Supplement of Earth Syst. Dynam., 11, 139–159, 2020
https://doi.org/10.5194/esd-11-139-2020-supplement

Earth System Dynamics
Open Access
EGU

Supplement of

Emulating Earth system model temperatures with MESMER: from global mean temperature trajectories to grid-point-level realizations on land

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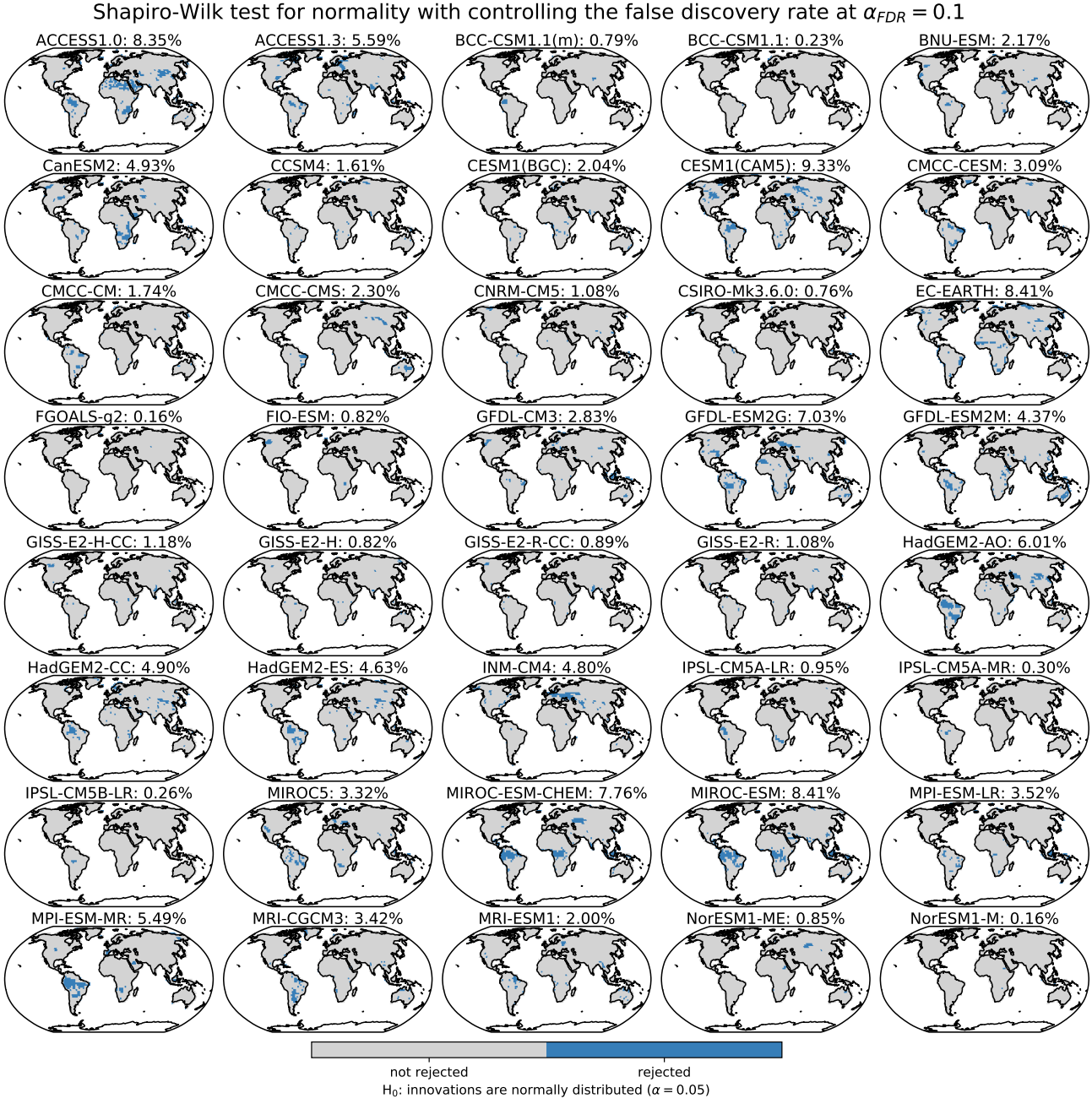

Figure S1. Shapiro-Wilk test for normality with H_0: the data are normally distributed (Steinskog et al., 2007) and controlling the False Discovery Rate (FDR, Wilks, 2016) at 10 % for the local residual variability innovations $\nu_{s,t}$ of the training runs.

