Supporting Information for "Investigating Recent Changes in MJO Precipitation and Circulation in Multiple Reanalyses"

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Introduction The supporting information includes seven supplementary figures that are mentioned but now shown in the main paper.

References

Henley, B. J., Gergis, J., Karoly, D. J., Power, S., Kennedy, J., & Folland, C. K. (2015, December). A tripole index for the interdecadal pacific oscillation. *Clim. Dyn.*, *45*(11), 3077–3090.

Mantua, N. J., Hare, S. R., Zhang, Y., Wallace, J. M., & Francis, R. C. (1997, June). A pacific interdecadal climate oscillation with impacts on salmon production*. *Bull.*
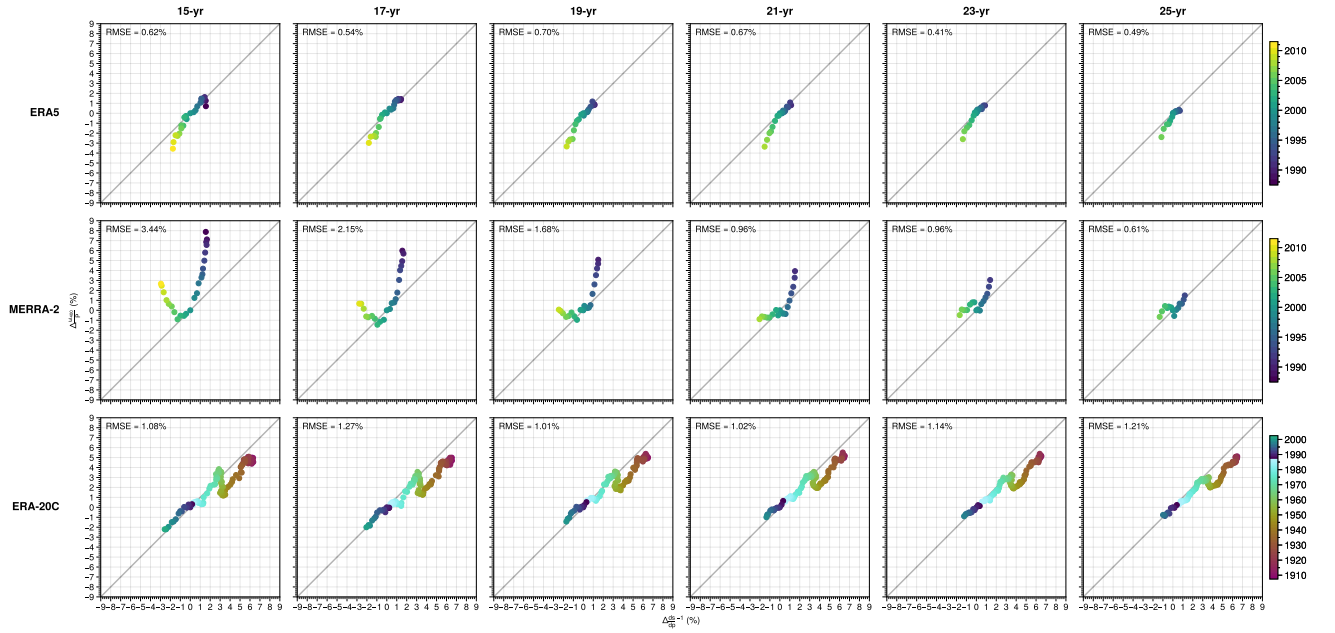
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October 6, 2020, 8:31pm

Am. Meteorol. Soc., *78*(6), 1069–1080.

Trenberth, K. E., & Stepaniak, D. P. (2001, April). Indices of el niño evolution. *J. Clim.*, *14*(8), 1697–1701.

Figure S1.   As Figure 3, but using 15, 17, 19, 21, 23, and 25-year running composites. Note that the reference years used in ERA5, MERRA-2, and ERA-20C are 2000, 2000, and 1990 as central years to make the colors consistent among different lengths of running windows.

