Supplement to: A process-based evaluation of biases in extratropical stratosphere-troposphere coupling in subseasonal forecast systems

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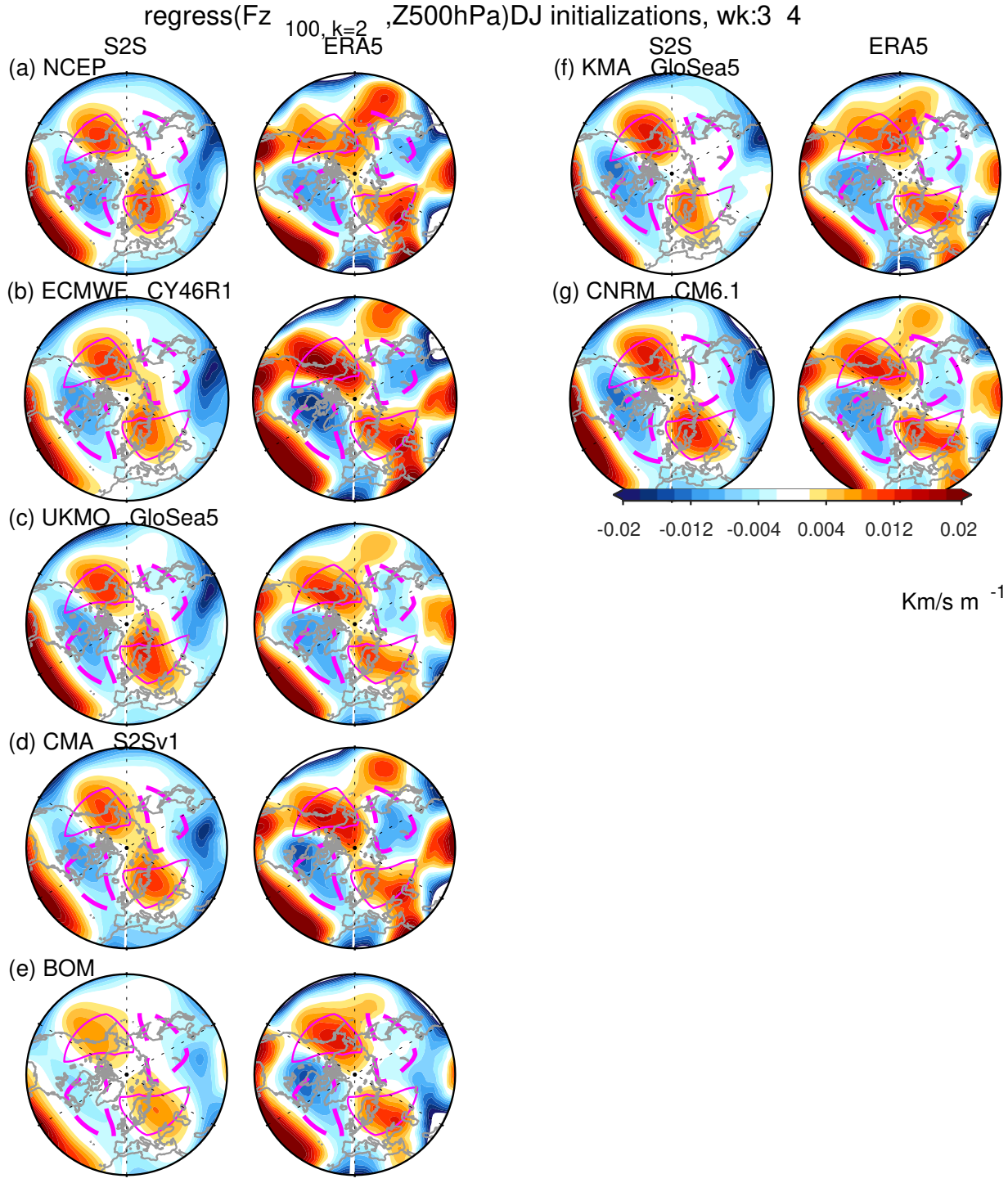

