

Inventory of Supporting Information

Manuscript #: Eastern equatorial Pacific warming delayed by aerosols and thermostat response to CO2 increase

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Please complete each of the Inventory Tables below to outline your Extended Data and Supplementary Information items.

There are four sections:

- *Extended Data*
- *Supplementary Information: Flat Files*
- *Supplementary Information: Additional Files*
- *Source Data*

Each section includes specific instructions. Please complete these tables as fully as possible. We ask that you avoid using spaces in your file names, and instead use underscores, i.e.: Smith_ED_Fig1.jpg not Smith ED Fig1.jpg

Please note that titles and descriptive captions will only be lightly edited, so please ensure that you are satisfied with these prior to submission.

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1. Extended Data

Complete the Inventory below for all Extended Data figures.

- Keep Figure Titles to one sentence only
- Upload your files as 'Figure Files' in our Manuscript Tracking system
- File names should include the Figure Number. i.e.: *Smith_ED_Fig1.jpg*
- Please be sure to include the file extension in the Filename. Note that Extended Data files must be submitted as .jpg, .tif or .eps files *only*, and should be approximately 10MB
- All Extended Data figure legends must be provided in the Inventory below and should not exceed 300 words each (*if possible*)
- Please include Extended Data *ONLY* in this table

Figure #	Figure title One sentence only	Filename This should be the name the file is saved as when it is uploaded to our system. Please include the file extension. i.e.: <i>Smith_ED_Fig1.jpg</i>	Figure Legend If you are citing a reference for the first time in these legends, please include all new references in the main text Methods References section, and carry on the numbering from the main References section of the paper. If your paper does not have a Methods section, include all new references at the end of the main Reference list.
Extended Data Fig. 1	<i>Long term changes in the Pacific zonal surface temperature gradient versus the sea level pressure (SLP) gradient</i>		<i>(a) the abrupt4xCO₂ experiments and (b) the SSP5-8.5 experiments relative to the piControl experiment. Long-term anomalies are shown, defined as years 2080-2100 minus the pi-Control for the SSP5-8.5 scenario and years 100-150 for the abrupt 4xCO₂ experiments. Each marker+color combination represents one model as described in the legend of Fig. 4. Negative values indicate the weakening of the temperature and SLP gradients. See Methods for the definitions of the two gradients. The SLP gradient indicates the strength of the Walker circulation. Changes in the zonal SST and SLP gradients are tightly coupled. The R and p values denote the correlation coefficients and statistical significance of Pearson's correlation, respectively.</i>

Extended Data Fig. 2	Changes in the Pacific zonal surface temperature gradient in the historical and SSP-3.70 experiments for each model		A bar chart showing changes in the Pacific zonal surface temperature gradient for each model in the full-forcing historical and SSP3-7.0 simulations (c.f. Fig. 5b). Changes in the historical and SSP scenarios are computed relative to the 1950-1970 baseline and compared to the observed trend (the red bar). Error bars (black) indicate ensemble spread (one standard deviation) for models that include at least 3 ensemble members.
Extended Data Fig. 3	Model mean state at low latitudes for the OT and EP categories		(a,c) Mean state SST and (b,d) SLP and surface winds for the OT and EP model categories (see main text) based on at least a 150-year average of piControl. Panels (e, f) show the mean state difference between the two categories. The OT models are generally colder in the Indo-Pacific, except in the regions off the coast of South and North America, but have weaker easterly winds in the equatorial band.
Extended Data Fig. 4	Model mean state biases for the OT and EP categories		Mean state (a,c) SST and (b,d) SLP biases for the OT and EP categories relative to the observed. The model mean state is based on at least a 150-year average of piControl. The observed mean state is based on monthly SST from ERSST v4 for years 1850-1970 and monthly mean SLP from NCEP-NCAR Reanalysis 1 for years 1950-2000. Hatching indicates areas where 80% or more of models agree on the sign of the bias. The RMS errors for the region (60° E to 60° W, 30° S to 30° N, land excluded) are 0.68 K and 41Pa for the OT category and 0.34 K and 44 Pa for the EP category.
Extended Data Fig. 5	Equatorial mean state of the OT and EP models		Profiles of (a,c) SST and (b,d) wind stress along the equator for the OT (blue) and EP (red) categories compared to the observations (black). The model mean state is based on at least a 150-year average of piControl. The green dashed line indicates a multi-model mean for all 40 models. The observations are based on monthly SST for years 1850-1970 from ERSST v4 and monthly mean SLP and winds from NCEP-NCAR Reanalysis 1 for years 1950-2000. Grey lines indicate individual models in each category.

