

Supplementary information for *A comparison of ENSO remote forcing regions in CMIP large ensembles*

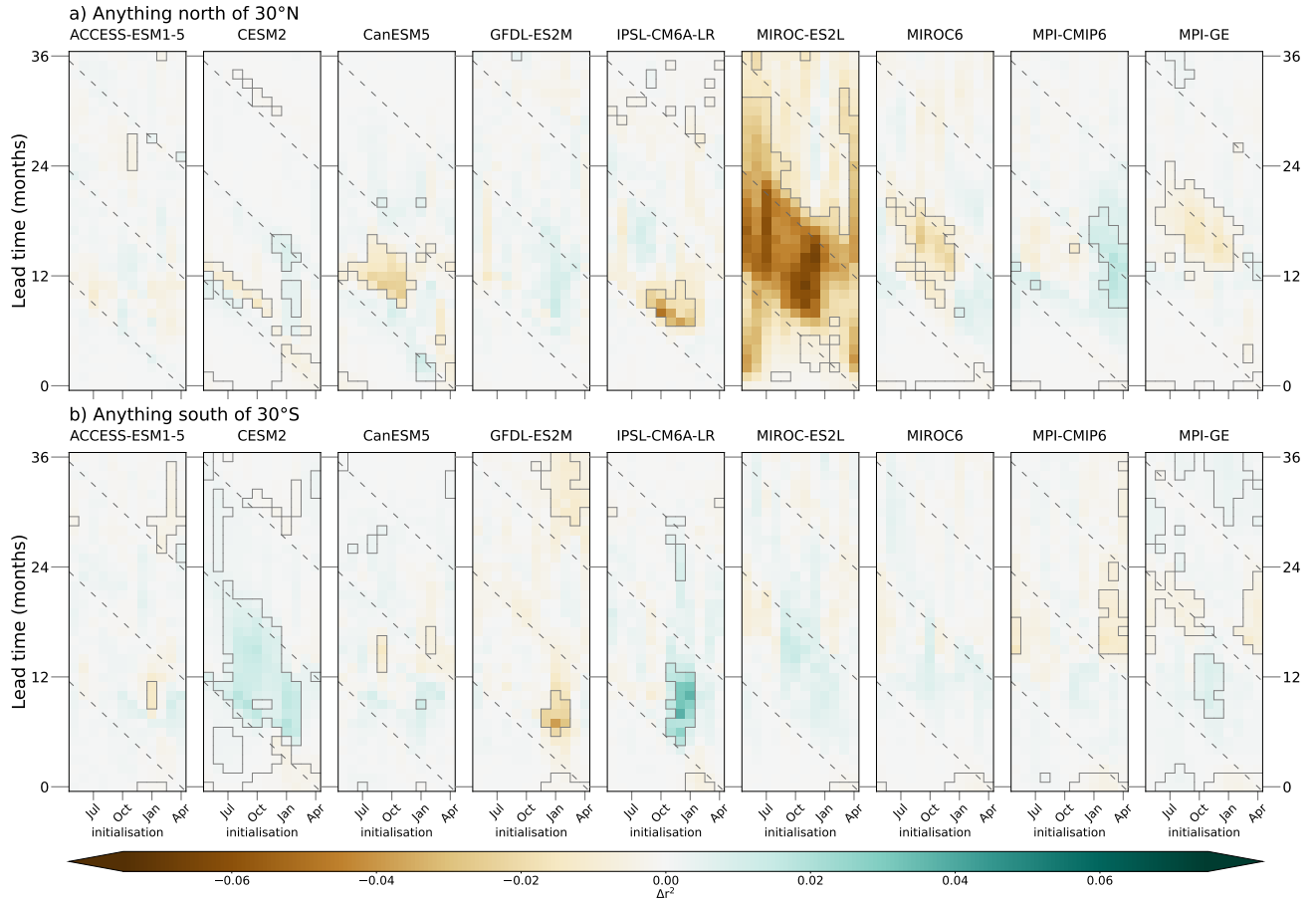


Figure S1: As per Figure 7, but for anomalies polewards of 30°. Change in model-analogue forecast skill of NINO34, as measured by anomaly correlation coefficient squared, as a result of expanding the region used to select analogues from the equatorial Pacific to also include a) all ocean north of 30°N, b) all ocean south of 30°S.