Figure S1. As in Figure 6 in the main text but for wave-2

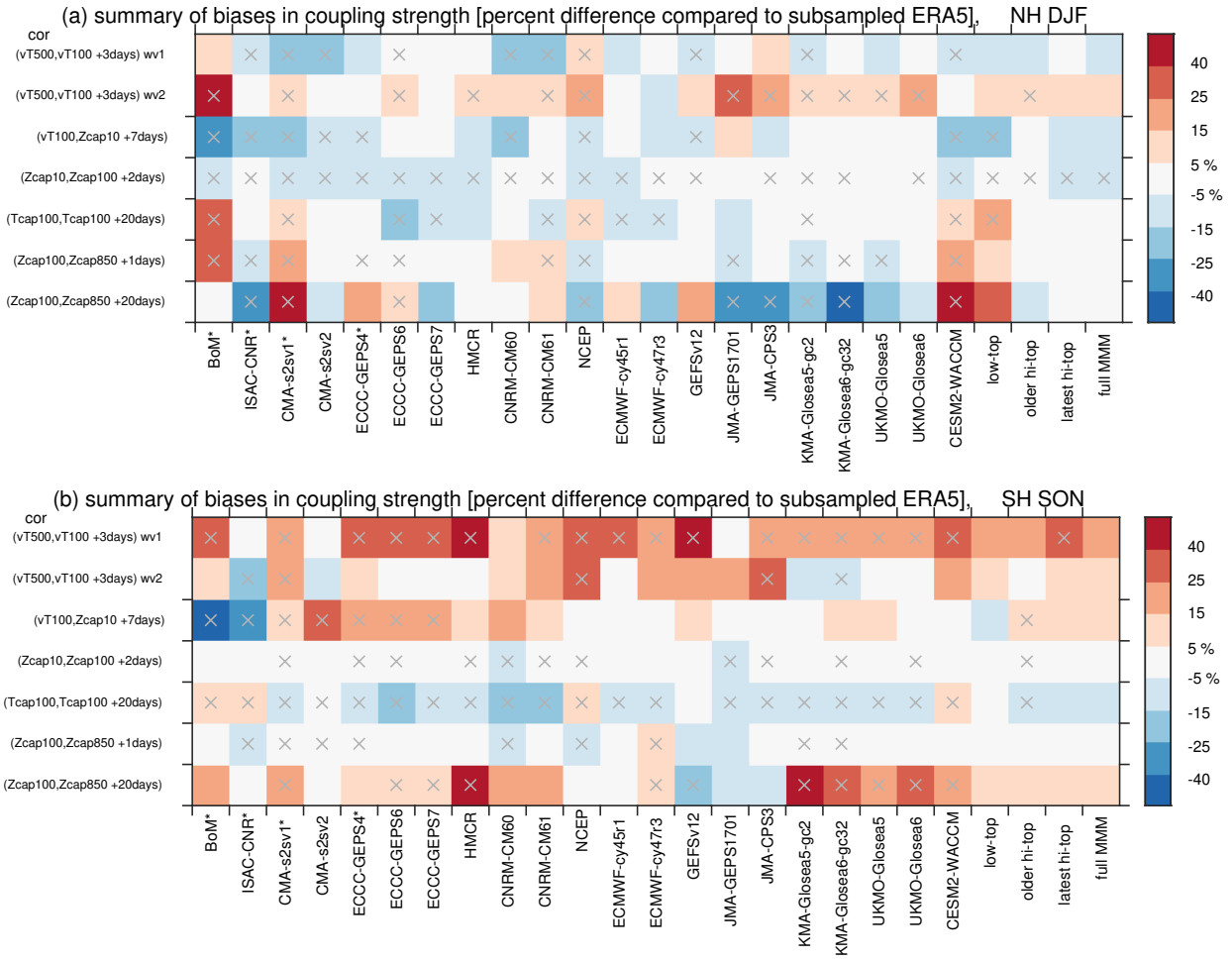

Figure S2. As in Figure 3 in the main text but for correlation coefficients.

Data availability. The hindcasts from the S2S database used here are available from https://apps.ecmwf.int/datasets/data/s2s/ under the "Reforecasts" S2S set. The NOAA GEFSv12 hindcasts can be obtained from https://registry.opendata.aws/noaa-gefs-reforecast/. Hindcasts for CESM2-CAM are available at https://www.earthsystemgrid.org/dataset/ucar.cgd.cesm2.s2s_hindcasts.html, while those for CESM2-WACCM are from https://www.earthsystemgrid.org/dataset/ucar.cgd.cesm2-waccm.s2s_hindcasts.html. Data for the GFDL-SPEAR can be made available upon request.