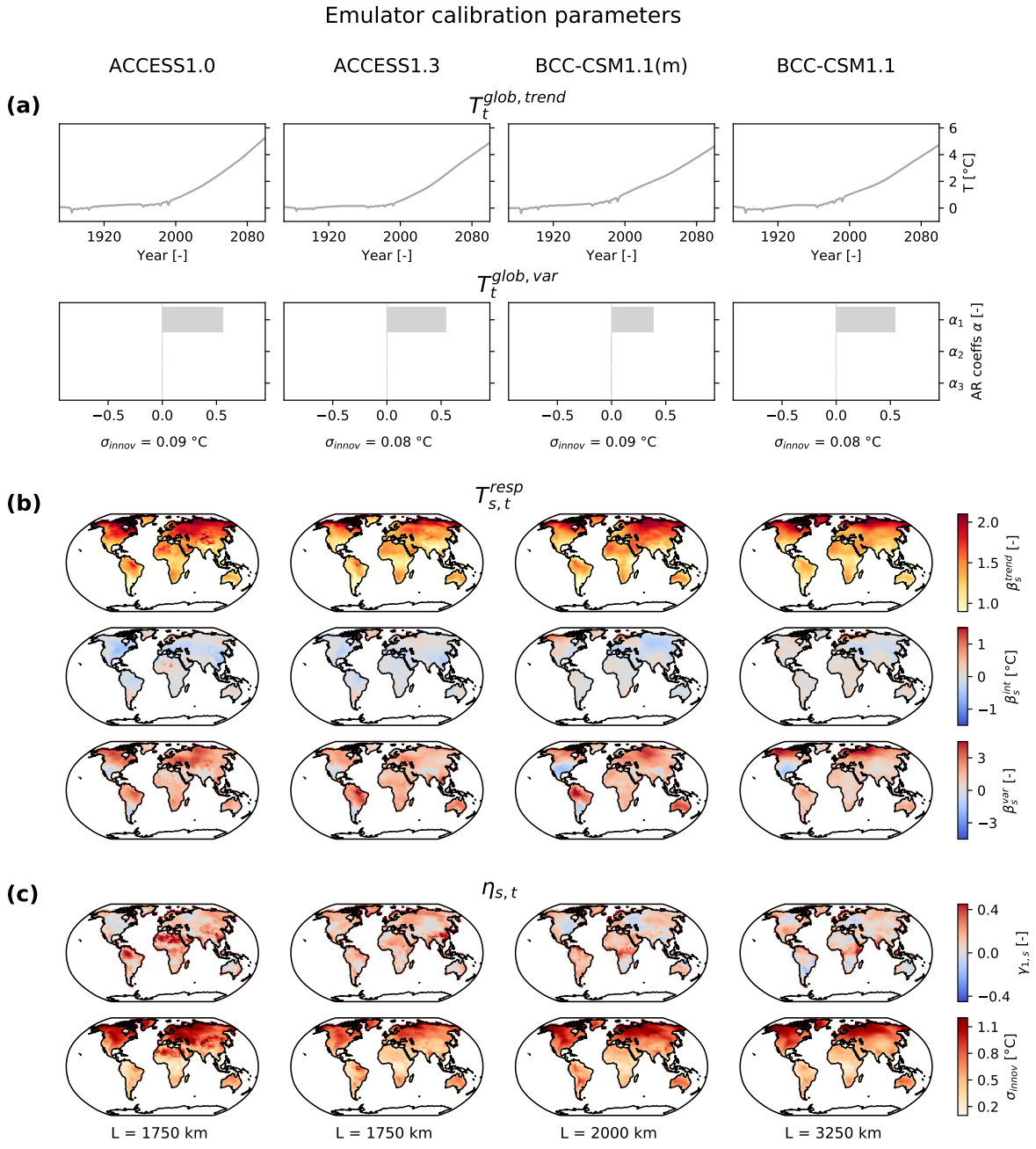

Figure S2. Emulator calibration parameters (rows) for four climate models (columns). Analogous to Fig. 3 for ACCESS1.0, ACCESS1.3, BCC-CSM1.1(m), and BCC-CSM1.1.

