Supplement for manuscript: "From emission scenarios to spatially resolved projections with a chain of computationally efficient emulators: MAGICC (v7.5.1) – MESMER (v0.8.1) coupling"

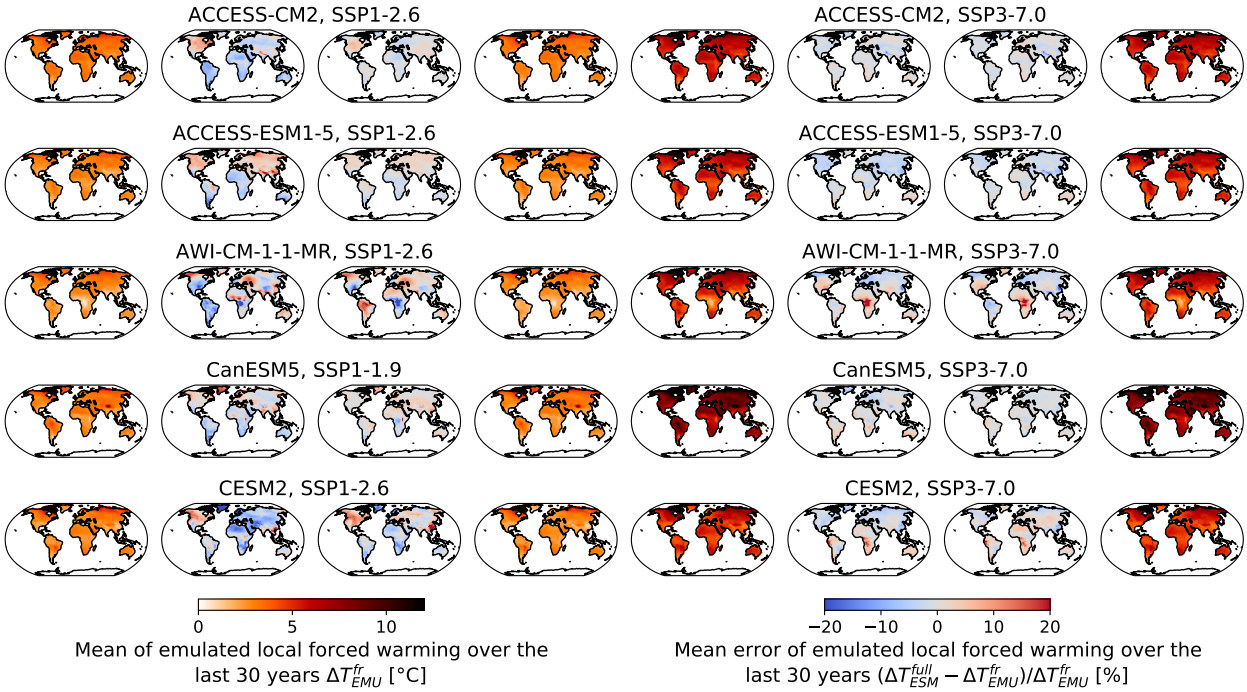

Figure S1. Emulated local forced warming and performance with respect to ESM simulations for both MESMER configurations averaged over the last 30 years of a low emission (left) and a high emission (right) scenario for five different ESMs (rows). The mean deviation of the ESM simulations from the emulated forced warming, i.e., error, shown here represents the average deviation across all available ESM initial-condition members for the scenario at hand. For each ESM and scenario combination, the map order reflects the column order in Fig. 3 with the first map showing the warming of the default configuration, the second the error of the default configuration, the third the error of the additional predictors configuration, and the fourth the warming of the additional predictors configuration.

