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Supplement of

Stability of ENSO and its tropical Pacific teleconnections over the Last Millennium

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Fig S1. Location of NINO3, NINO3.4 and NINO4 index regions.

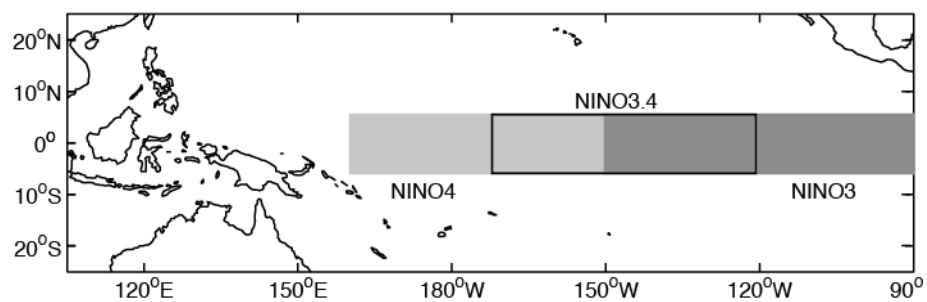


Fig S2. Composited anomaly maps for surface temperature (K) for CMIP5 models for El Niño episodes for historical experiment (left) and past1000 experiment (right), showing multi-model mean (MMM). El Niño events are defined using the NINO3.4 (upper), NINO3 (middle) and NINO4 (lower) indices. Rectangular boxes indicate the West, Central and east Pacific regions. Plots indicate that teleconnected patterns may differ with ENSO index considered.

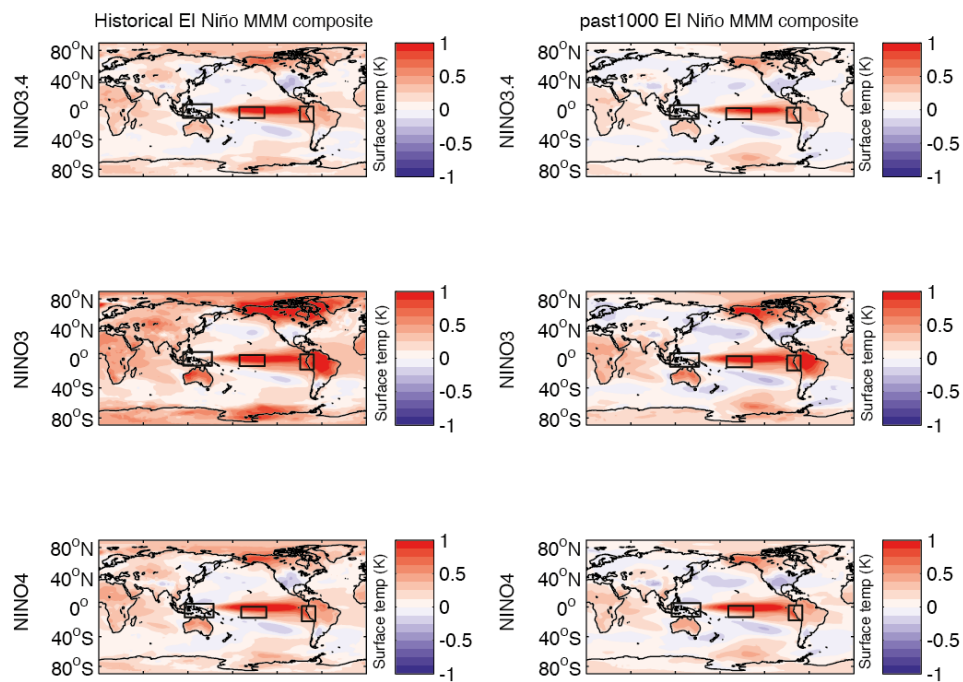


Fig. S3 As for Fig. S2 but showing composited La Niña episodes.