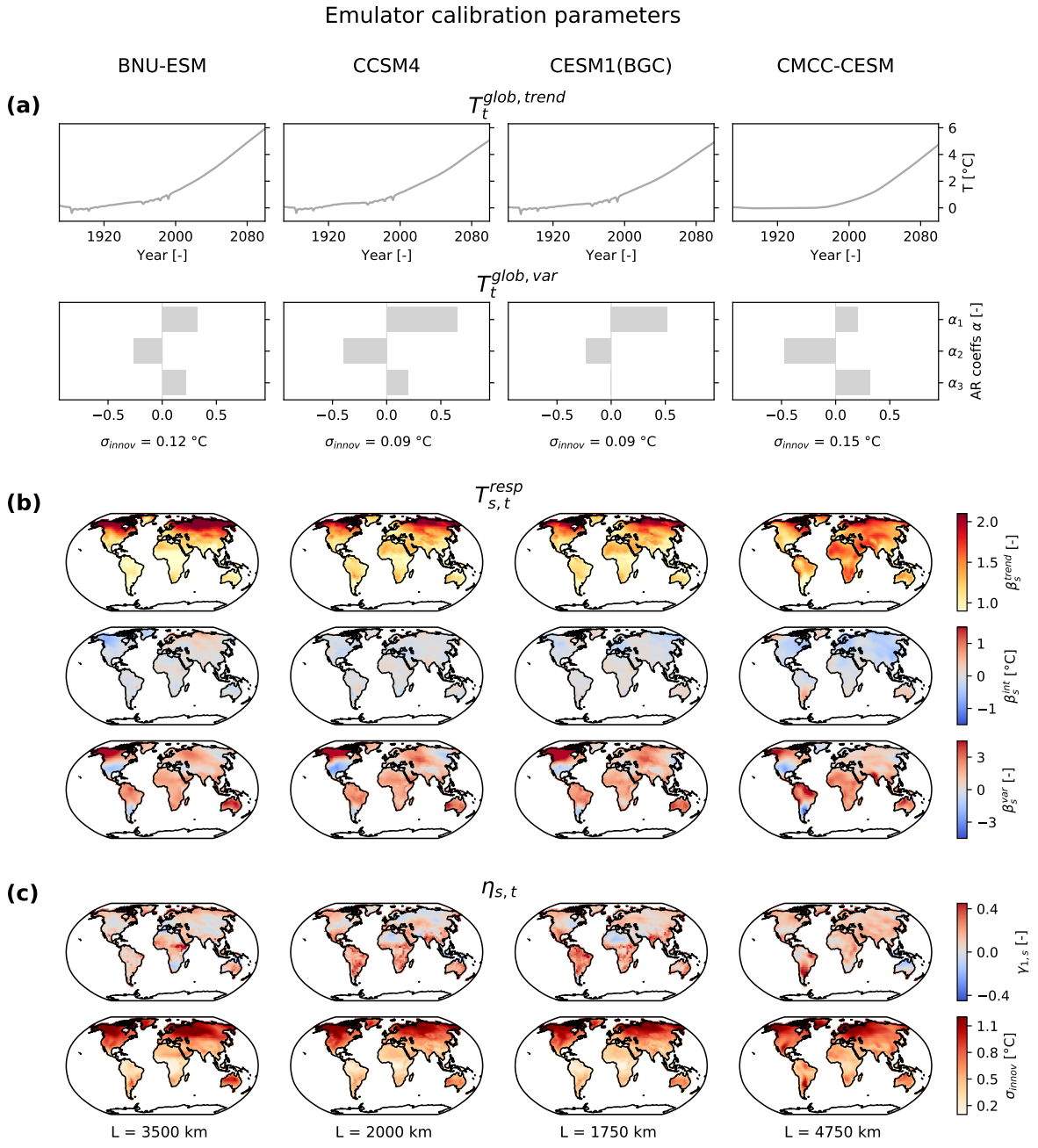

Figure S3. Emulator calibration parameters (rows) for four climate models (columns). Analogous to Fig. 3 for BNU-ESM, CCSM4, CESM1(BGC), and CMCC-CESM.

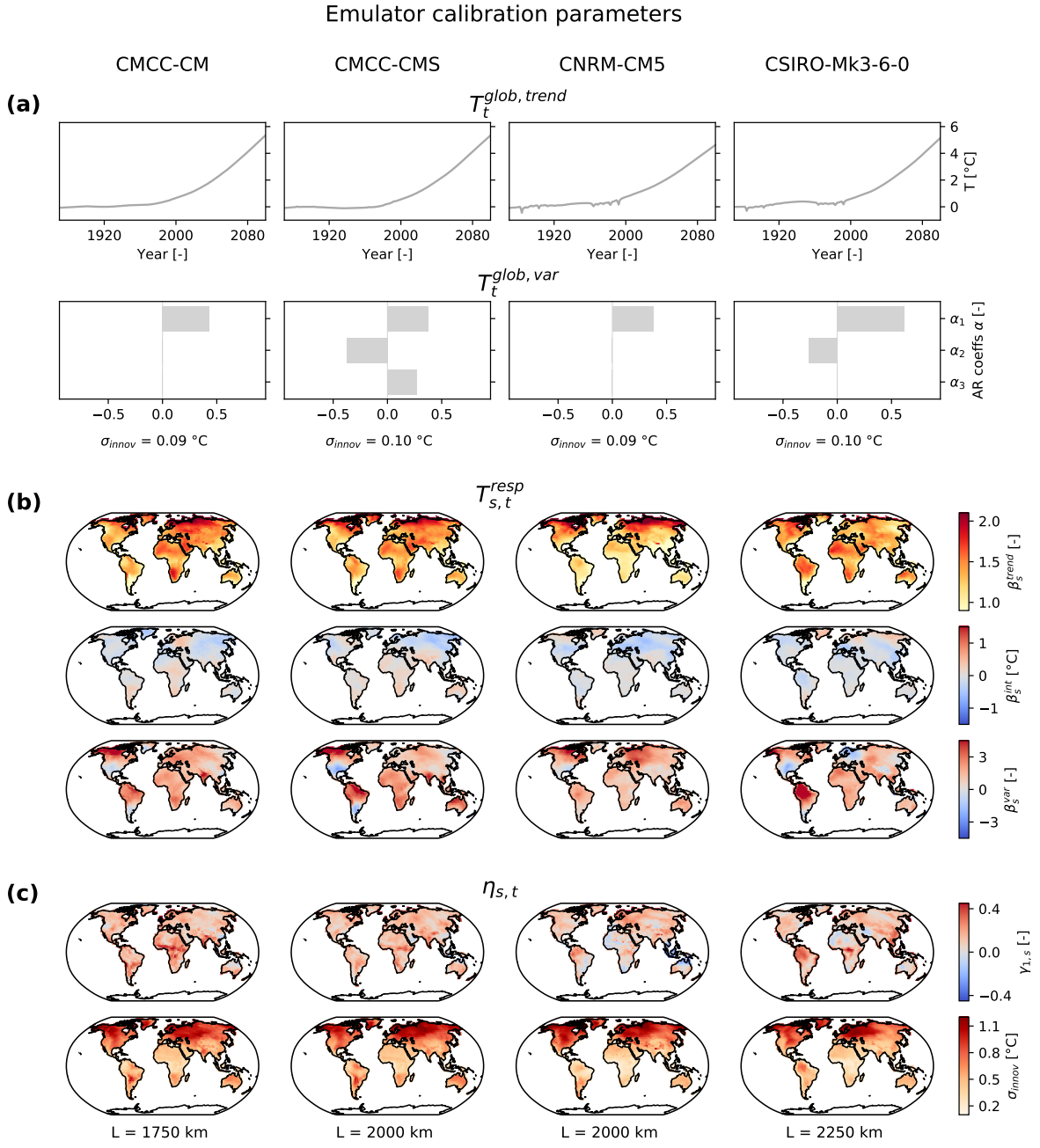

Figure S4. Emulator calibration parameters (rows) for four climate models (columns). Analogous to Fig. 3 for CMCC-CM, CMCC-CMS, CNRM-CM5, and CSIRO-Mk3.6.0.