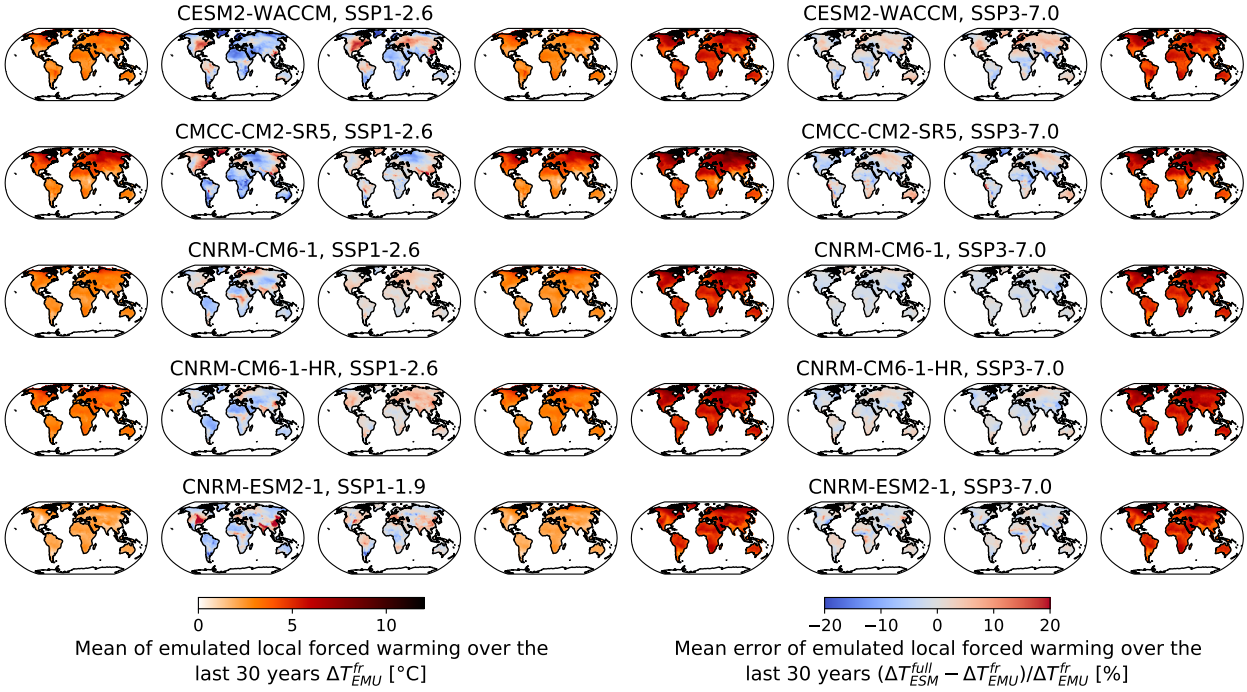

Figure S2. Same as Fig. S1 but for five different ESMs.

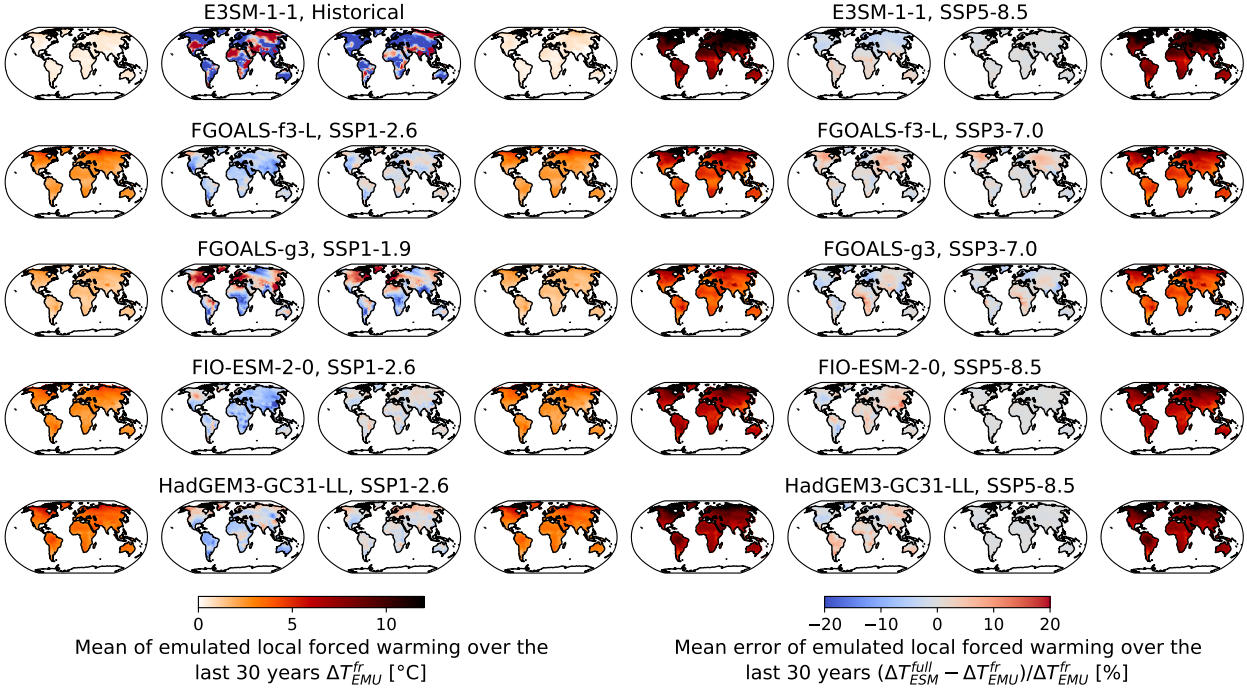

Figure S3. Same as Fig. S1 but for five different ESMs.