Author contributions. CIG and AHB drafted the paper. CIG produced the final version of all figures exception Figure 9 and 10. ZDL organized and led the SNAP effort leading to this paper, and also downloaded all of the data. AHB produced the final version of Figure 9 and 10. EDS produced an earlier version of Figures 9 and 10. IS and AYK produced an earlier version of Figure 12. GK produced earlier

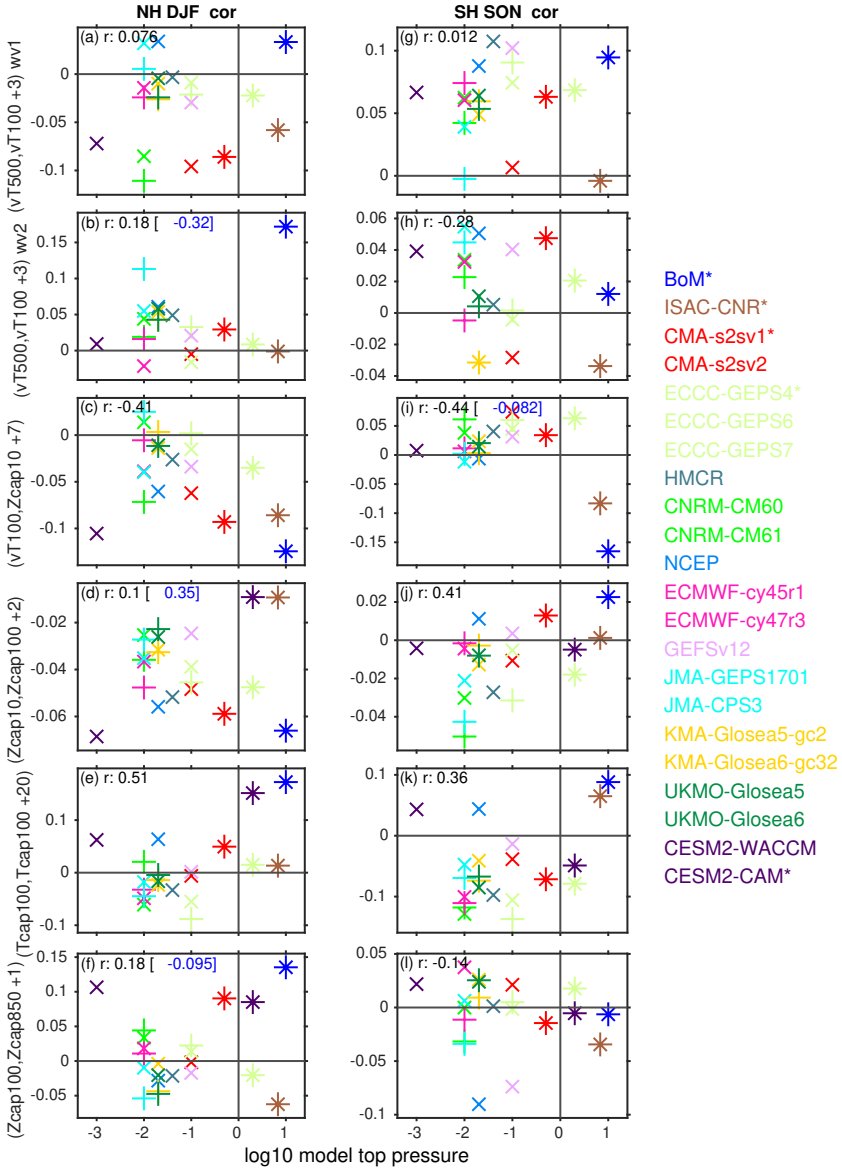

Figure S3. As in Figure 4 in the main text but with the coupling strength on the y-axis defined using correlation.