Extended Data Fig. 6	<i>Anomalies in SST, sea level pressure (SLP) and surface winds in experiments with full or partial historical forcing</i>		<i>As in Fig. 6 but panels on the left include hatching to indicate that 80% or more of the models agree on the sign of the trend relative to the area mean SST warming (60°E to 60°W, 30°S to 30°N, land excluded).</i>
Extended Data Fig. 7	<i>Evolution of the Pacific surface temperature gradient for selected models in historical simulations</i>		<i>Examples of time evolution of the Pacific zonal temperature gradient (blue) in three selected models relative to the 1950-1970 baseline, compared to the observed changes (red). The ensemble mean is plotted in blue and individual ensemble members are plotted in grey. The first row is the historical full-forcing experiments, the second row is the GHG-only historical runs, and the third row is the aerosol-only historical runs. The observed timeseries are from ERSST v4. A 15-year running mean is applied. Positive values indicate the strengthening of the zonal temperature gradient and hence the Walker circulation.</i>
Extended Data Fig. 8	<i>Historical surface temperature anomalies for HadGEM3-GC31-LL</i>		<i>Surface temperature anomalies produced by the HadGEM31-GC31-LL model in (a) full-forcing, (b) GHG-only and (c) aerosols-only historical experiments. The anomalies are calculated as years 2000-2014 minus 1950-1970. (d) A linear superposition of the GHG-only and aerosols-only anomalies. Noticeable differences between this last panel and the historical full-forcing anomalies in panel (a) indicate nonlinear interaction between the effects of GHG and aerosol forcing.</i>
Extended Data Fig. 9	<i>Historical surface temperature anomalies for CNRM-CM6</i>		<i>As in Extended Data Fig. 8, but for CNRM-CM6. Here, panels (a) and (d) are nearly identical, which indicates that in this model the GHG and aerosol forcings act independently with no nonlinear interaction.</i>
Extended Data Fig. 10	<i>Historical surface temperature anomalies for MIROC6</i>		<i>As in Extended Data Fig. 8, but for MIROC6. Here, panels (a) and (d) are very similar, which indicates that in this model the GHG and aerosol forcings act independently with no nonlinear interaction.</i>

Delete rows as needed to accommodate the number of figures (10 is the maximum allowed).

2. Supplementary Information:

A. Flat Files

Complete the Inventory below for all additional textual information and any additional Supplementary Figures, which should be supplied in one combined PDF file.

- **Row 1:** A combined, flat PDF containing any Supplementary Text, Discussion, Notes, Additional Supplementary Figures, Supplementary Protocols, simple tables, and all associated legends. Only one such file is permitted.
- **Row 2:** Nature Research’s Reporting Summary; if previously requested by the editor, please provide an updated Summary, fully completed, without any mark-ups or comments. **(Reporting Summaries are not required for all manuscripts.)**

Item	Present?	Filename This should be the name the file is saved as when it is uploaded to our system, and should include the file extension. The extension must be .pdf	A brief, numerical description of file contents. i.e.: <i>Supplementary Figures 1-4, Supplementary Discussion, and Supplementary Tables 1-4.</i>
Supplementary Information	yes		Supplementary Fig. 1, Supplementary Table 1
Reporting Summary	Choose an item.		
Peer Review Information	Choose an item.	<i>OFFICE USE ONLY</i>	

B. Additional Supplementary Files

Complete the Inventory below for all additional Supplementary Files that cannot be submitted as part of the Combined PDF.

- Do not list Supplementary Figures in this table (see section 2A)
- Where possible, include the title and description within the file itself
- Spreadsheet-based tables & data should be combined into a workbook with multiple tabs, not submitted as individual files.
- Compressed files are acceptable where necessary. ZIP files are preferred.
- Please note that the *ONLY* allowable types of additional Supplementary Files are:
 - Supplementary Tables
 - Supplementary Audio
 - Supplementary Videos
 - Supplementary Software
 - Supplementary Data, for example: raw NMR Data, Cryo-EM Data, Computational Data, Crystallographic Data, etc.

Type	Number If there are multiple files of the same type this should be the numerical indicator. i.e. "1" for Video 1, "2" for Video 2, etc.	Filename This should be the name the file is saved as when it is uploaded to our system, and should include the file extension. i.e.: <i>Smith_Supplementary_Video_1.mov</i>	Legend or Descriptive Caption Describe the contents of the file
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- Acceptable types of Source Data for Main Figures and Extended Data Figures are:
 - Statistical Source Data
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 - One file for each relevant Figure, containing all source data
 - Full-length, unprocessed Gels or Blots
 - JPG, TIF, or PDF formats only
 - One file for each relevant Figure, containing all supporting blots and/or gels
- ‘Source Data’ is only allowed for Main Figures and Extended Data Figures.
 - Include Unprocessed Gels or Blots for Supplementary Figures as additional Supplementary Figures.
 - Include Statistical Source Data for Supplementary Figures as ‘Supplementary Data’ files and list them in section 2B.
 - Please see [this example of Source Data](#) in a publication.

Parent Figure or Table	Filename This should be the name the file is saved as when it is uploaded to our system, and should include the file extension. i.e.: <i>Smith_SourceData_Fig1.xls</i> , or <i>Smith_Unmodified_Gels_Fig1.pdf</i>	Data description i.e.: Unprocessed Western Blots and/or gels, Statistical Source Data, etc.
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