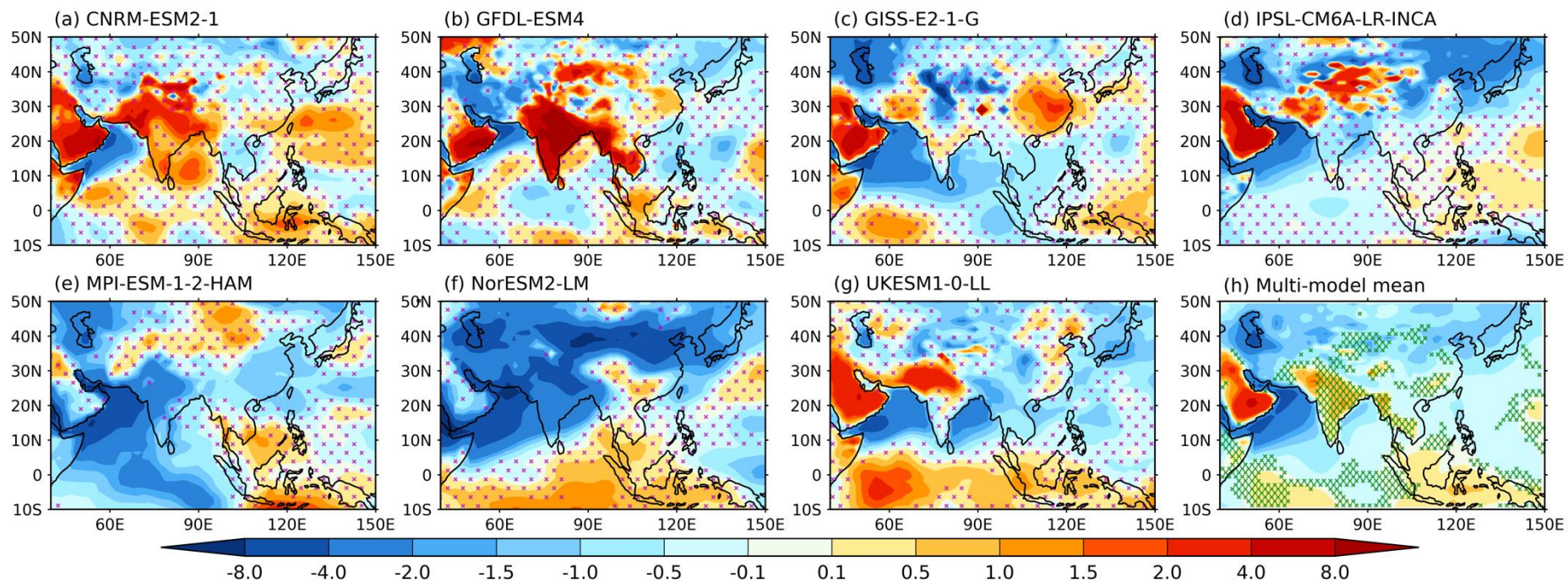
Figure S5. JJA mean changes in TOA clear-sky ERF (W m^{-2}) due to doubled dust emissions in (a-g) individual models and (h) the multi-model mean. Purple hatches denote insignificant differences at the 10% level. Green hatches in (h) denote where ≤4 models have the same sign as the multi-model mean.