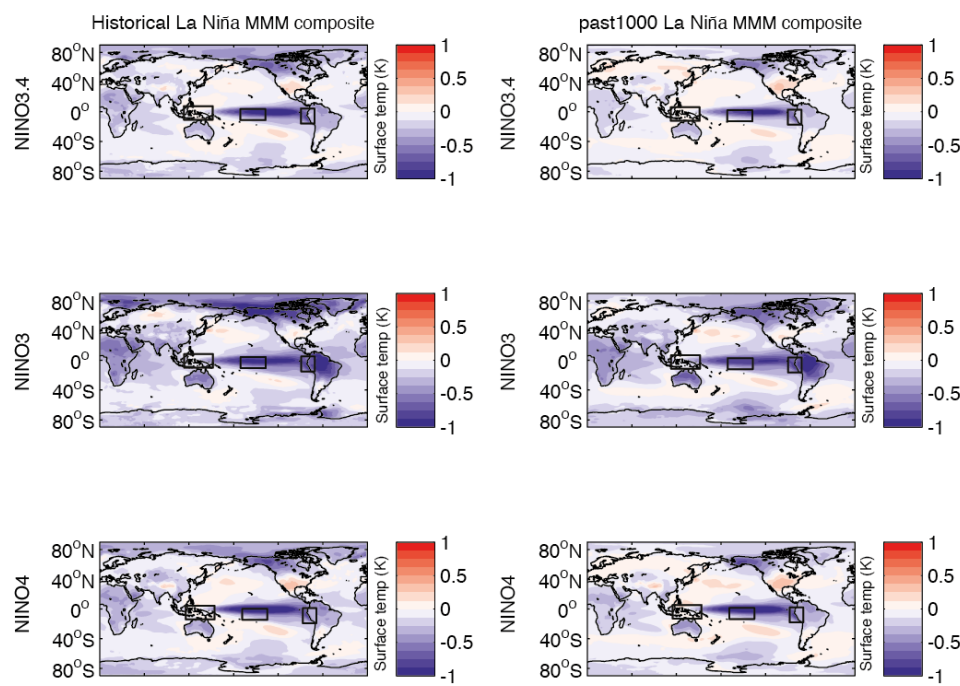


Fig. S4 Running annual-mean surface temperature anomalies (K) over the NINO3.4 region (5°N - 5°S, 170° - 120°W) for Last Millennium simulations conducted with MIROC-ESM and bcc-csm1-1 models. Red/blue shading highlights departures from each model's long-term mean. Running means were calculated using a 240-month triangle smoother.

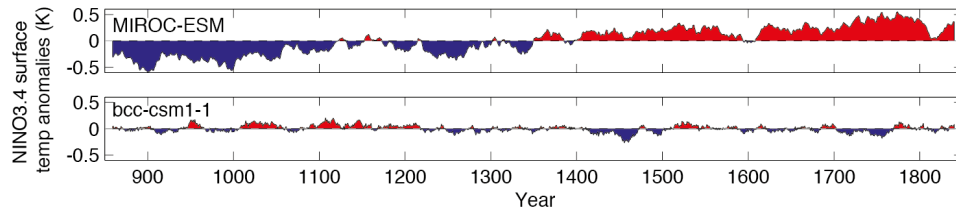
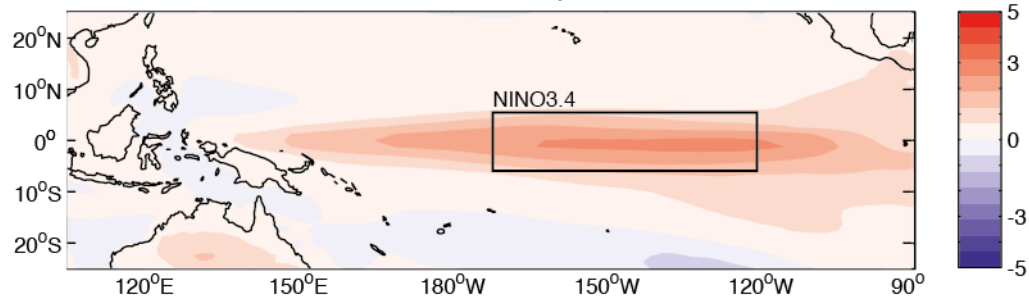


Fig. S5 Comparison of leading patterns (standardised, first EOFs) of monthly variability in surface temperature for CMIP5 multi-model mean (MMM) for (a) historical and (b) Last Millennium experiments. The location of the NINO3.4 region (5°N - 5°S, 170° - 120°W) is indicated by a rectangular box.