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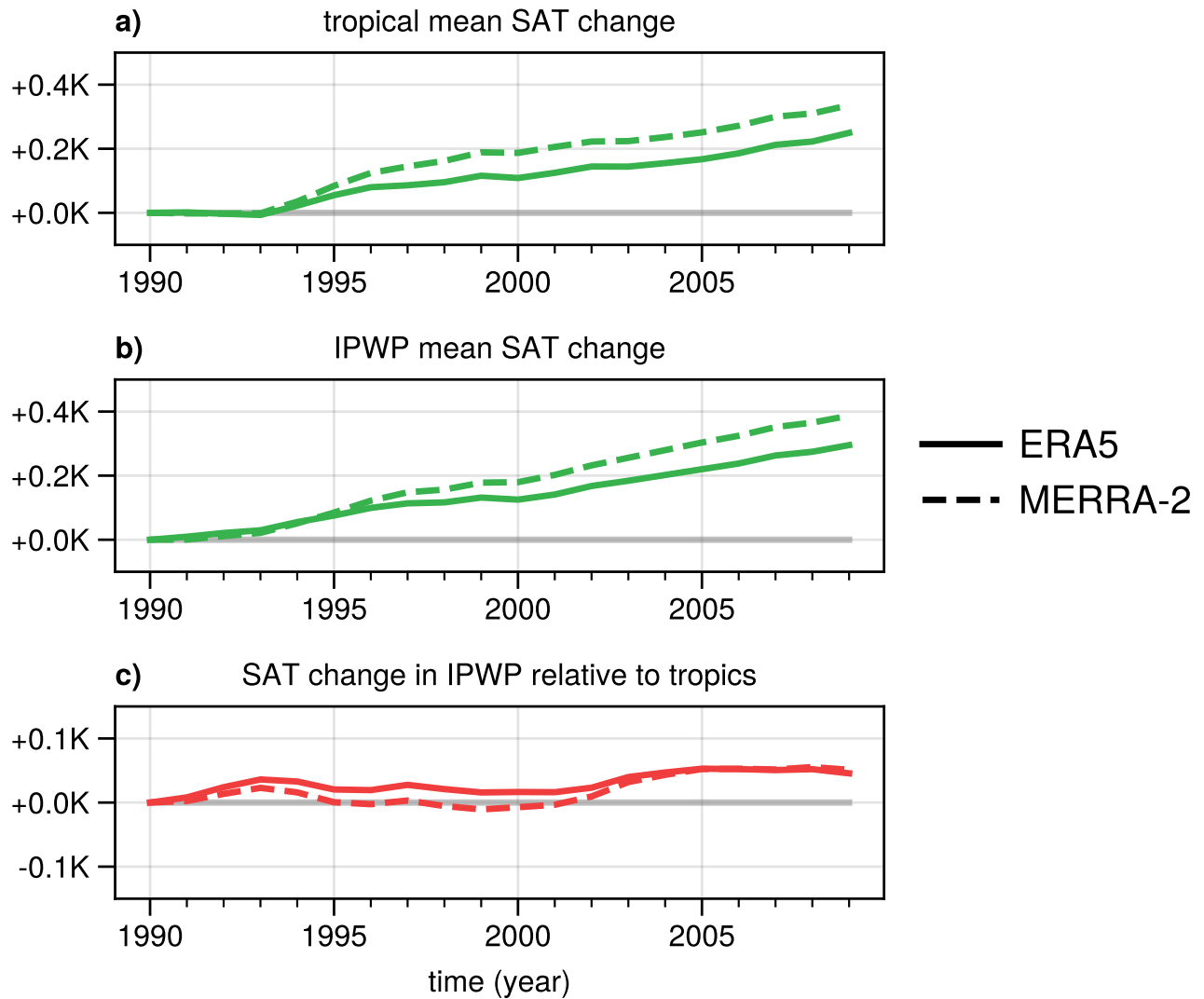
Figure S2.   The boreal-wintertime changes of the 19-years running means of (a) surface air temperature within the tropics (15°S-15°N), (b) surface air temperature in the IPWP region, and (c) the change in the IPWP region relative to the tropics, equivalent to (b) minus (a). Solid lines are from ERA5 and dashed lines are from MERRA-2.