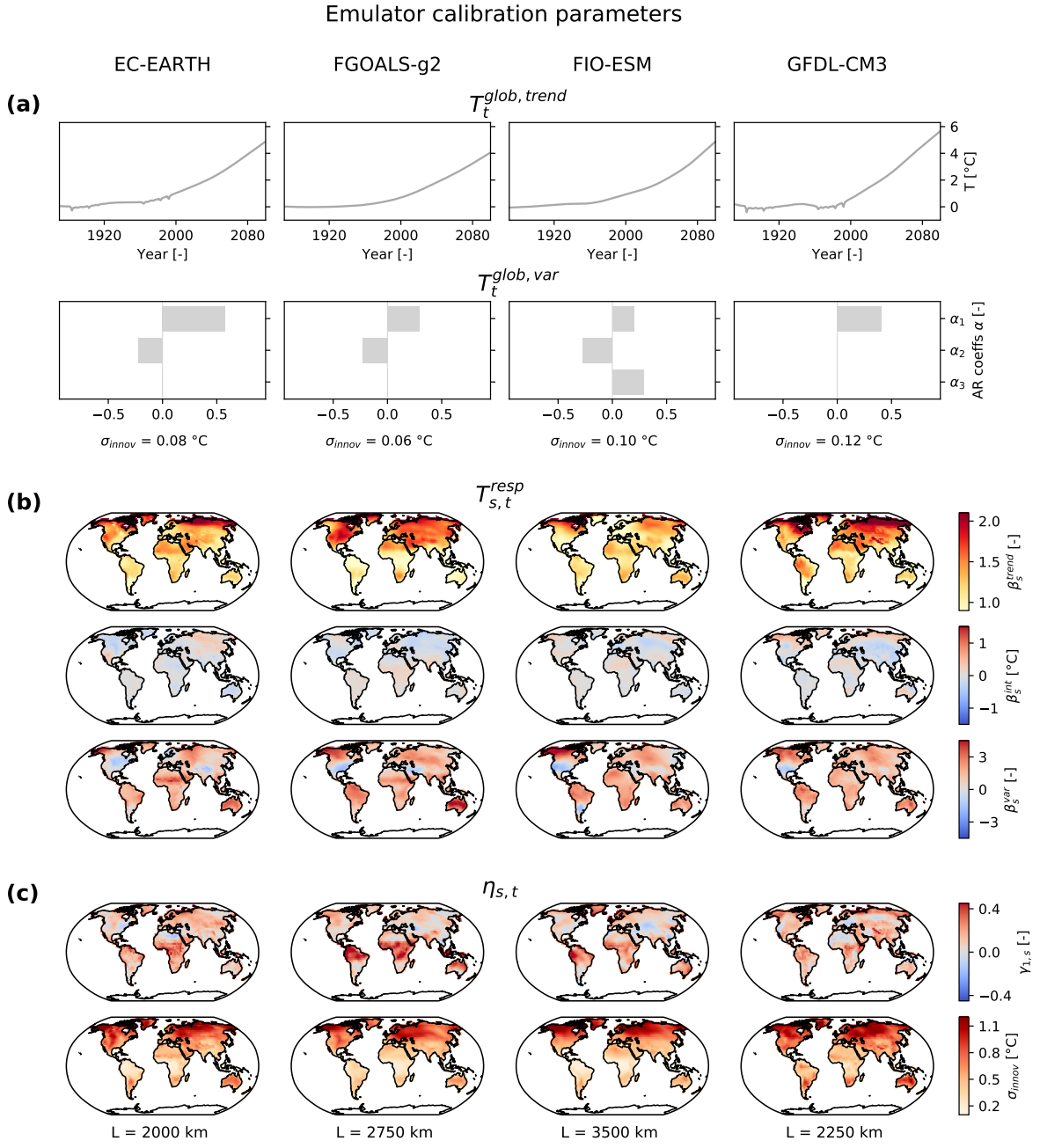

Figure S5. Emulator calibration parameters (rows) for four climate models (columns). Analogous to Fig. 3 for EC-EARTH, FGOALS-g2, FIO-ESM, and GFDL-CM3.