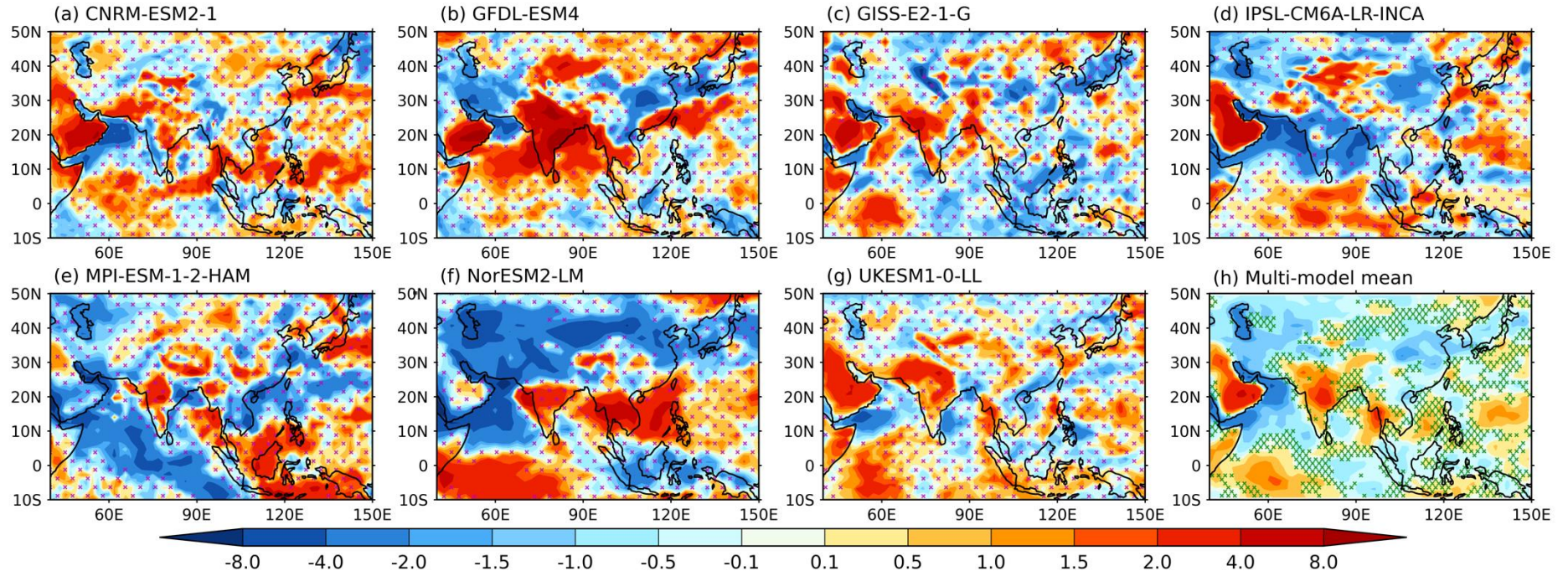
Figure S6. JJA mean changes in TOA all-sky net ERF (W m⁻²) due to doubled dust emissions in (a-g) individual models and (h) the multi-model mean. Purple hatches denote insignificant differences at the 10% level. Green hatches in (h) denote where ≤4 models have the same sign as the multi-model mean.
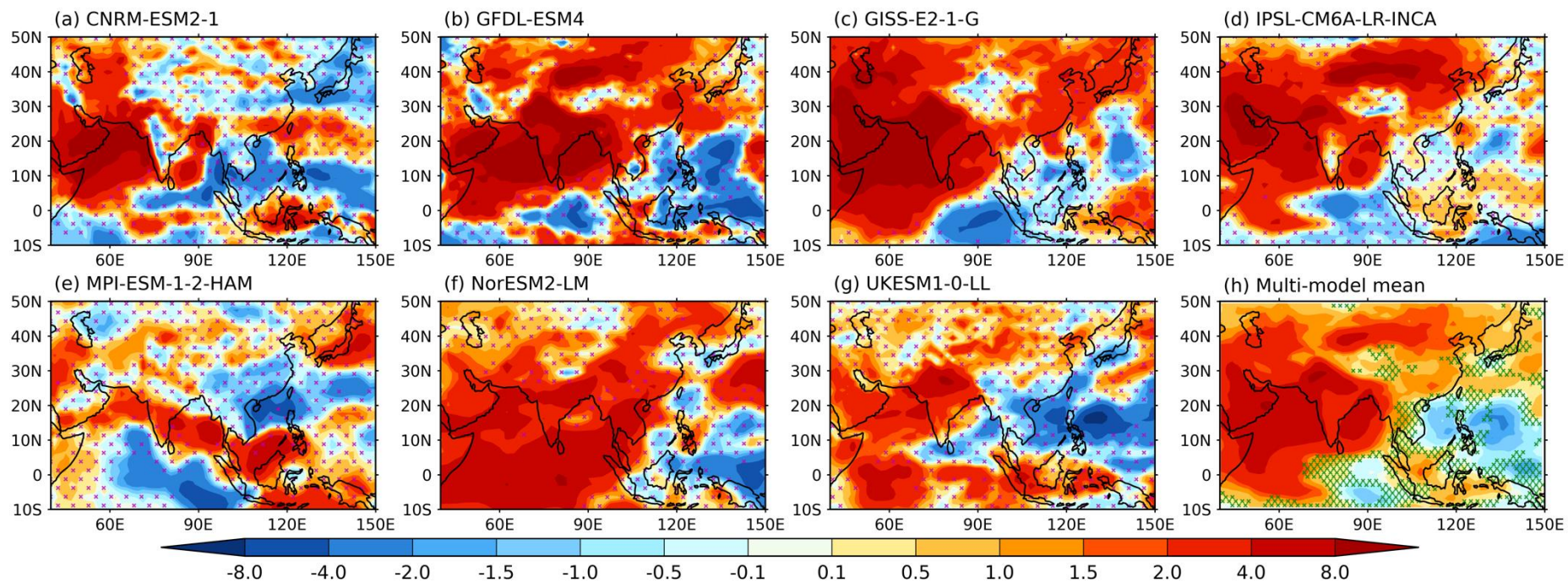
Figure S7 JJA mean changes in atmospheric absorption (W m^{-2}) due to doubled dust emissions in (a-g) individual models and (h) the multi-model mean. Purple hatches denote insignificant differences at the 10% level. Green hatches in (h) denote where ≤4 models have the same sign as the multi-model mean.
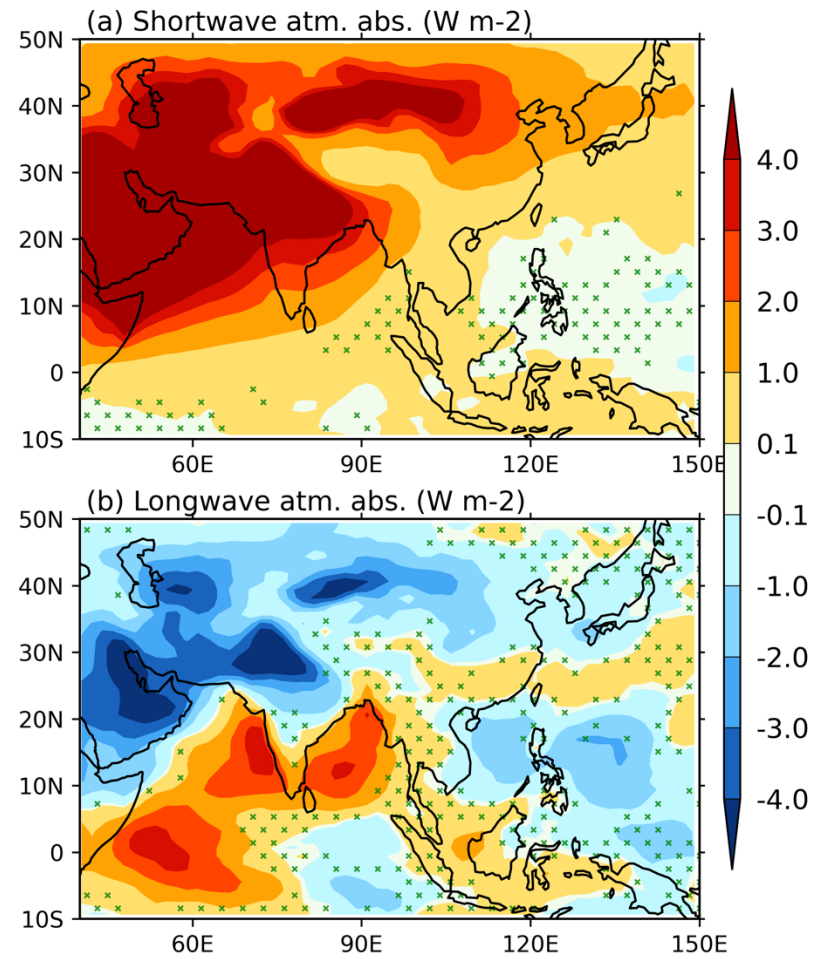
Figure S8. JJA multi-model mean changes in all-sky (a) shortwave and (b) longwave atmospheric absorption (W m^{-2}) due to doubled dust emissions. Green hatches denote where ≤4 models have the same sign as the multi-model mean.