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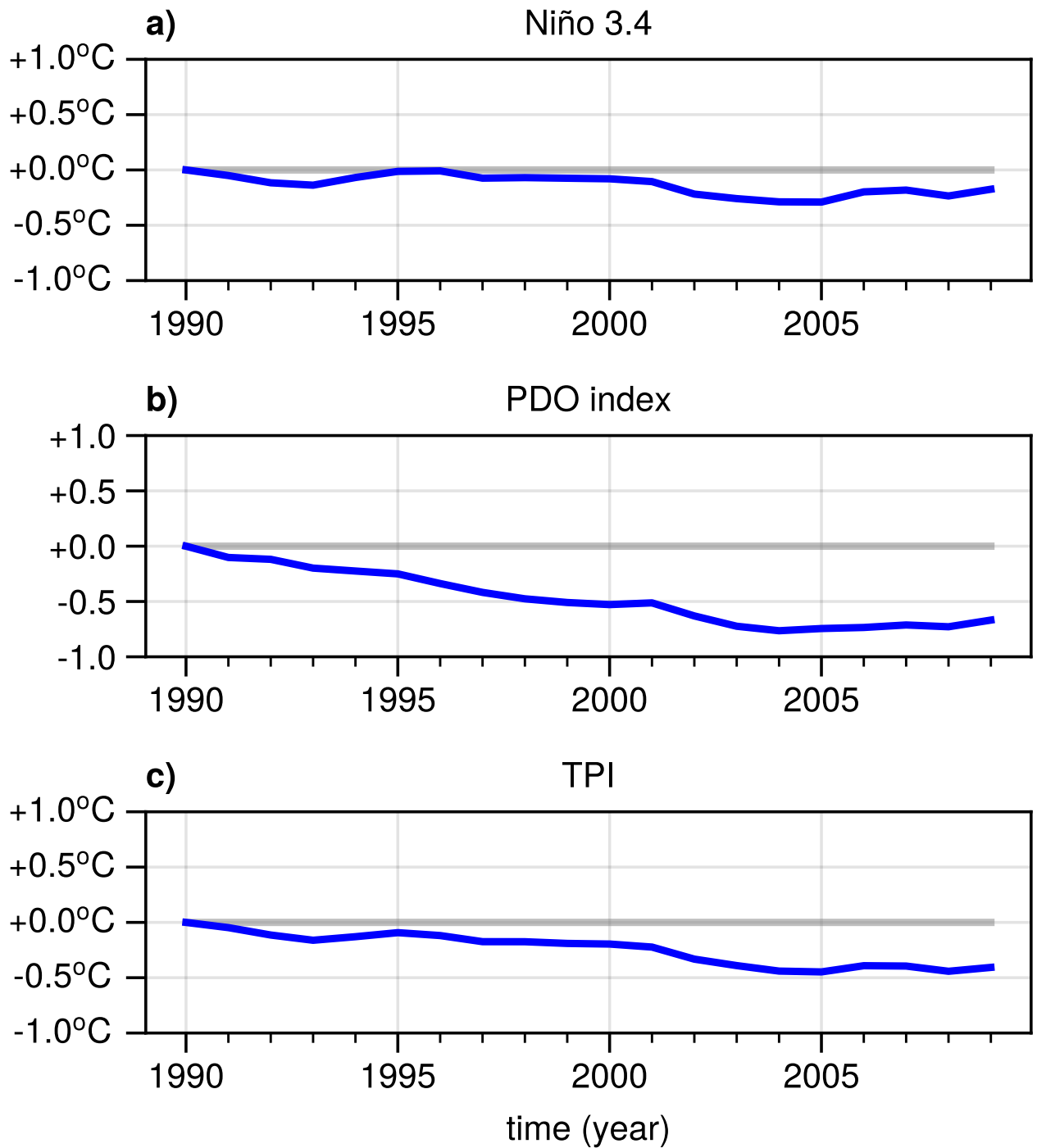
Figure S3.   The boreal-wintertime changes of the 19-years running means of (a) the Niño 3.4 SST (Trenberth & Stepaniak, 2001), (b) the unfiltered Pacific Decadal Oscillation (PDO) index (Mantua et al., 1997), and (c) the unfiltered