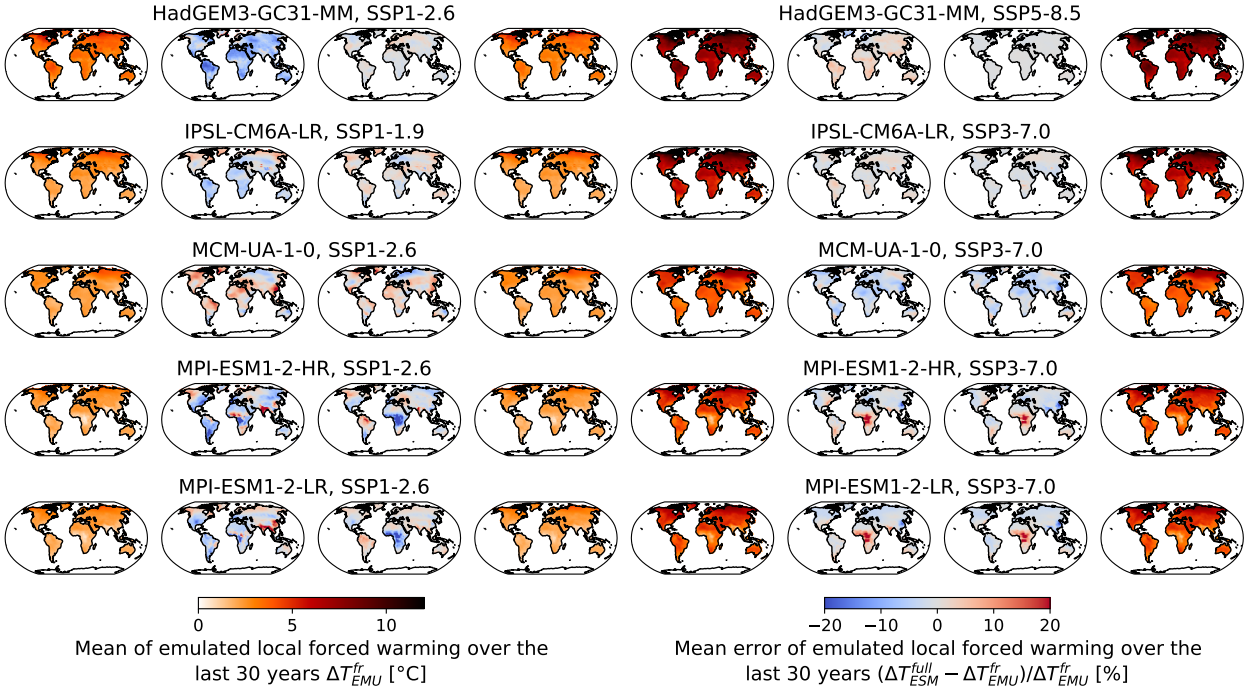

Figure S4. Same as Fig. S1 but for five different ESMs.

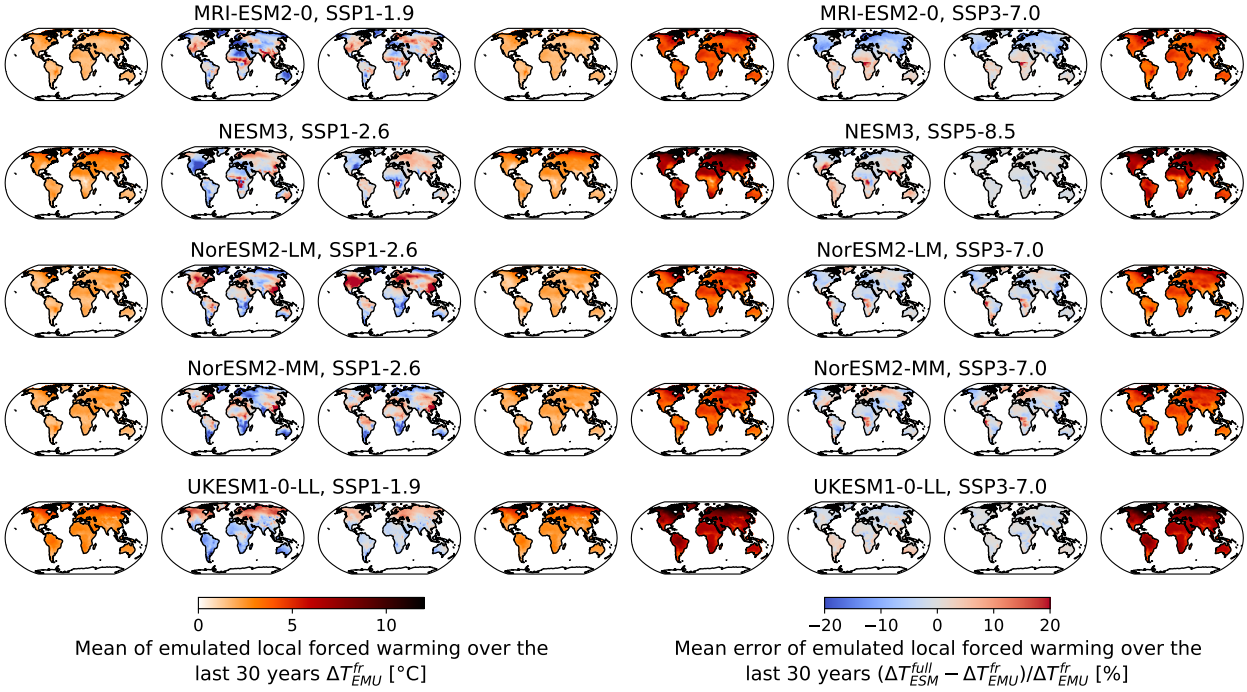

Figure S5. Same as Fig. S1 but for five different ESMs.