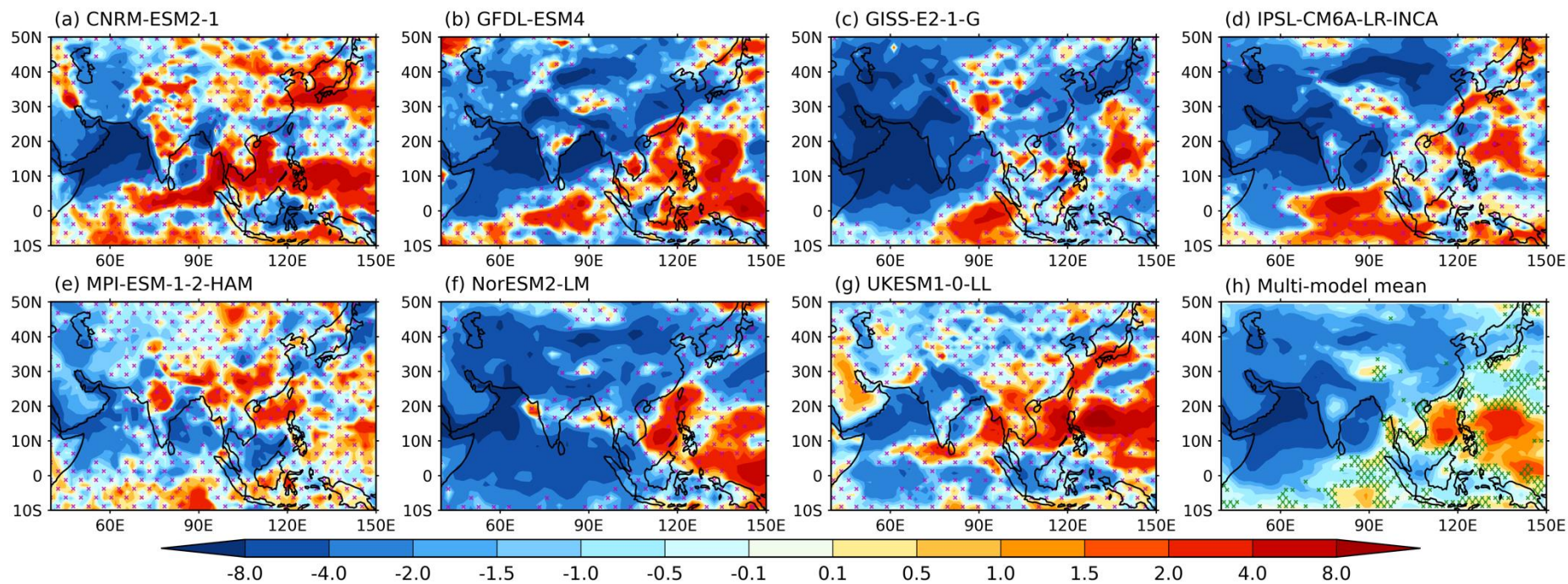
Figure S9. JJA mean changes in surface all-sky net ERF (W m^{-2}) due to doubled dust emissions in (a-g) individual models and (h) the multi-model mean. Purple hatches denote insignificant differences at the 10% level. Green hatches in (h) denote where ≤4 models have the same sign as the multi-model mean.