Interdecadal-Pacific-Oscillation (IPO) tripole SST index (TPI; Henley et al., 2015).
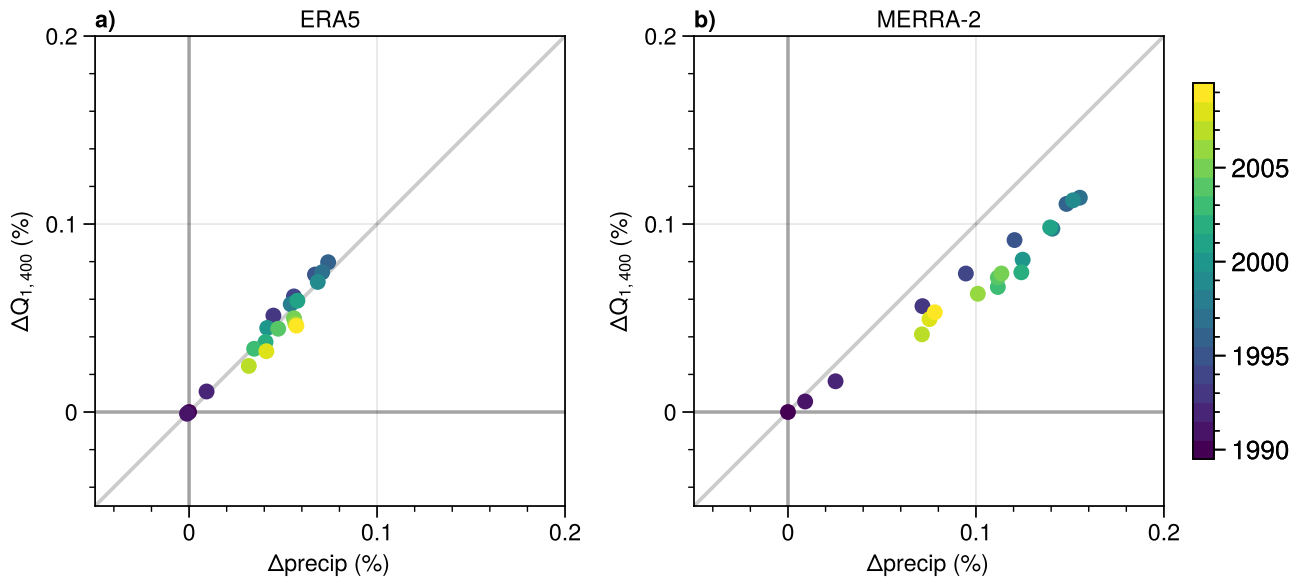
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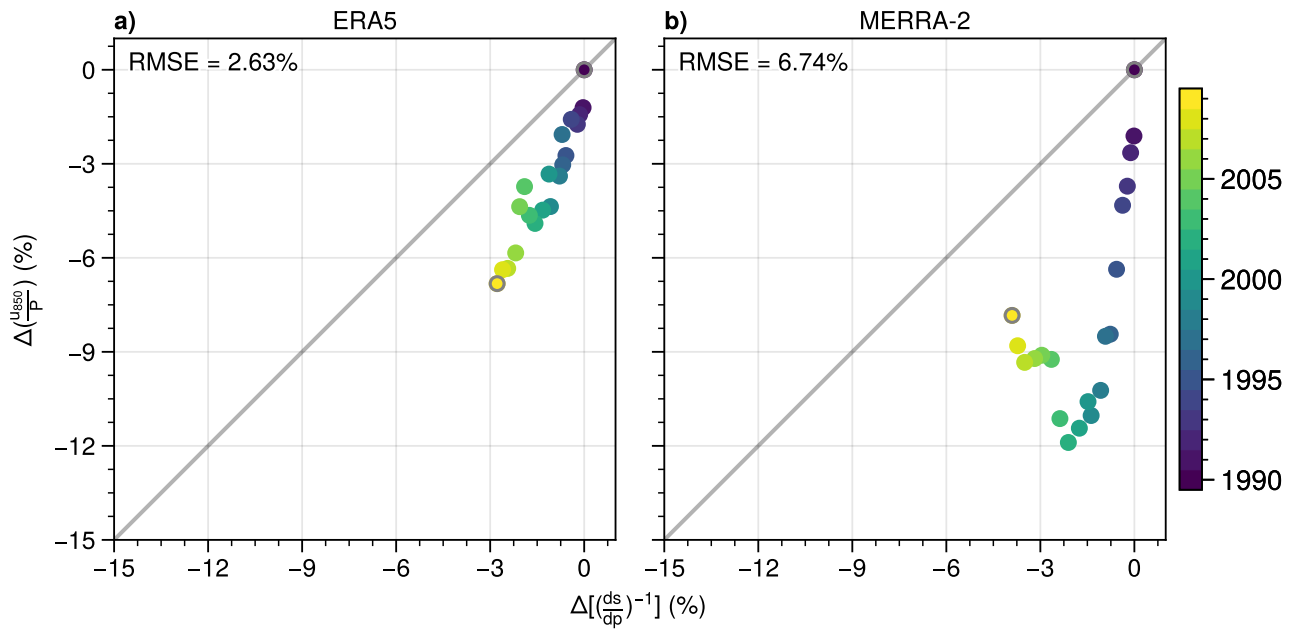
Figure S4.   As Figure 3a-b, but the y-axis is the ratio of MJO u_{850} to precipitation amplitude.