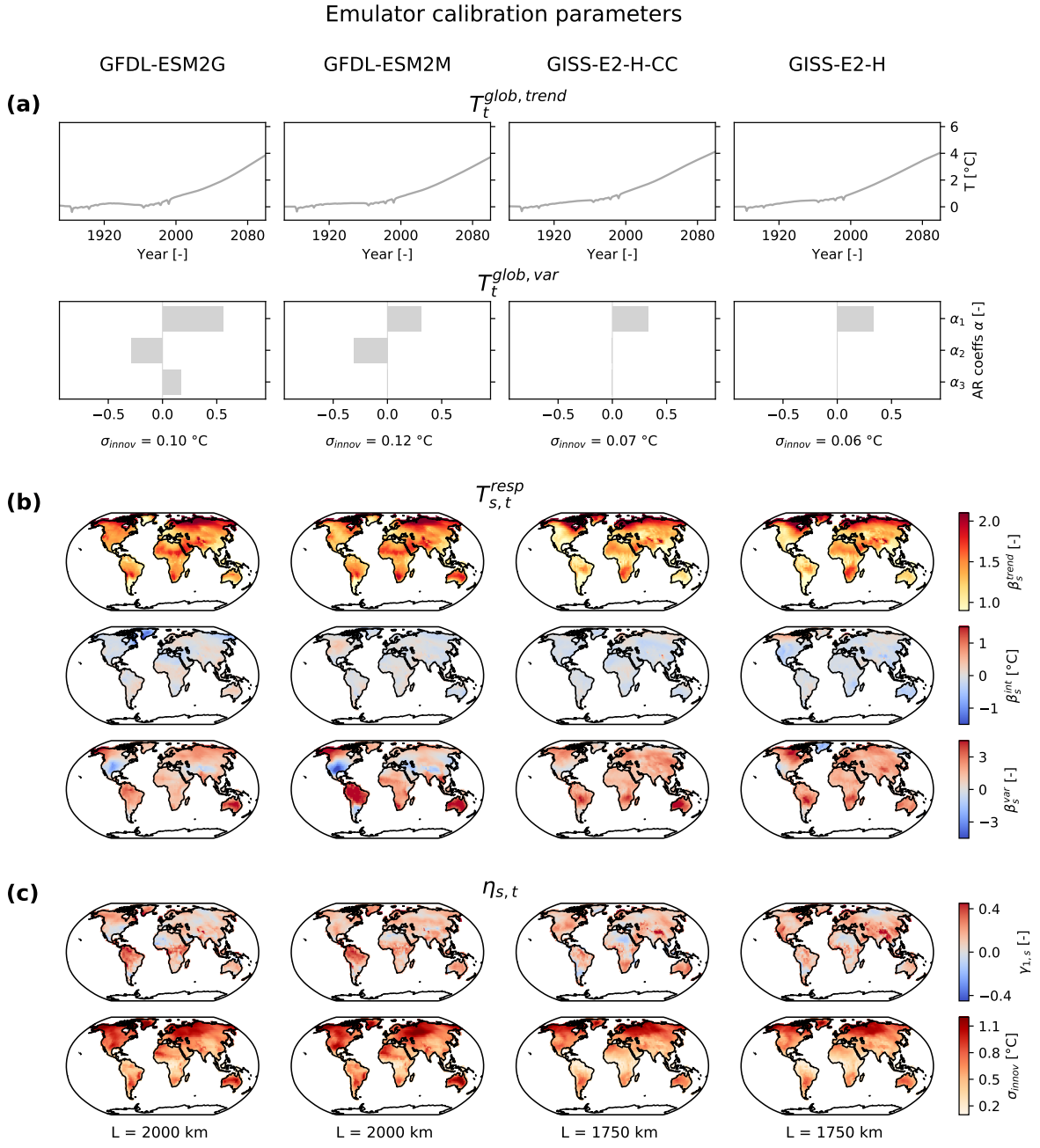

Figure S6. Emulator calibration parameters (rows) for four climate models (columns). Analogous to Fig. 3 for GFDL-ESM2G, GFDL-ESM2M, GISS-E2-H-CC, and GISS-E2-H.