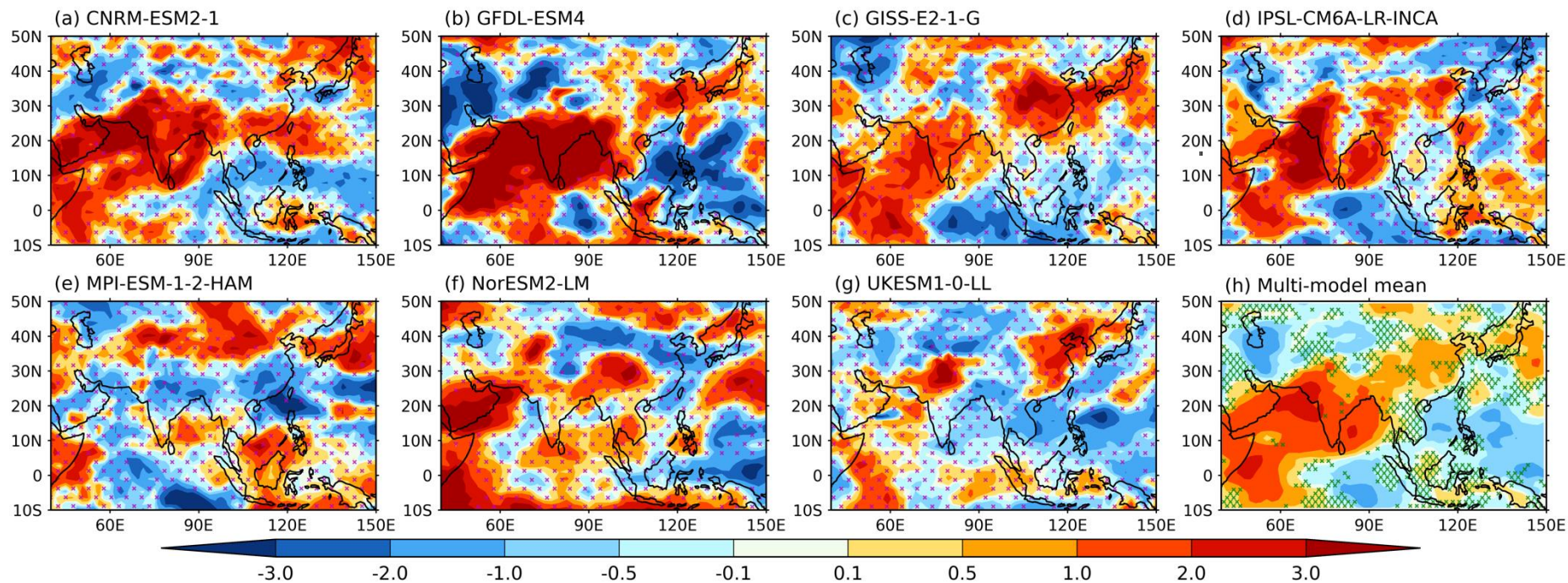
Figure S10. JJA mean changes in total cloud fraction (%) due to doubled dust emissions in (a-g) individual models and (h) the multi-model mean. Purple hatches denote insignificant differences at the 10% level. Green hatches in (h) denote where ≤4 models have the same sign as the multi-model mean.
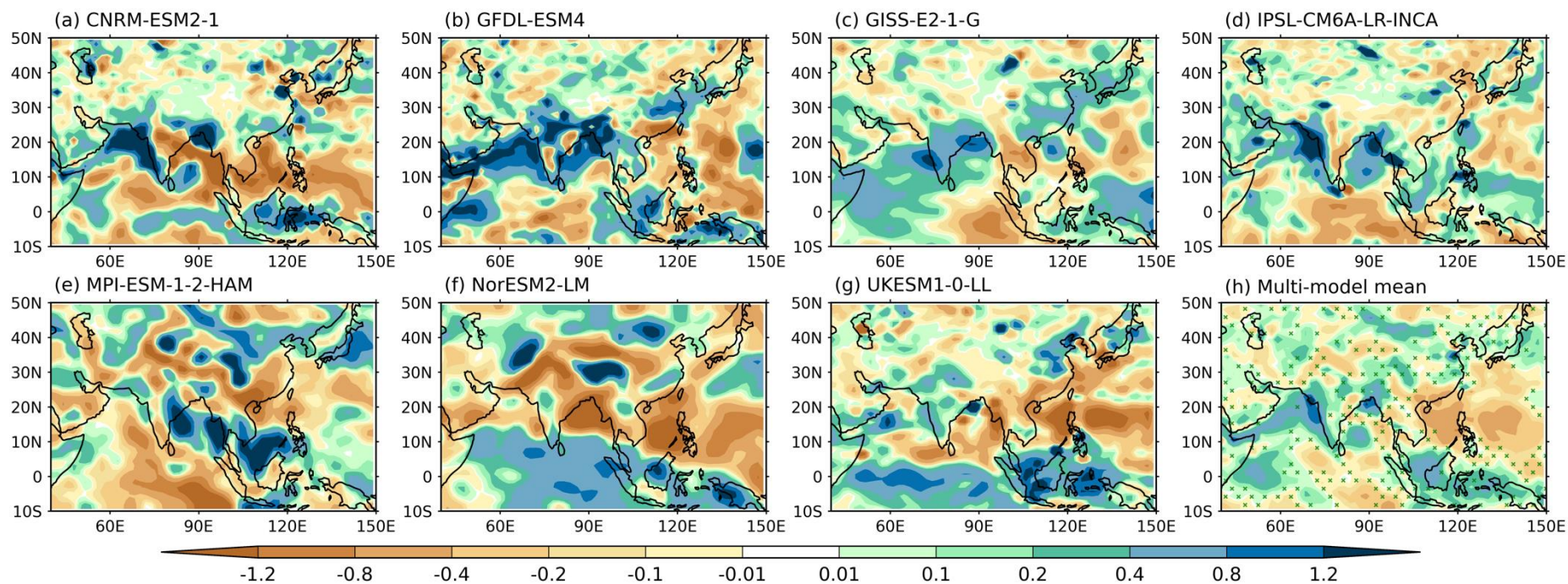
Figure S11. JJA mean changes in vertically integrated moisture flux convergence (mm day⁻¹) due to doubled dust emissions