a Historical MMM EOF1 surface temperature



b past1000 MMM EOF1 surface temperature

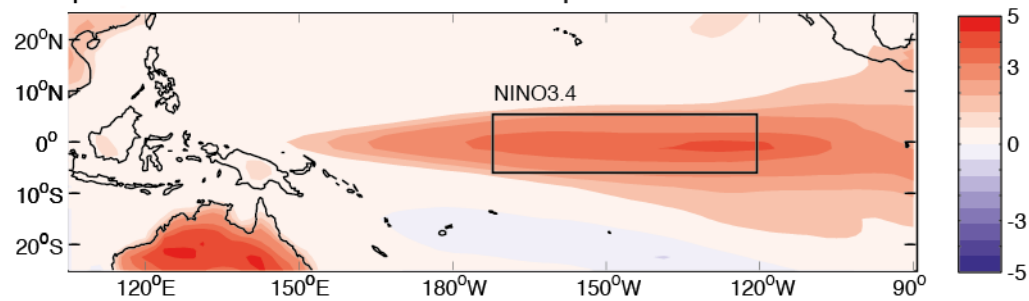


Fig. S6 Evolution of prescribed volcanic forcings for CMIP5 Last Millennium experiment, showing the two alternative data sets used by modelling groups, including (a) timeseries of stratospheric aerosol optical depth (AOD) at 0.55 μ m provided by Crowley et al. (2008) and (b) global hemisphere total stratospheric injections (Tg) from Gao et al. (2008). Large volcanic eruptions occurring between 1200 and 1500 are evident in both data sets.

