# Supporting Information for The predictability of the downward vs. non-downward propagation of sudden stratospheric warmings in S2S hindcasts

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## Introduction

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

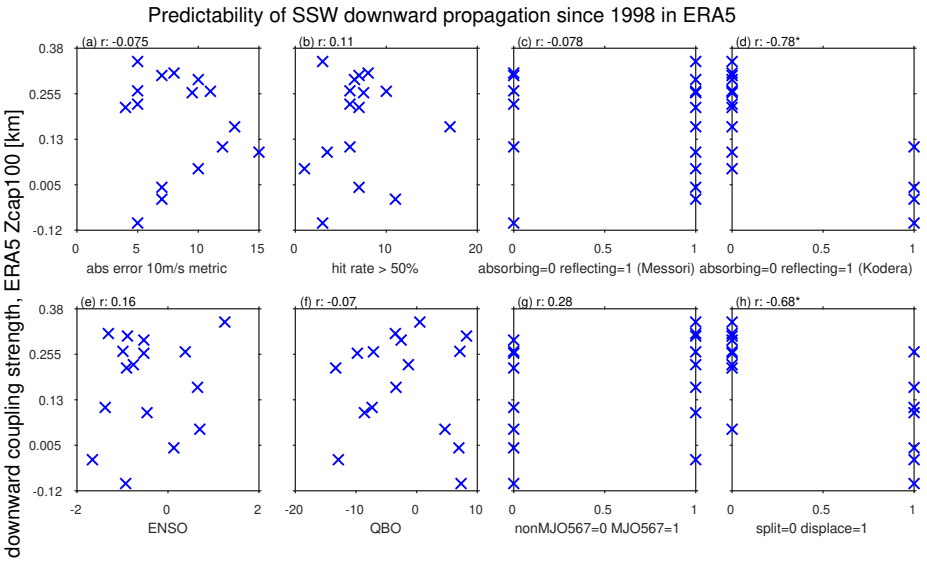


**Figure S1.** Scatter plots comparing the downward propagation as quantified by the ERA5 Z100cap (y-axis) to each of the following factors (x-axis): predictability of the SSW as given by the earliest forecast lead in which the median (a) hit rate still exceeds 50% and (b) absolute error of U1060 is less than 10m/s, across all models (Chwat et al., 2022); whether each SSW was absorbing or reflecting using the (c) Messori et al. (2022) definition and (d) Kodera et al. (2016) definition;(e) Niño3.4 index [Kelvin]; (f) Quasi-Biennial Oscillation [m/s]; (g) whether the event was preceded by Madden Julian Oscillation Phase 5, 6, or 7 of amplitude exceeding 1 in the two weeks before the event; (h) split versus displacement. Each of the 16 SSWs is indicated with an "x", and the correlation for each panel is indicated. Correlations exceeding 0.50 (in absolute value) allow rejecting a null hypothesis of no relationship, and are indicated with a star next to the correlation.

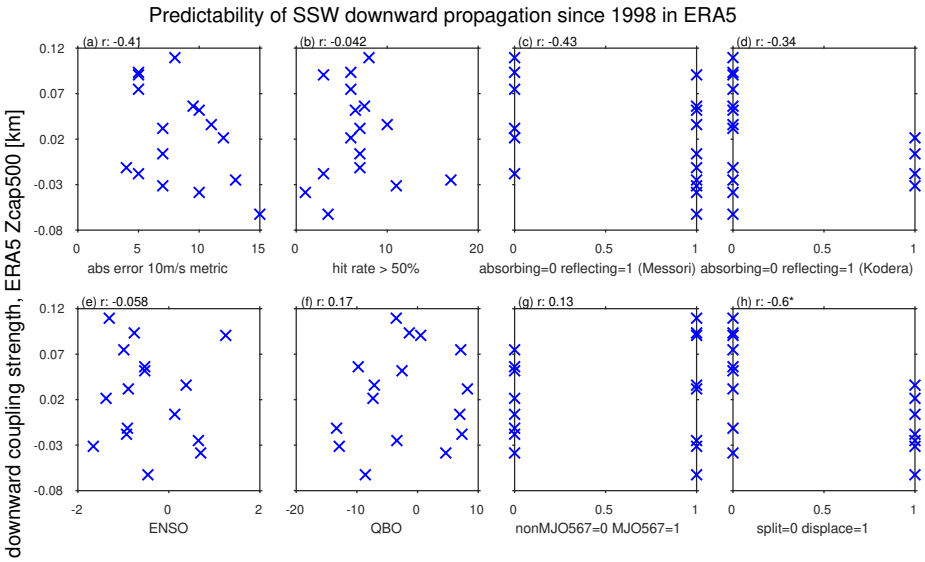


**Figure S2.** As in figure Figure S1 but replacing the y-axis with the ERA5 Z500cap.

## References

Chwat, D., Garfinkel, C. I., Chen, W., & Rao, J. (2022). Which sudden stratospheric warming events are most predictable? *Journal of Geophysical Research: Atmospheres*, *127*(18), e2022JD037521. Retrieved from `https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2022JD037521` (e2022JD037521 2022JD037521) doi: https://doi.org/10.1029/2022JD037521

Kodera, K., Mukougawa, H., Maury, P., Ueda, M., & Claud, C. (2016). Absorbing and reflecting sudden stratospheric warming events and their relationship with tropospheric circulation. *Journal of Geophysical Research: Atmospheres*, *121*(1), 80–94. doi: 10.1002/2015JD023359

Messori, G., Kretschmer, M., Lee, S. H., & Wendt, V. (2022). Stratospheric downward wave reflection events modulate north american weather regimes and cold spells. *Weather and Climate Dynamics*, *3*(4), 1215–1236.