in (a-g) individual models and (h) the multi-model mean. Green hatches in (h) denote where ≤4 models have the same sign as the multi-model mean.
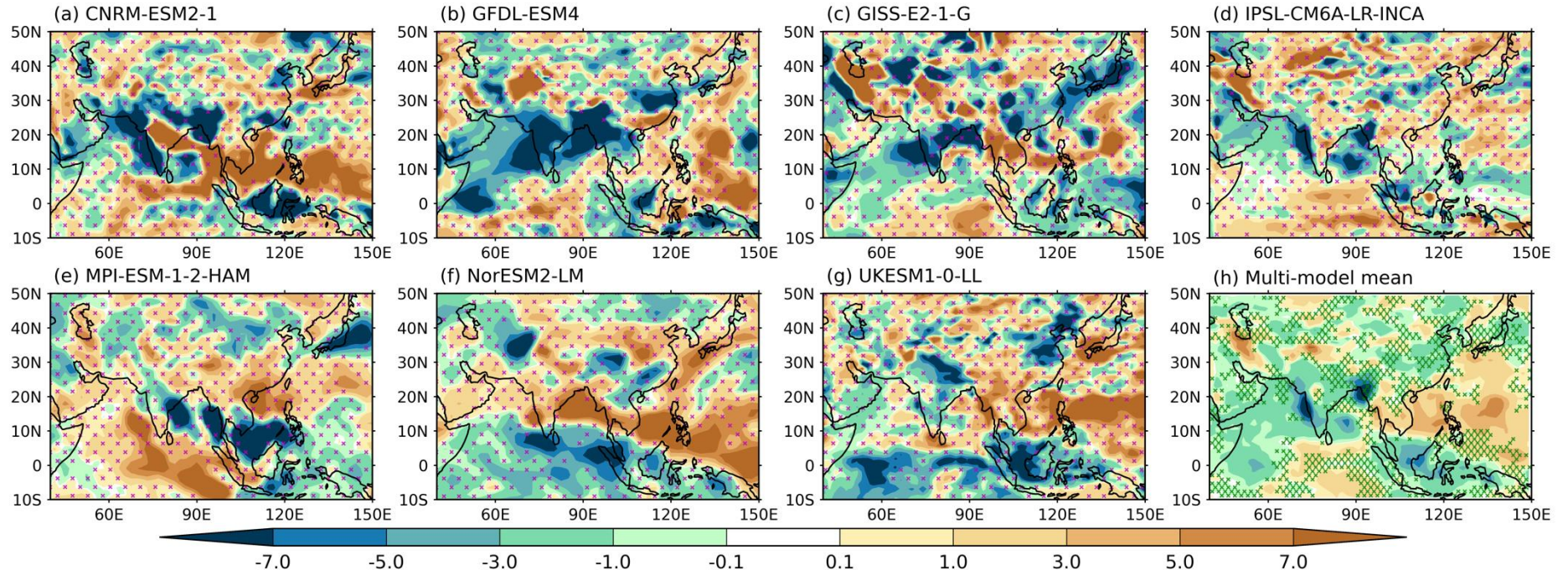
Figure S12. JJA mean changes in 500-hPa vertical velocity (hPa day^{-1}) due to doubled dust emissions in (a-g) individual models and (h) the multi-model mean. Purple hatches denote insignificant differences at the 10% level. Green hatches in (h) denote where ≤4 models have the same sign as the multi-model mean.