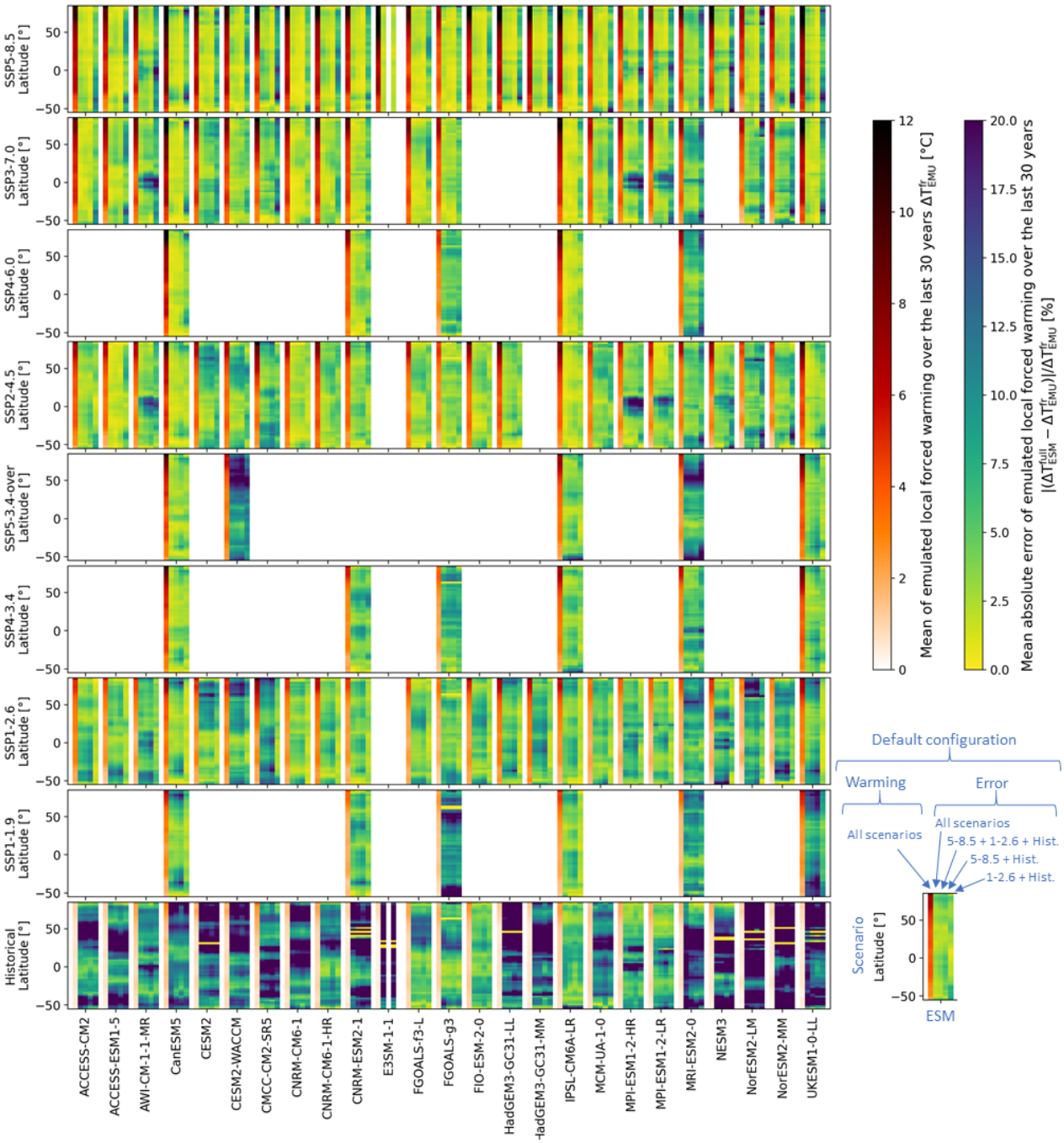

Figure S6. Latitudinally-averaged grid-point-level emulated local forced warming and performance with respect to ESM simulations averaged over the last 30 years of each scenario for MESMER's default configuration with different numbers of training scenarios. The depicted warming is based on the emulations produced by MESMER trained on all available scenarios. The performance error is additionally shown for MESMSER trained only on a high and a low emission pathway (SSP5-8.5 + SSP1-2.6 + Historical), solely on a high emission pathway (SSP5-8.5 + Historical), and solely on a low emission pathway (SSP1-2.6 + Historical). The mean absolute deviation of the ESM simulations from the emulated forced warming, i.e., error, shown here represents the average absolute deviation across all available ESM initial-condition members for the scenario at hand.