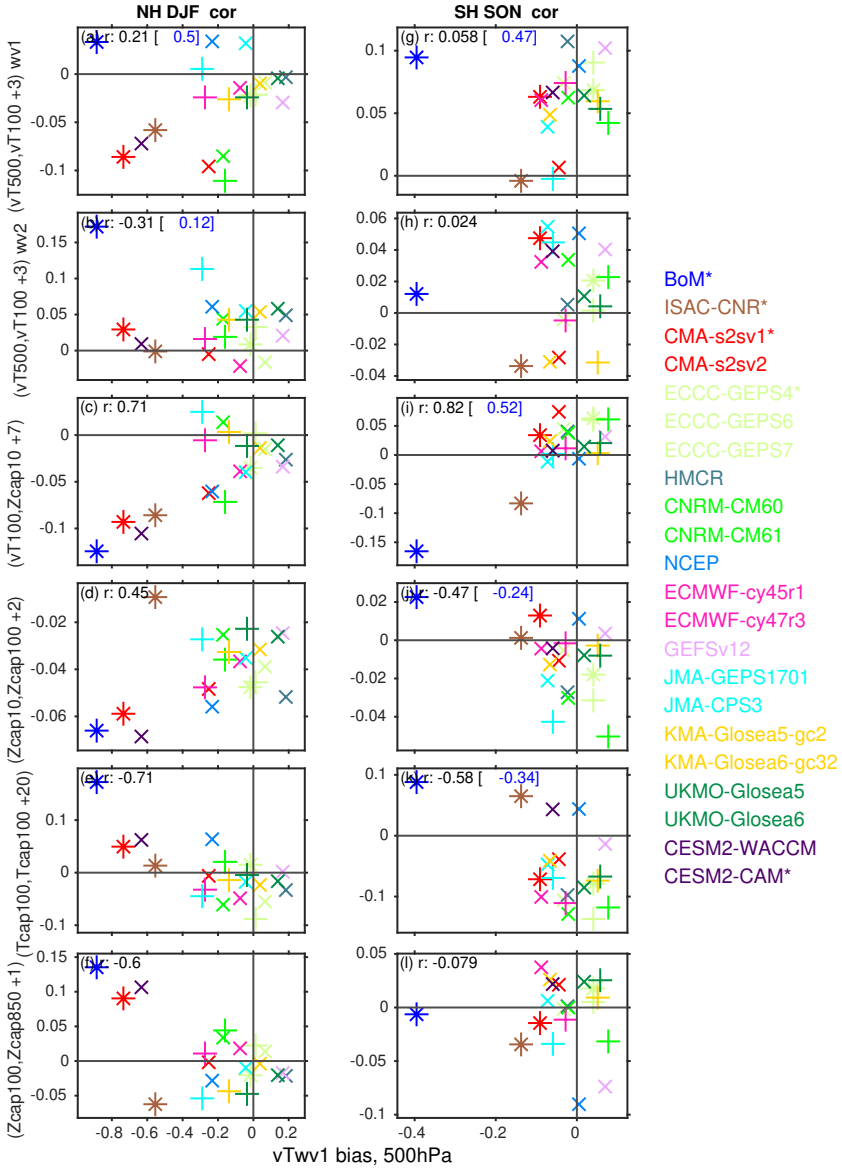

Figure S4. As in Figure 5 in the main text but with the coupling strength on the y-axis defined using correlation.