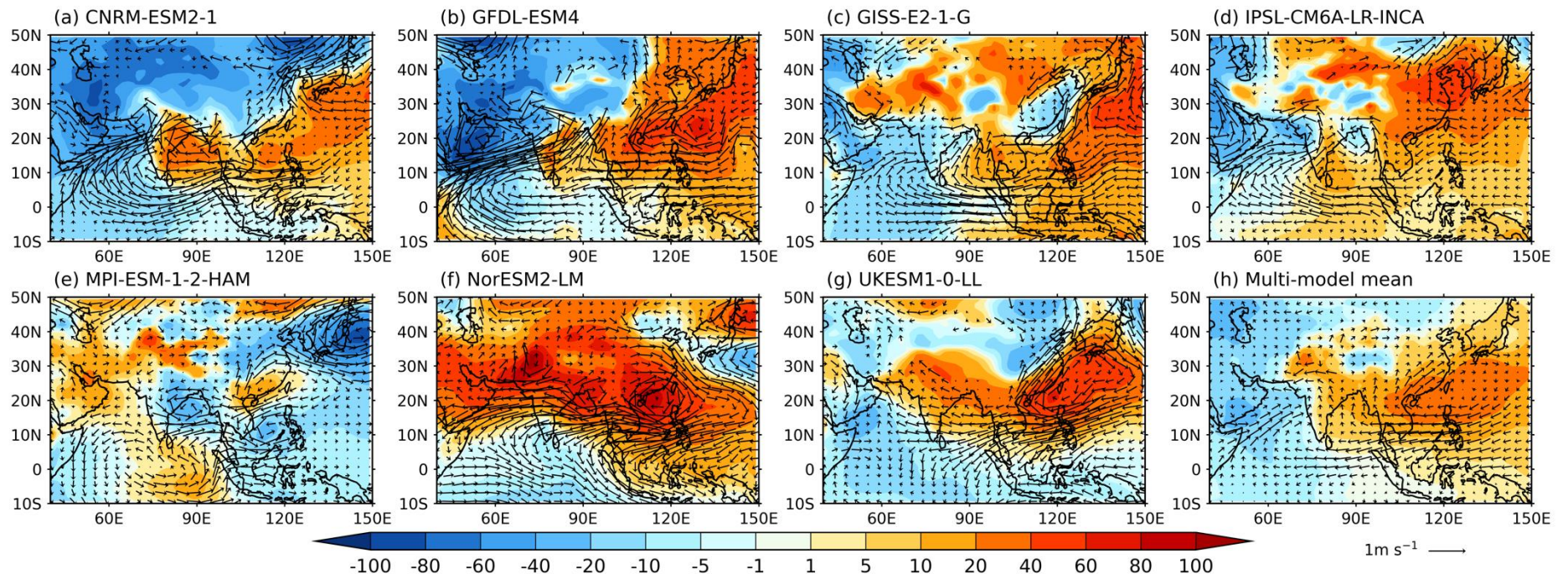
Figure S13. JJA mean changes in sea level pressure (colours, Pa) and in 850-hPa winds (vectors, m s⁻¹) due to doubled dust emissions in (a-g) individual models and (h) the multi-model mean.