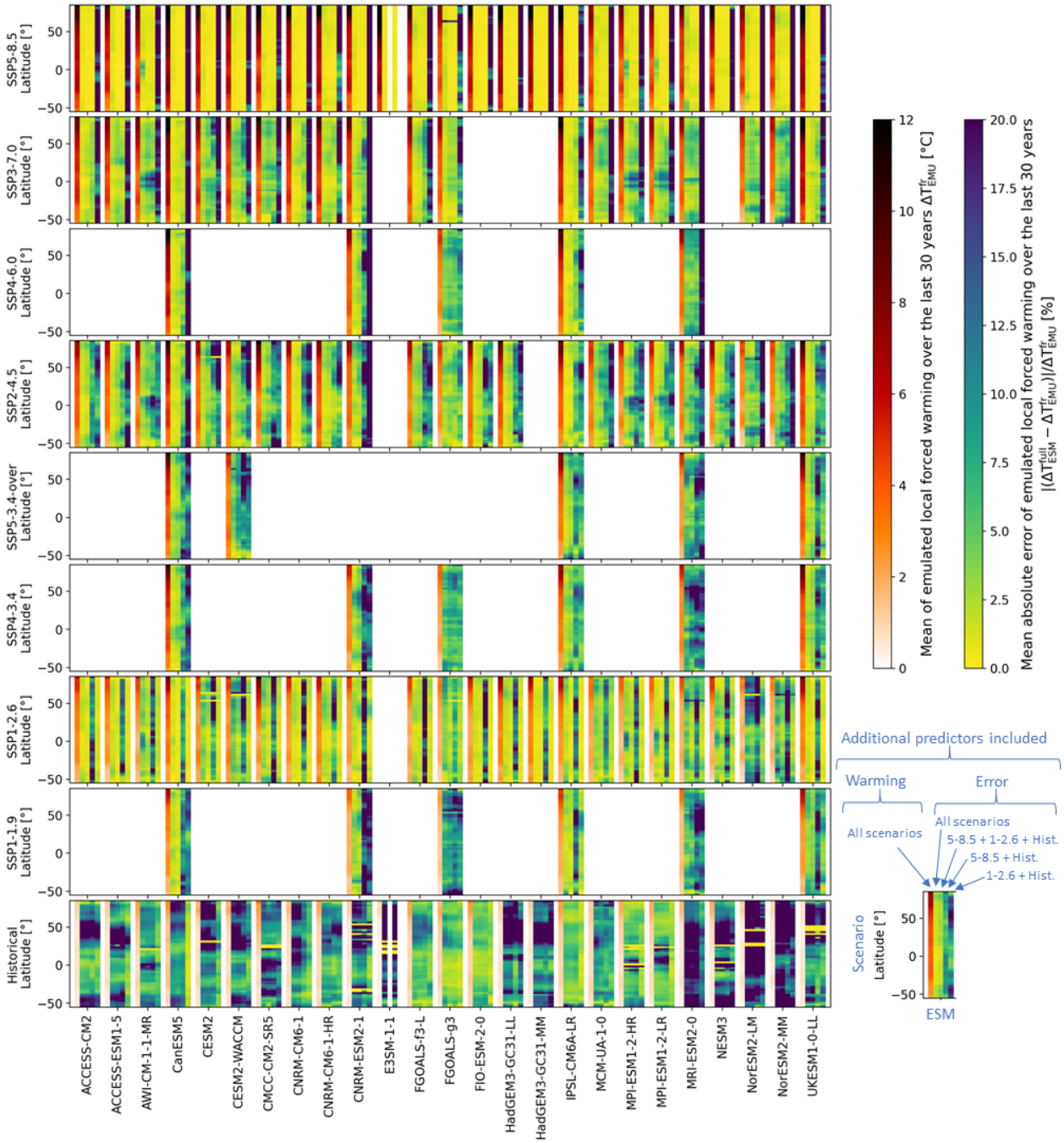

Figure S7. Same as Figure S6 but for MESMER's additional predictors configuration.