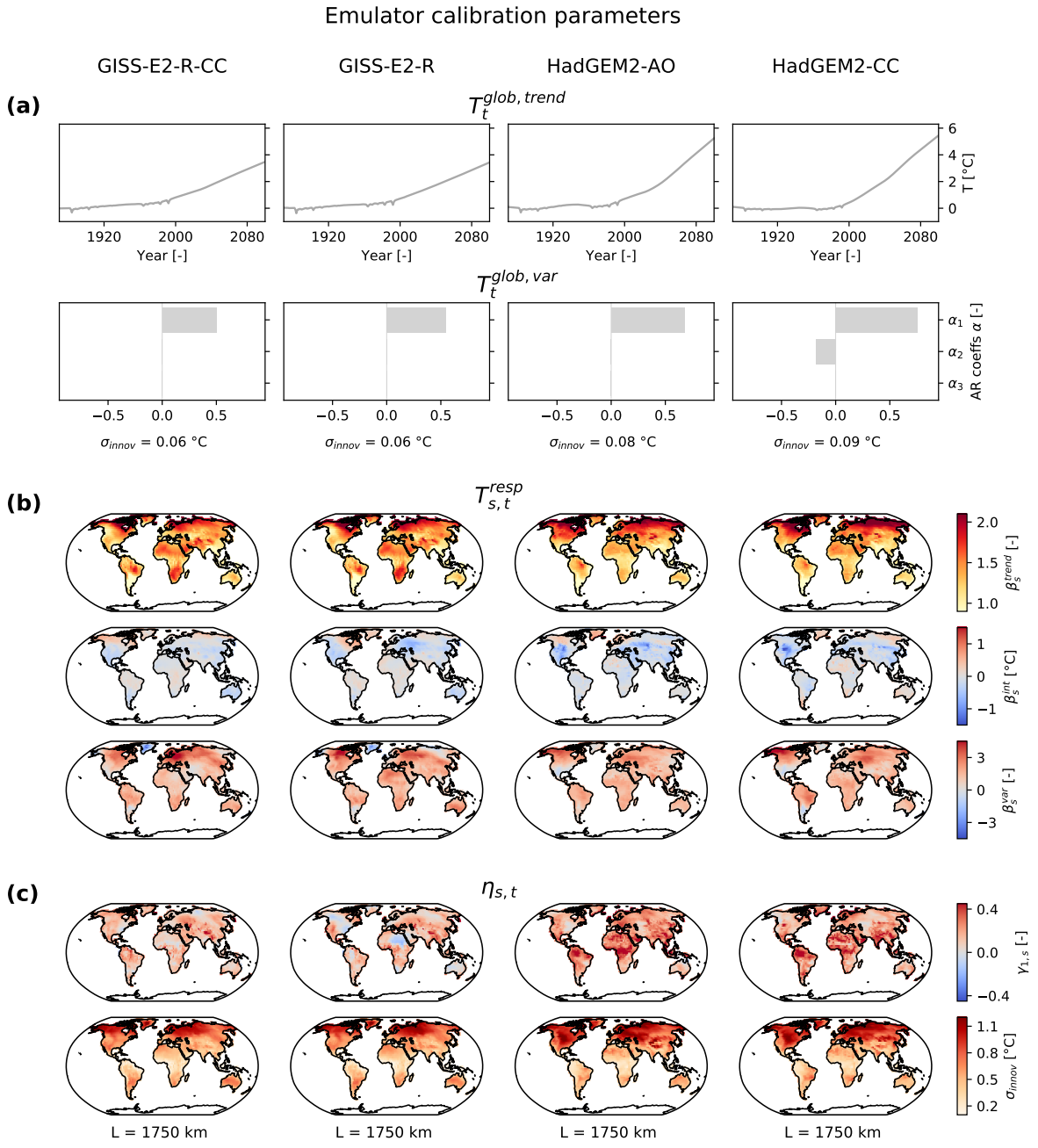

Figure S7. Emulator calibration parameters (rows) for four climate models (columns). Analogous to Fig. 3 for GISS-E2-R-CC, GISS-E2-R, HadGEM2-AO, HadGEM2-CC.

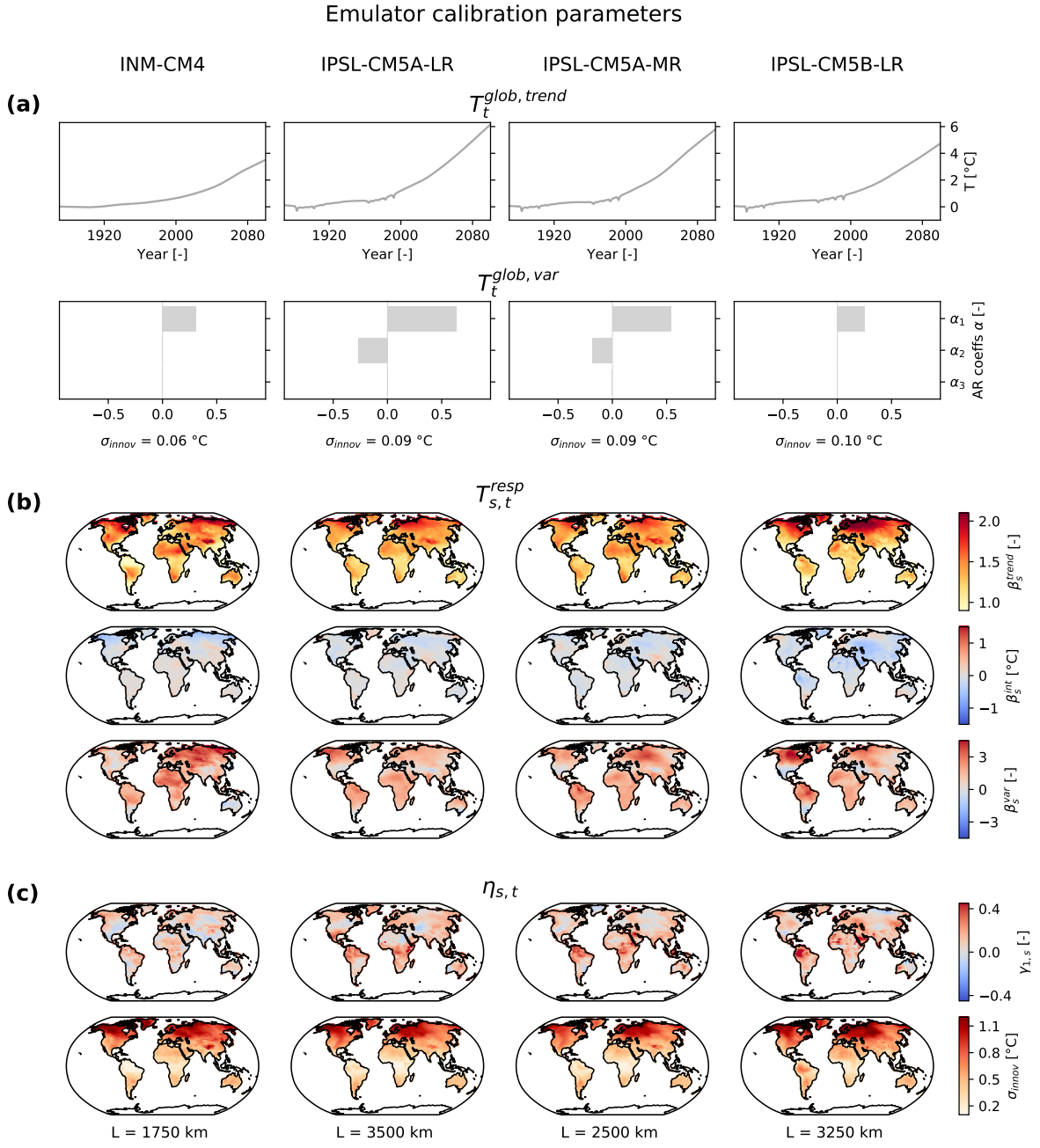

Figure S8. Emulator calibration parameters (rows) for four climate models (columns). Analogous to Fig. 3 for INM-CM4, IPSL-CM5A-LR, IPSL-CM5A-MR, and IPSL-CM5B-LR.