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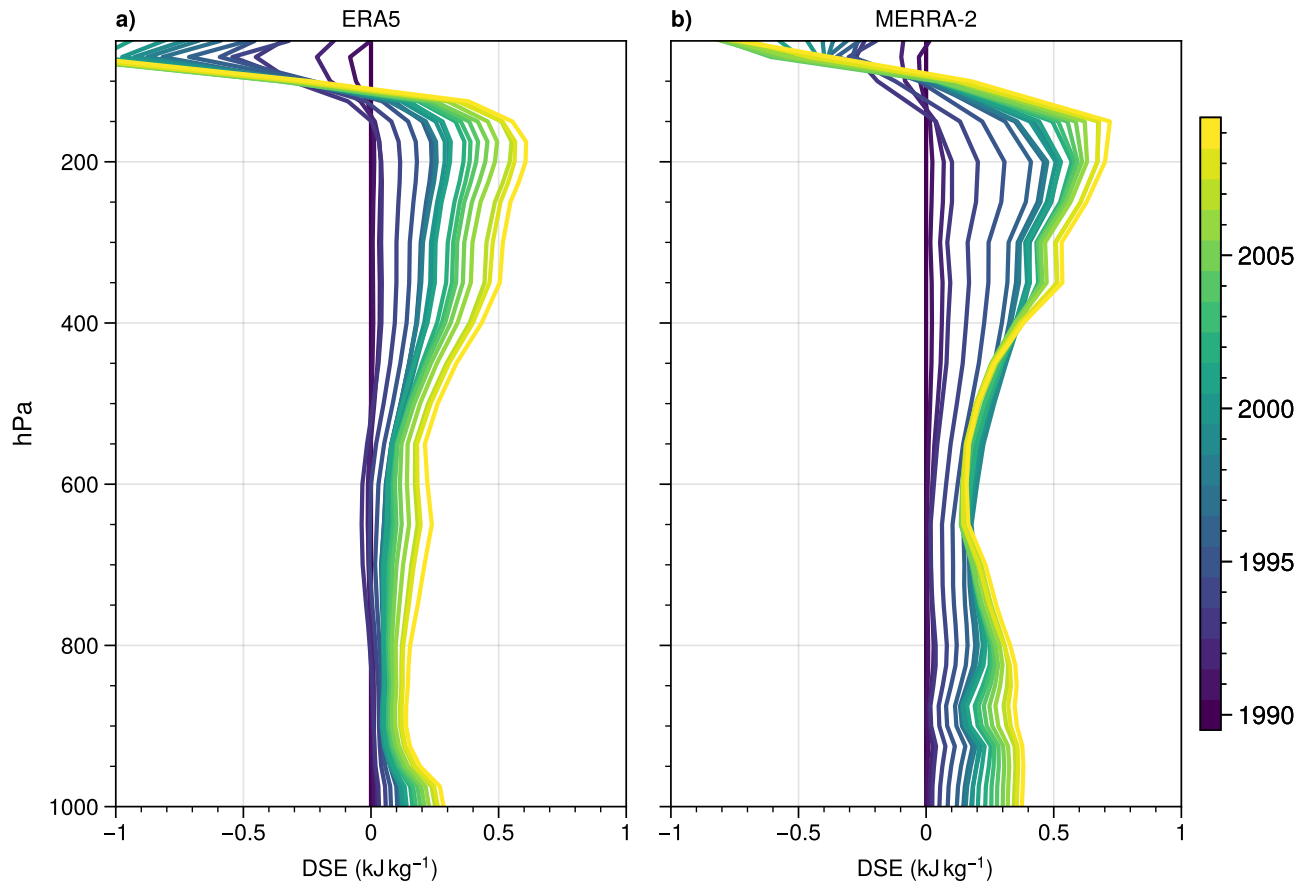
Figure S5.   The changes of boreal-wintertime composite DSE between the 19-years running windows and the early period in ERA5 and MERRA-2. The color indicates the central year of the running windows.