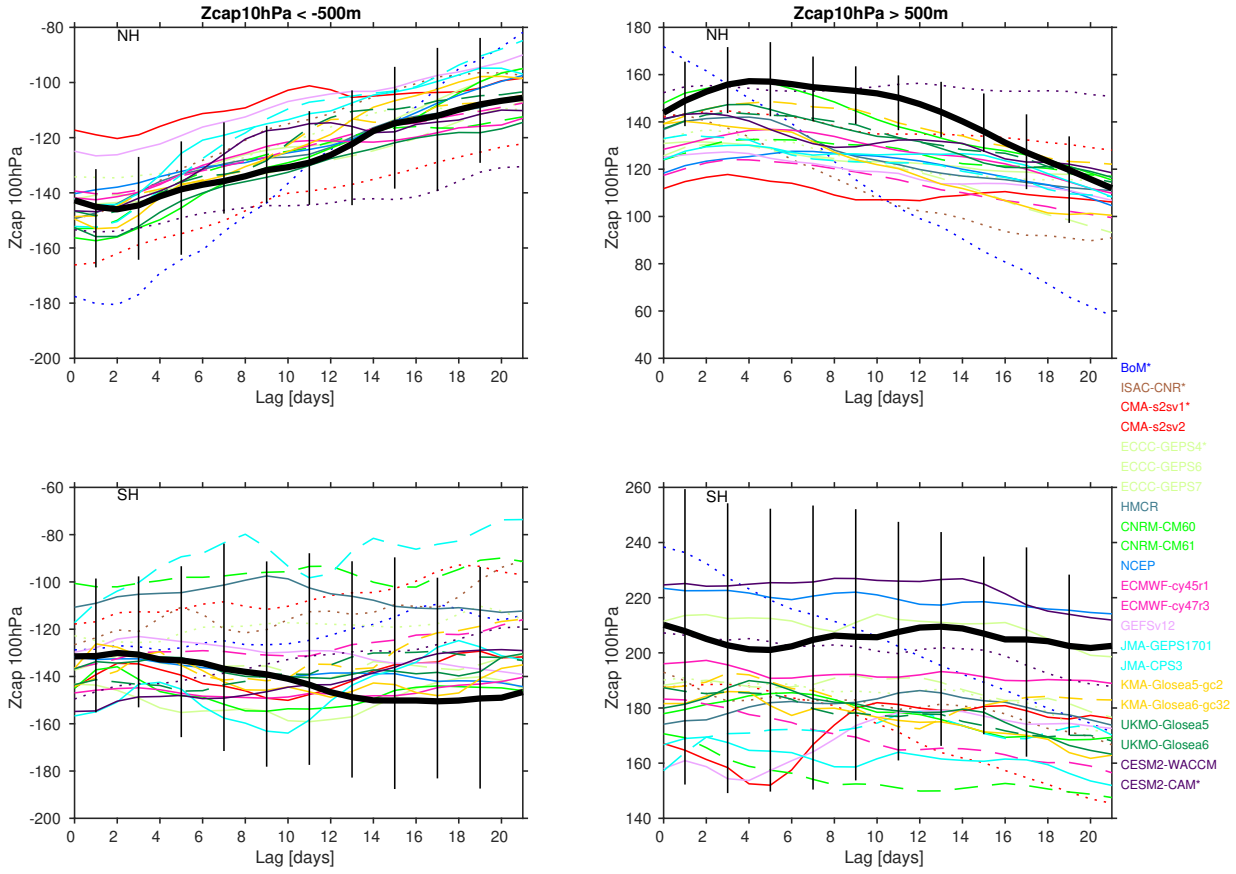

Figure S5. As in Figure 11 in the main text, but for a composite based approach of the downward propagation of extreme events within the stratosphere. For each model, we composite initializations in which Zcap at 10hPa in day 10 exceeds 500m or is more negative than -500m. We then analyze the evolution of Zcap at 100hPa from days 10 through 32.

versions of Figures 4 and 5. All the listed coauthors were active participants in this SNAP community effort and provided comments on the draft manuscript.

Competing interests. Daniela Domeisen is a member of the editorial board of Weather and Climate Dynamics.

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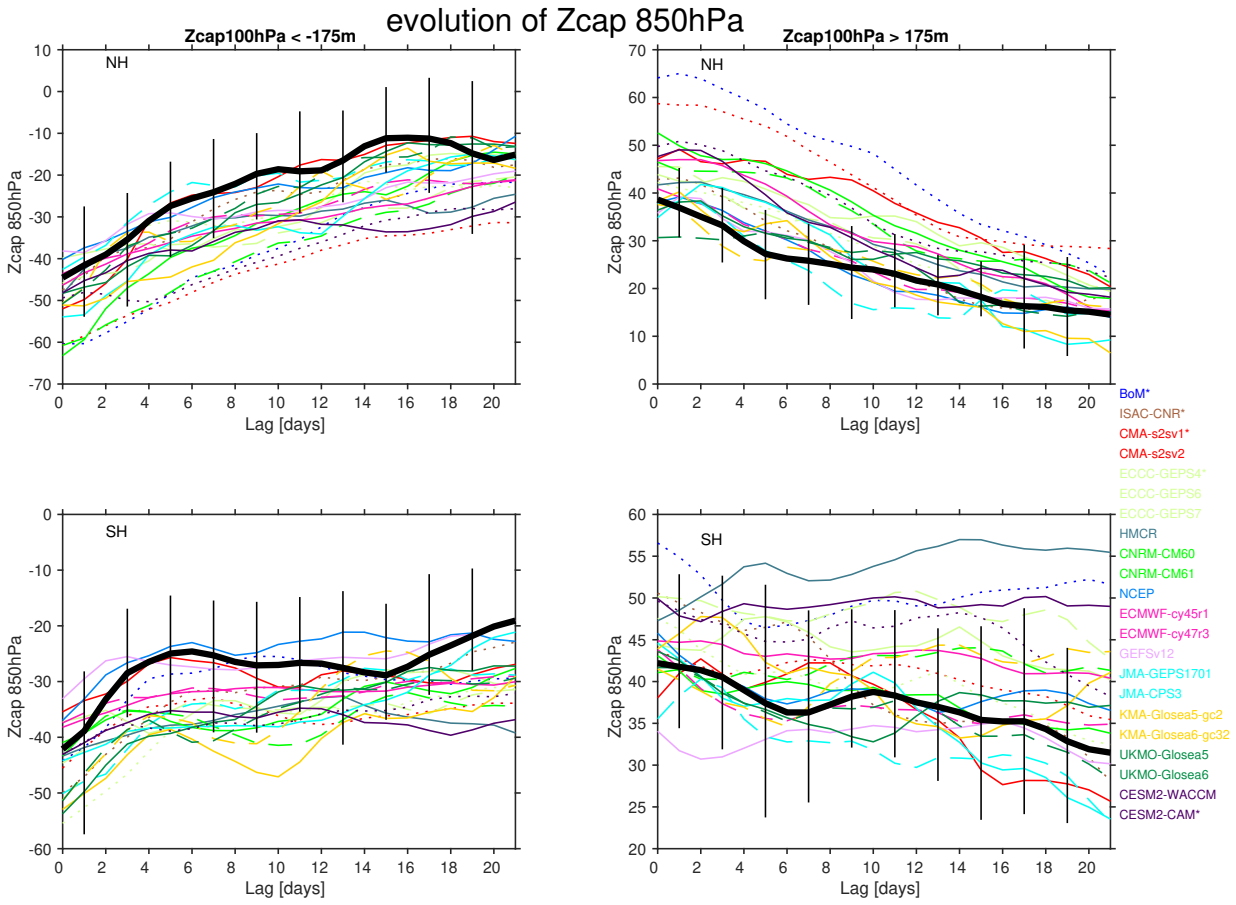