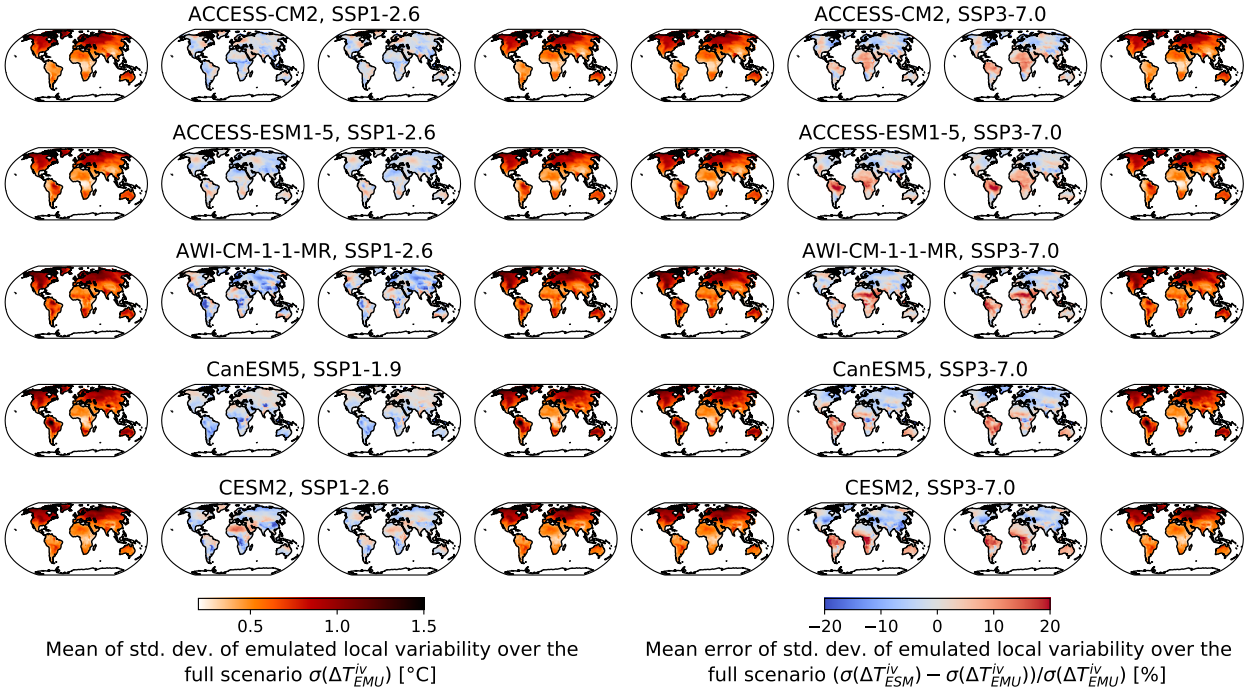

Figure S8. Standard deviation of emulated local variability and performance with respect to ESM simulations' standard deviations for both MESMER configurations averaged over the full scenario period of a low emission (left) and a high emission (right) scenario for five different ESMs (rows). The standard deviation of the local variability emulations is based on 600 emulations for each ESM. To obtain local variability from ESM simulations, the emulated local forced warming is subtracted from every ESM simulation. Subsequently, the standard deviation of this estimate of an ESM simulation's local variability is computed. The mean deviation of the ESM simulations' standard deviations from the emulations' standard deviation, i.e., error, shown here represents the average deviation across all available ESM initial-condition members for the scenario at hand. For each ESM and scenario combination, the map order reflects the column order in Fig. 4 with the first map showing the standard deviation of the emulated variability of the default configuration, the second the error of the default configuration, the third the error of the additional predictors configuration, and the fourth the standard deviation of emulated variability of the additional predictors configuration.