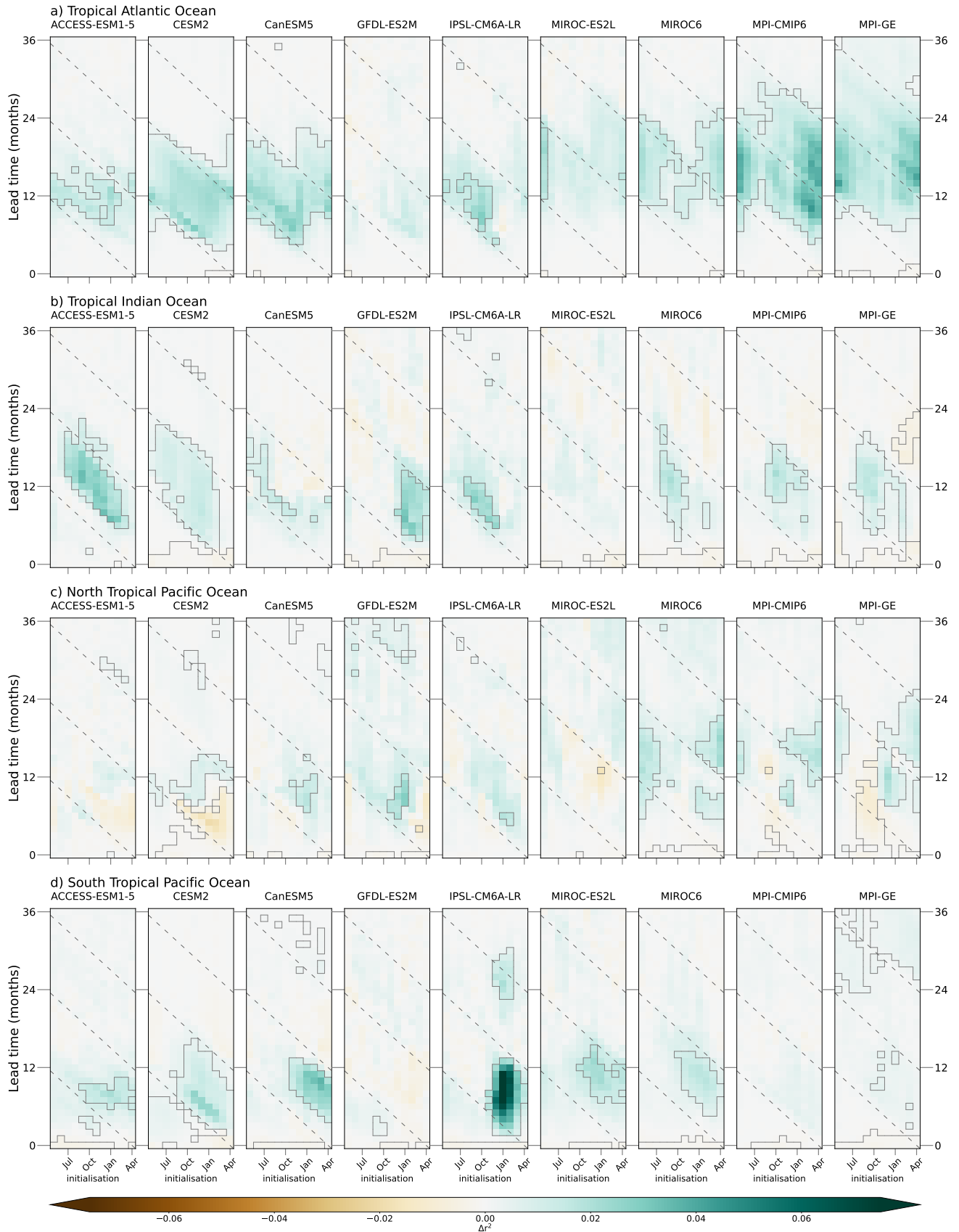


Figure S2: As per Figure 7, but with all other regions as baseline instead of just the equatorial Pacific. Change in model-analogue forecast skill of NINO34, as measured by anomaly correlation coefficient squared, as a result of expanding the region used to select analogues from the all other tropical regions to also include to a) the tropical Atlantic Ocean, b) the tropical Indian Ocean, c) the north tropical Pacific Ocean, or d) the south tropical Pacific Ocean.