Figure S6. As in 12 in the main text, but for a composite based approach of the downward propagation of extreme events from the lower stratosphere to the troposphere. For each model, we composite initializations in which Zcap at 100hPa in day 10 exceeds 175m or is more negative than -175m. We then analyze the evolution of Zcap at 850hPa from days 10 through 32.

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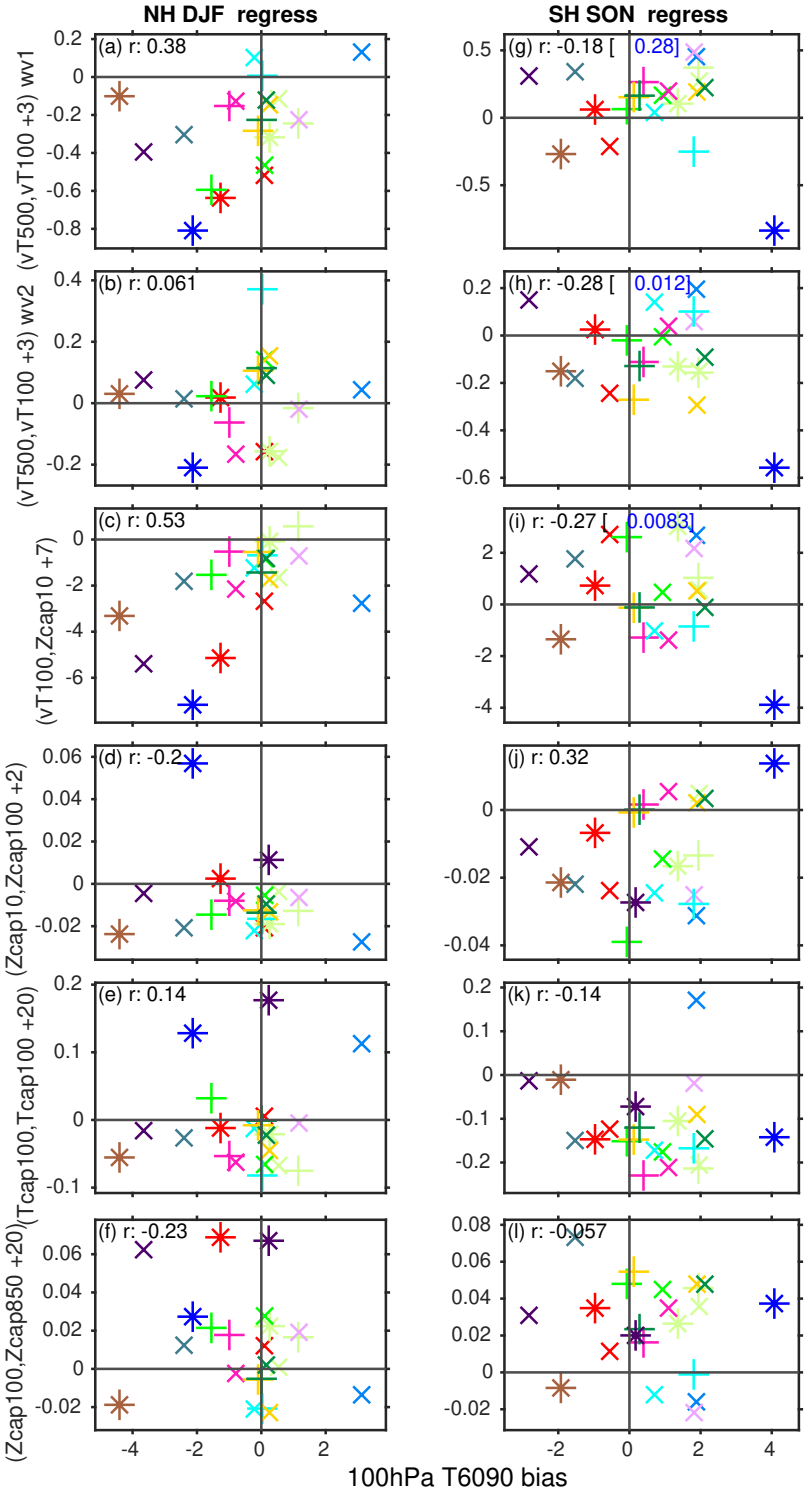