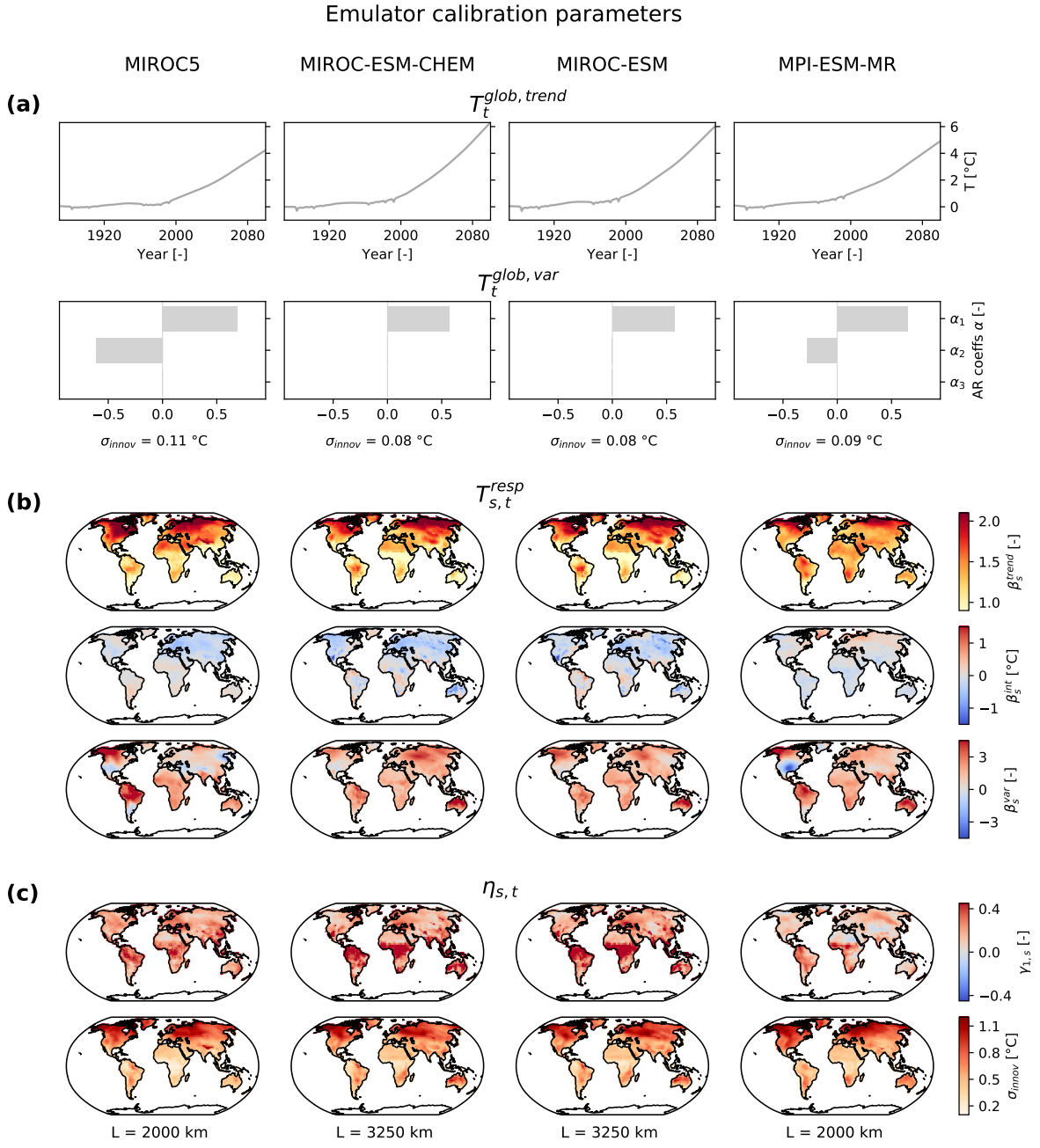

Figure S9. Emulator calibration parameters (rows) for four climate models (columns). Analogous to Fig. 3 for MIROC5, MIROC-ESM-CHEM, MIROC-ESM, and MPI-ESM-MR.