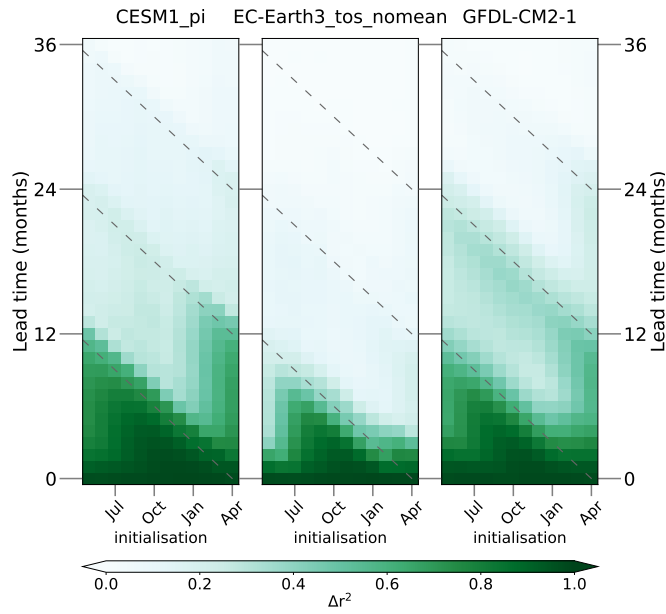


Figure S3: As per Figure 6, but for models CESM1, EC-Earth3, GFDL-CM2.1. Model-analogue forecast skill of NINO34, as measured by anomaly correlation coefficient squared

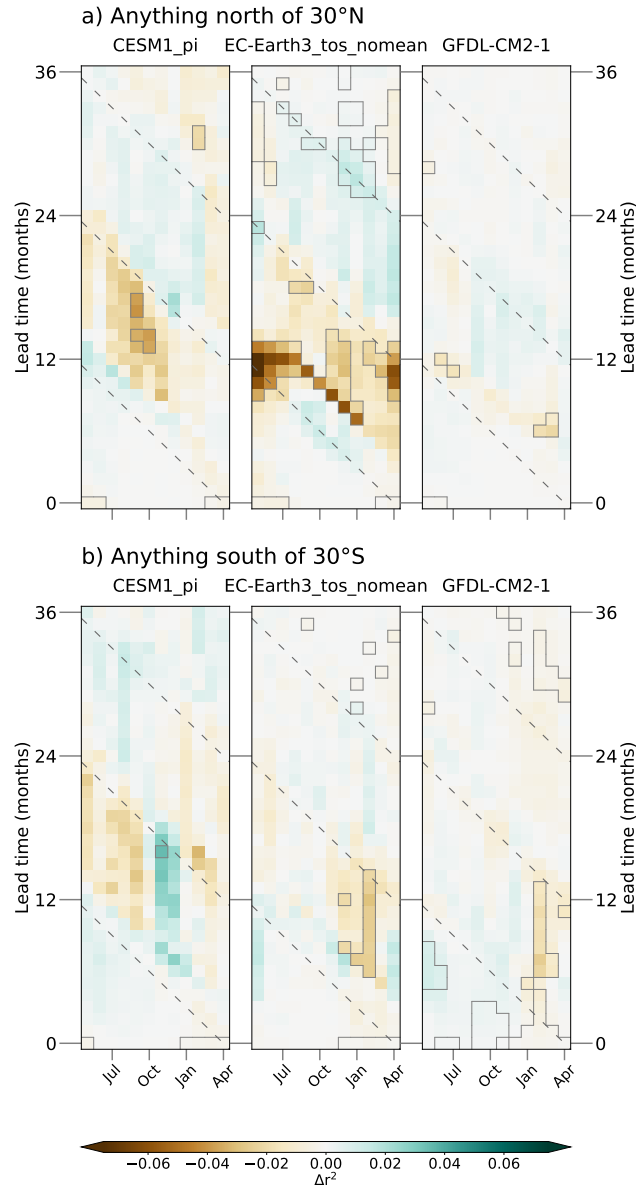


Figure S4: As per Figure 9, but for anomalies polewards of 30°. Change in model-analogue forecast skill of NINO3.4, as measured by anomaly correlation coefficient squared, as a result of expanding the region used to select analogues from the equatorial Pacific to also include a) all ocean north of 30°N, b) all ocean south of 30°S.