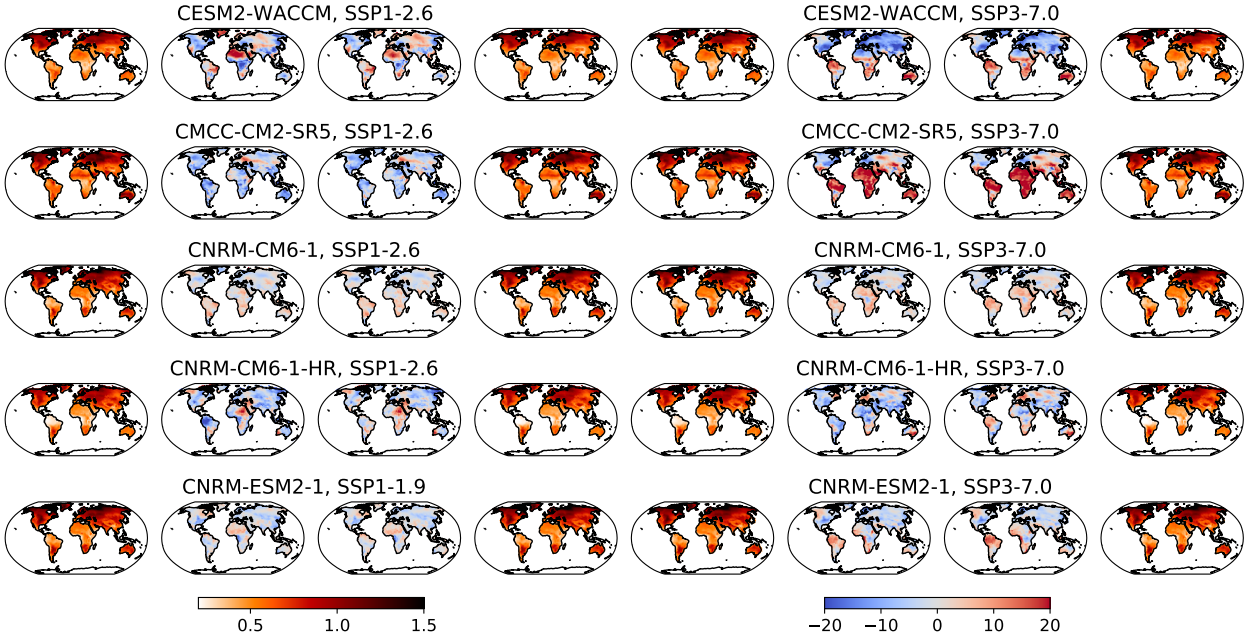

Figure S9. Same as Fig. S8 but for five different ESMs.

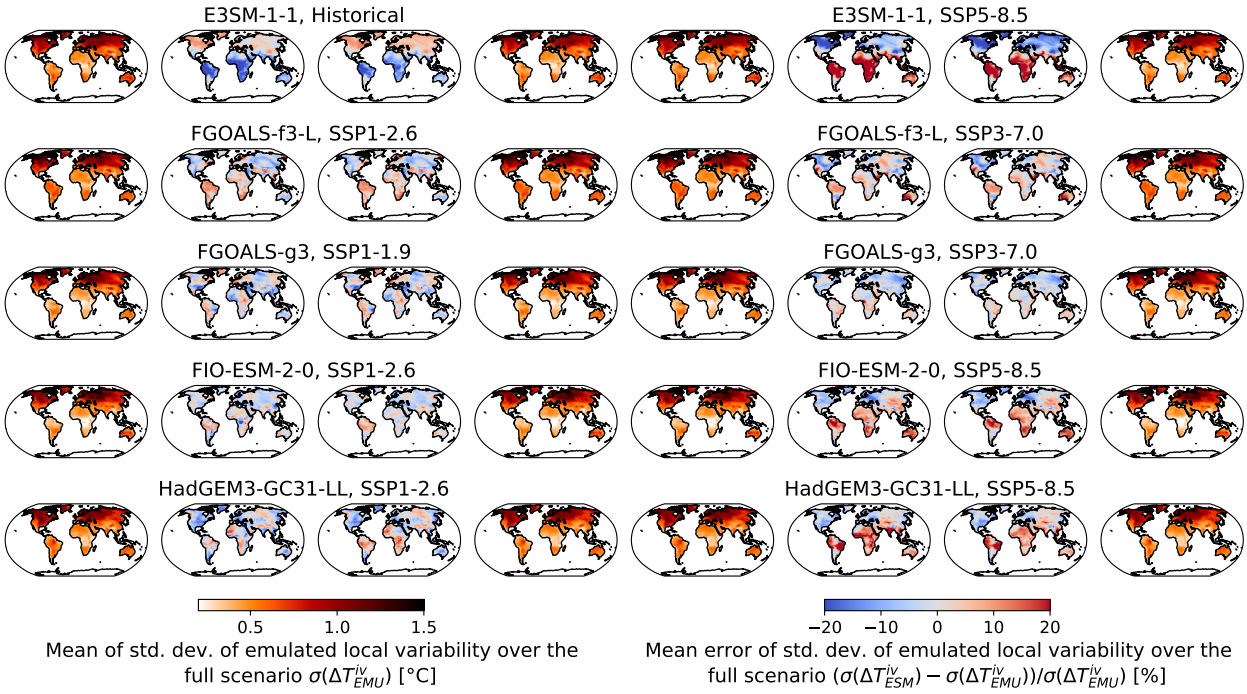

Figure S10. Same as Fig. S8 but for five different ESMs.