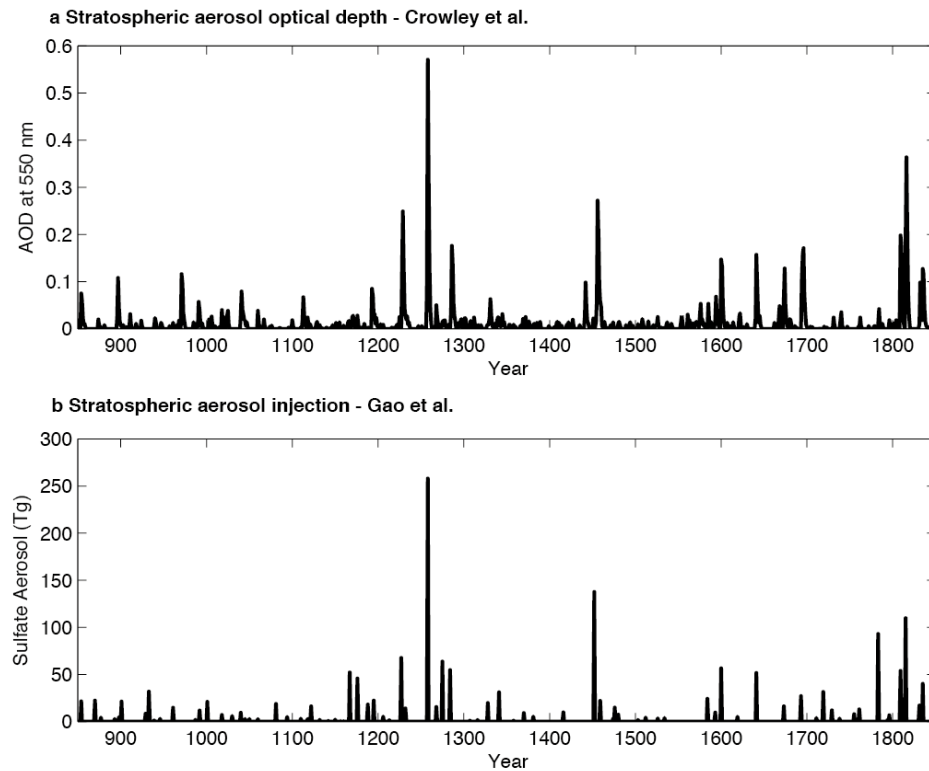
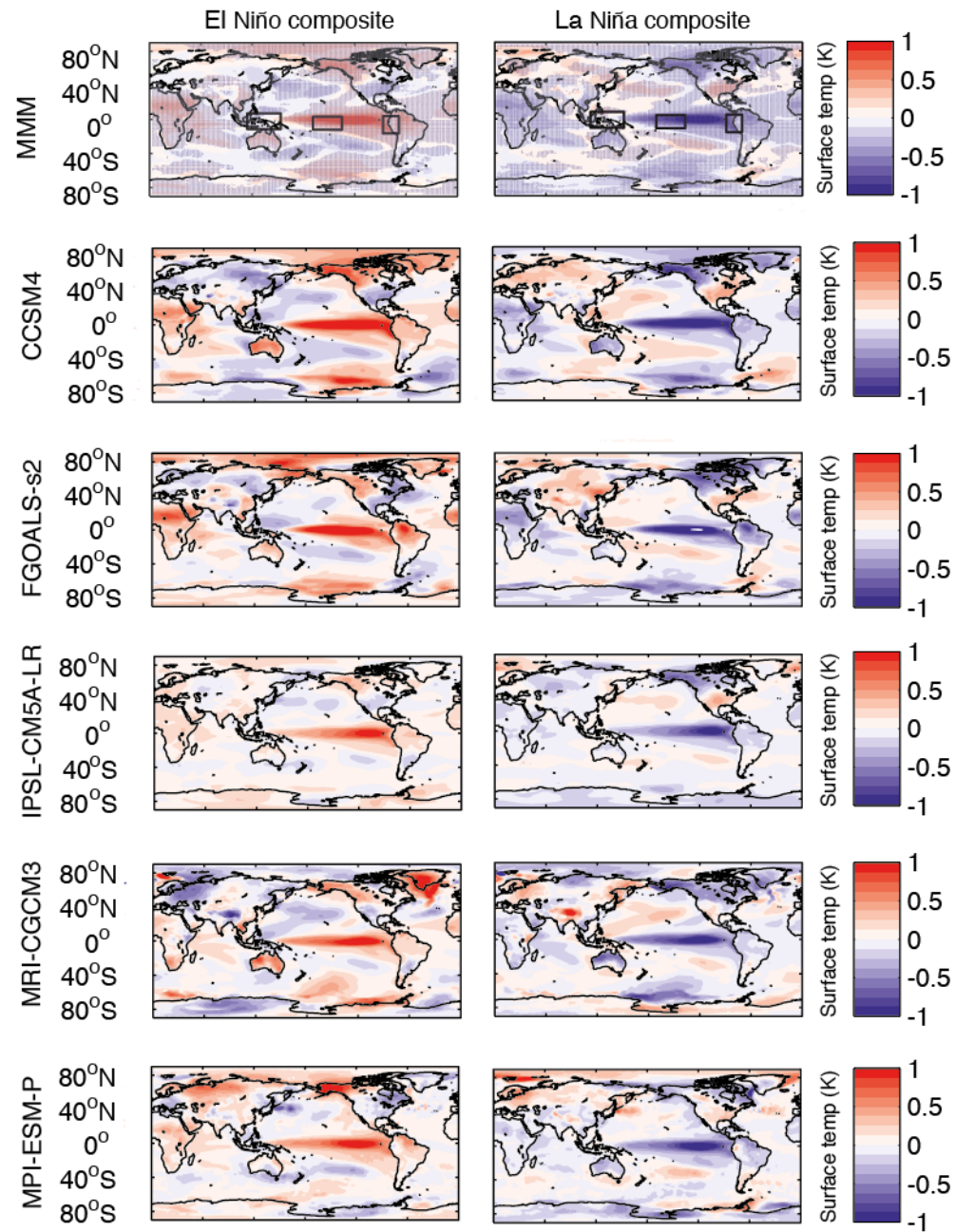


Fig. S7 Composited anomaly maps for surface temperature (K) for CMIP5 models (left, El Niño episodes; right, La Niña episodes) for midHolocene experiment, showing multi-model mean (MMM) and each model. Rectangular boxes indicate the West, Central and east Pacific regions. Stippling indicates where more than 80% of the models agree on the sign of the ENSO-associated anomaly.



References

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Gao, C., Robock, A. and Ammann, C.: Volcanic forcing of climate over the past 1500 years: An improved ice core-based index for climate models, Journal of Geophysical Research Atmospheres, 113(D23), D23111, doi:10.1029/2008JD010239, 2008.