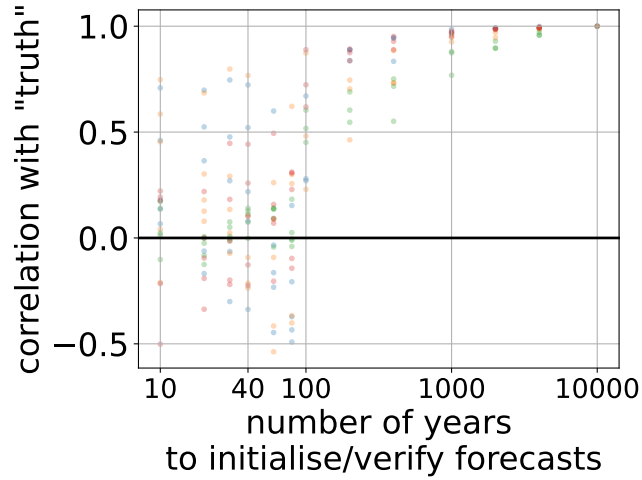


Figure S5: The impacts of using limited initialisations on patterns of remote influences on ENSO. Analogue forecasts were initialised from a diminishing subset of the CESM2 large ensemble, and the pattern of influence from each of the tropical Atlantic Ocean, tropical Indian Ocean, north tropical Pacific Ocean and south tropical Pacific Ocean was compared with that from the full ensemble. 10,000 initialisation states corresponds to the largest ensembles used in this work: CESM2 and MPI-GE. 1,000 initialisation states corresponds roughly to the smallest ensembles used in this work: GFDL-ES2M, IPSL-CM6A, MIROC-ES2L. If using observations, 100 initialisations states would require SST data since 1925, and no SSH, and 40 initialisation states is a realistic set of observational SST and SSH.

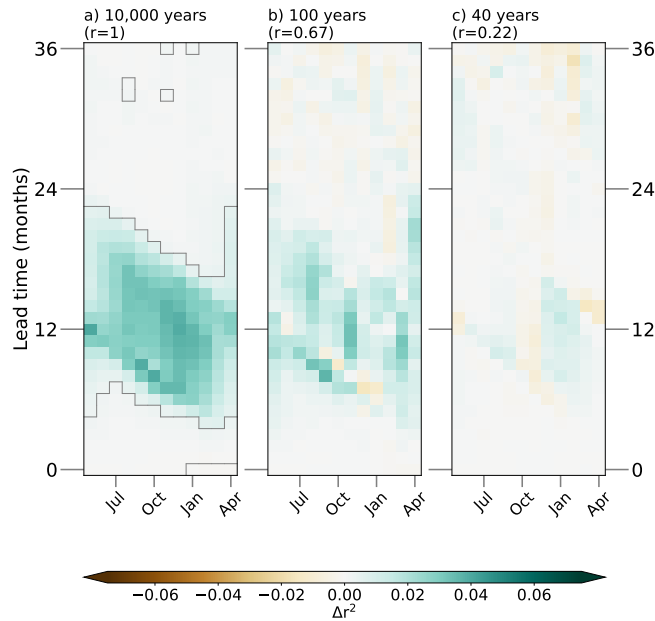


Figure S6: The impacts of using limited initialisations on patterns of tropical Atlantic influences on ENSO. a) All initialisation states are used. b) 100 initialisation states are used, an approximation of the expected results using SST data since 1924. c) 40 initialisation states are used, an approximation of the expected results using SST and SSH data since 1985.

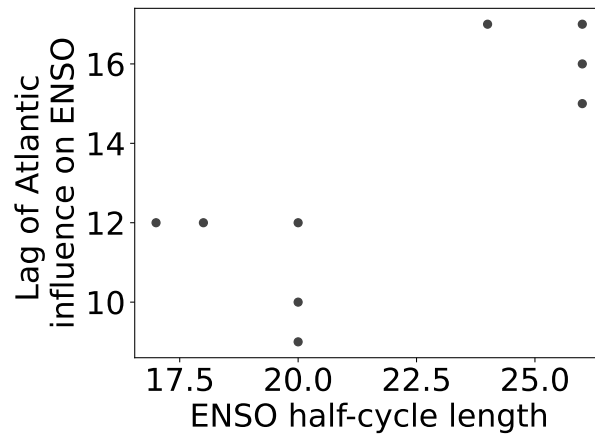


Figure S7: Relationship between the of lead times at which the Atlantic influences the Pacific and the length of ENSO cycle in different models. On the x axis is lag of peak NINO34 autocorrelaiton, a metric of ENSO cycle lenght, and y axis is the lead time at which the annual-mean Atlantic influence on ENSO peaks (e.g. Figure 10). Correlation coefficient across models 0.8