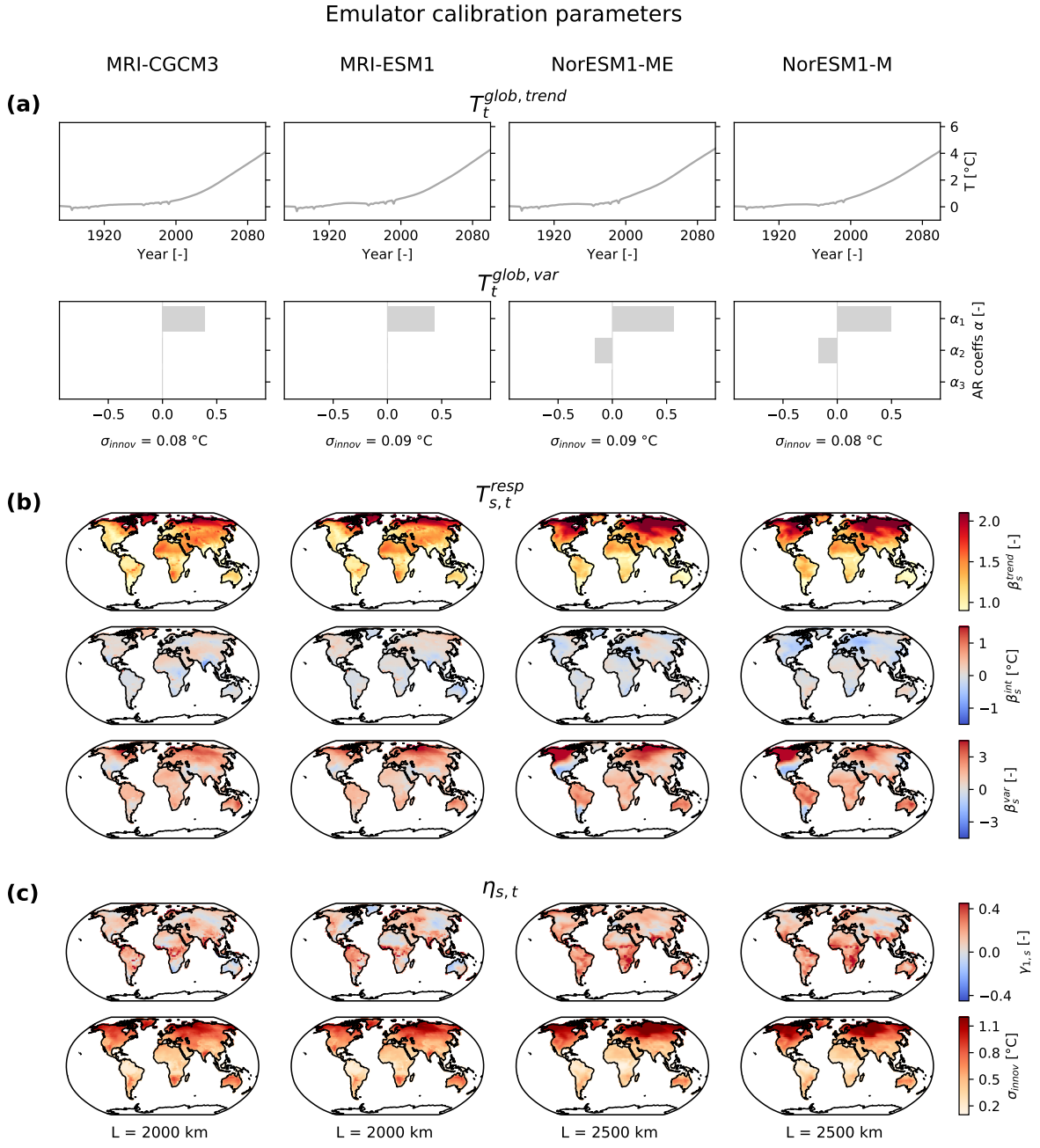

Figure S10. Emulator calibration parameters (rows) for four climate models (columns). Analogous to Fig. 3 for MRI-CGCM3, MRI-ESM1, NorESM1-ME, and NorESM1-M.

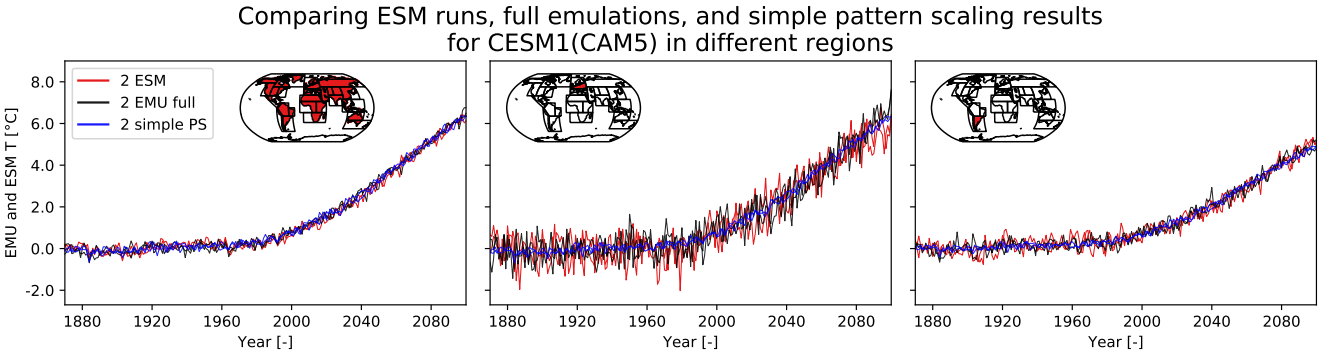

Figure S11. Comparison of regionally averaged temperature time series for CESM1(CAM5) test runs (red), full emulations (black), and simple pattern scaling results (blue) in three regions. The regions are (from left to right): global land, Central Europe (CEU), and Southeastern South America (SSA). The pattern scaling results at each grid point and time step are obtained by $T^{ps}_{s,t} = \beta^{ps}_{1,s} \cdot T^{glob}_{t} + \beta^{ps}_{0,s}$ with the coefficients $\beta^{ps}_{1,s}$ and $\beta^{ps}_{0,s}$ fit with the Ordinary Least Squares (OLS) algorithm on the training run.

References

Steinskog, D. J., Tjøstheim, D. B., and Kvamstø, N. G.: A Cautionary Note on the Use of the Kolmogorov–Smirnov Test for Normality, Monthly Weather Review, 135, 1151–1157, https://doi.org/10.1175/mwr3326.1, 2007.

Wilks, D. S.: "The stippling shows statistically significant grid points": How research results are routinely overstated and overinterpreted, and what to do about it, Bulletin of the American Meteorological Society, 97, 2263–2273, https://doi.org/10.1175/BAMS-D-15-00267.1, 2016.