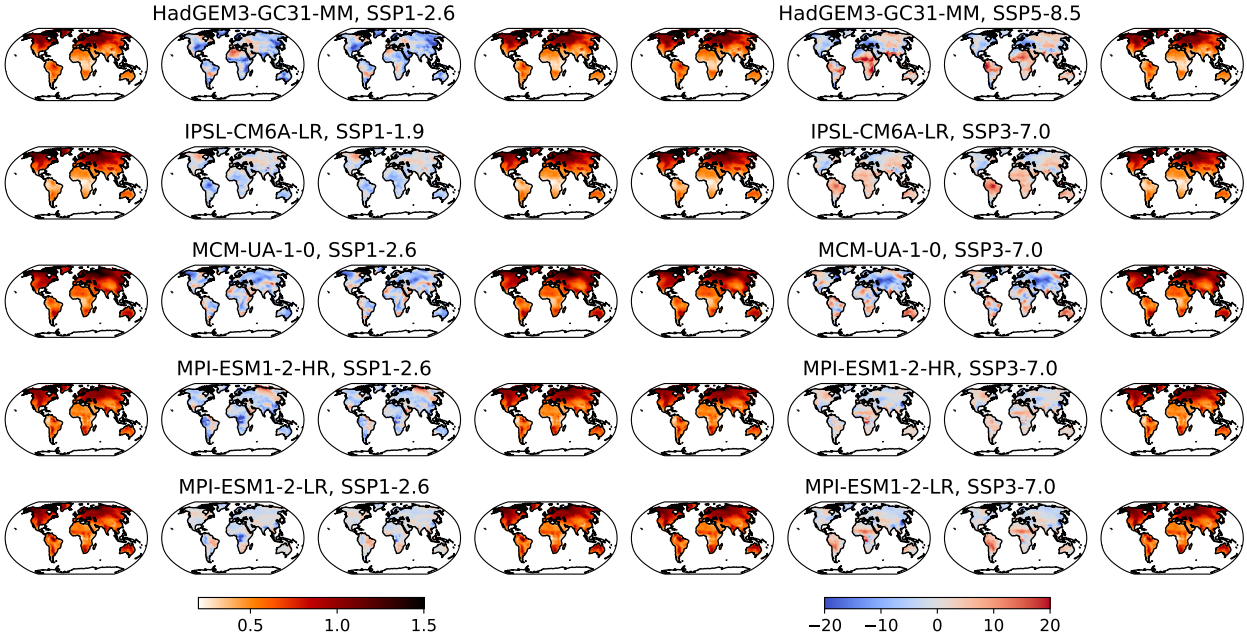

Figure S11. Same as Fig. S8 but for five different ESMs.

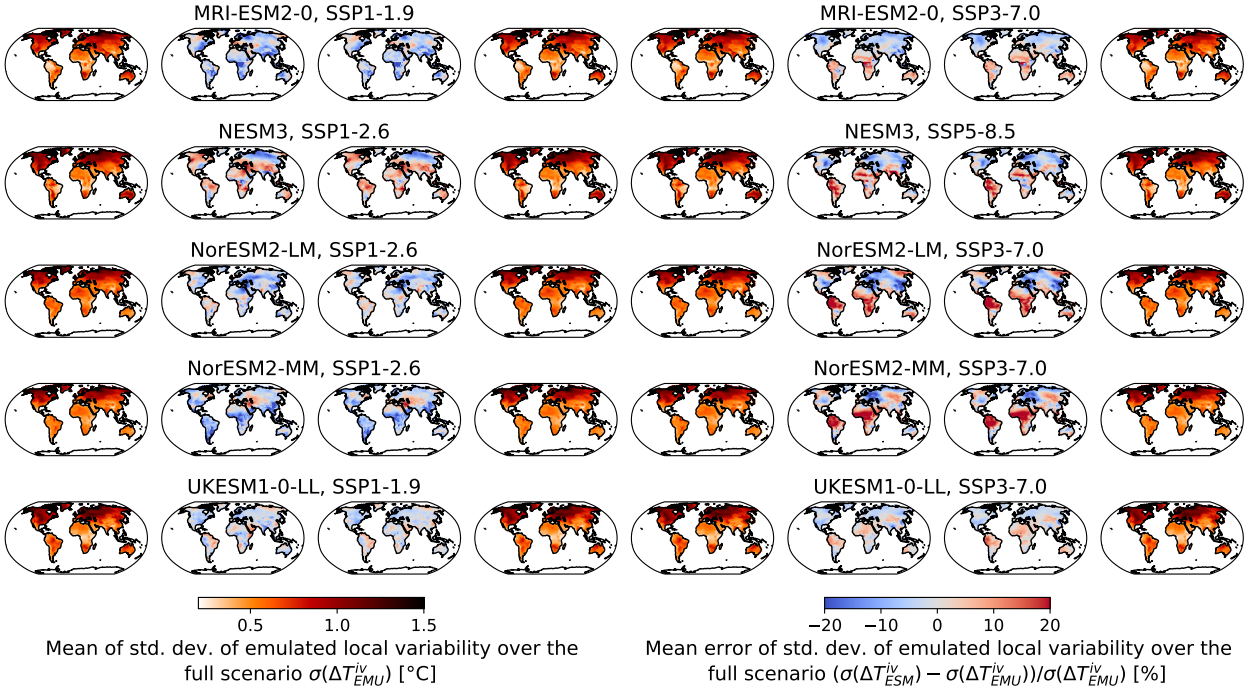

Figure S12. Same as Fig. S8 but for five different ESMs.