Figure S7. As in Figure 4 in the main text, but for 100hPa temperature biases from 60° to the pole on the x-axis.

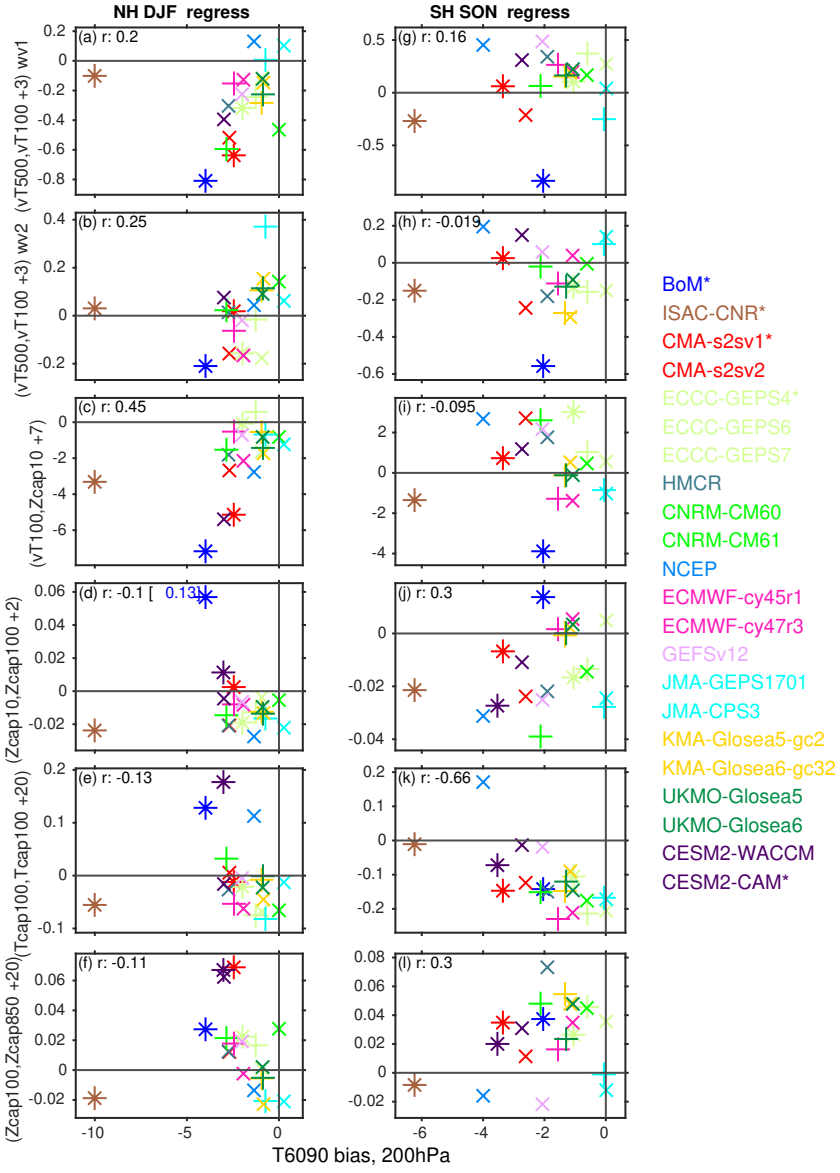

Figure S8. As in 4 in the main text, but for 200hPa temperature biases from 60° to the pole on the x-axis.