Figure S6.   As Figure 3a-b, but the relative change in boreal-wintertime MJO anomaly amplitudes of (x-axis) precipitation and (y-axis) apparent heat source at 400 hPa ($Q_{1,400}$). The grey diagonal line is one-to-one, indicating that MJO precipitation has the same percentage change as MJO $Q_{1,400}$. $Q_{1,400}$ was derived as a residual in the thermodynamic energy budget.
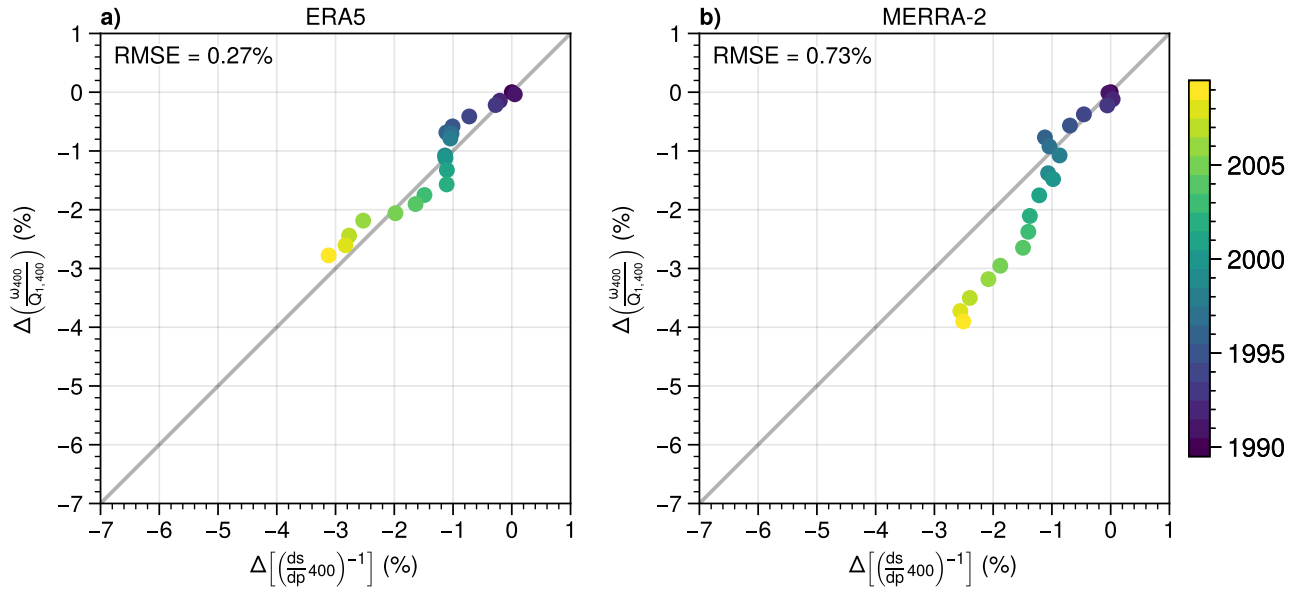
Figure S7.   As Figure 3a-b, but shows the relative change in MJO $\omega_{400}/Q_{1,400}$ instead of MJO ω_{400}/P on the y-axis.

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