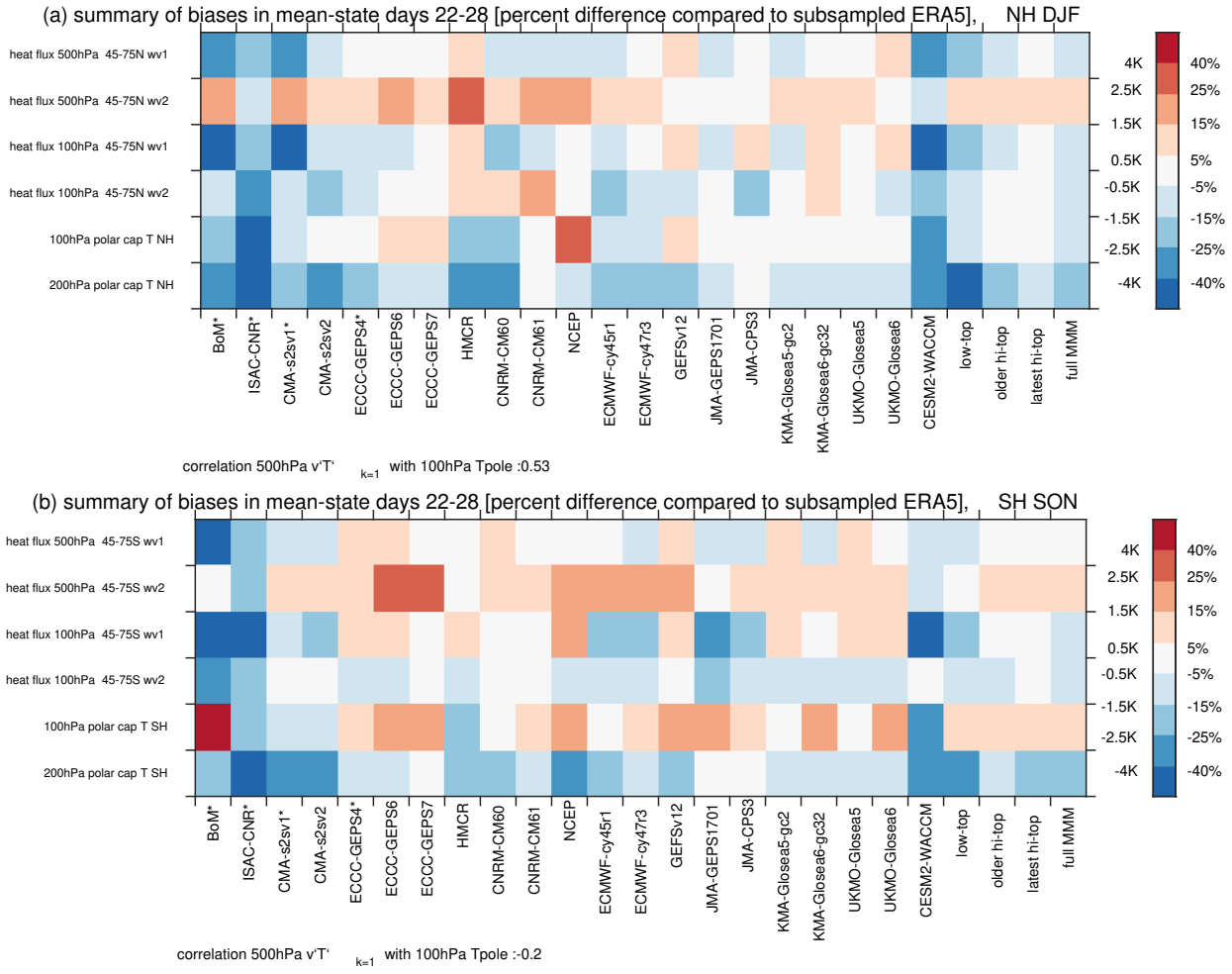

Figure S9. Mean bias of the various diagnostics in days 22-28. For each forecast system we compare to the corresponding period in ERA5, and then show the percent error (bias divided by ERA5 mean state) for heat flux and raw biases for temperature.

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