Supplementary Material - The Atlantic Ocean's Variability in mid-Holocene Simulations

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Figure S1. Possible states for SST and precipitation
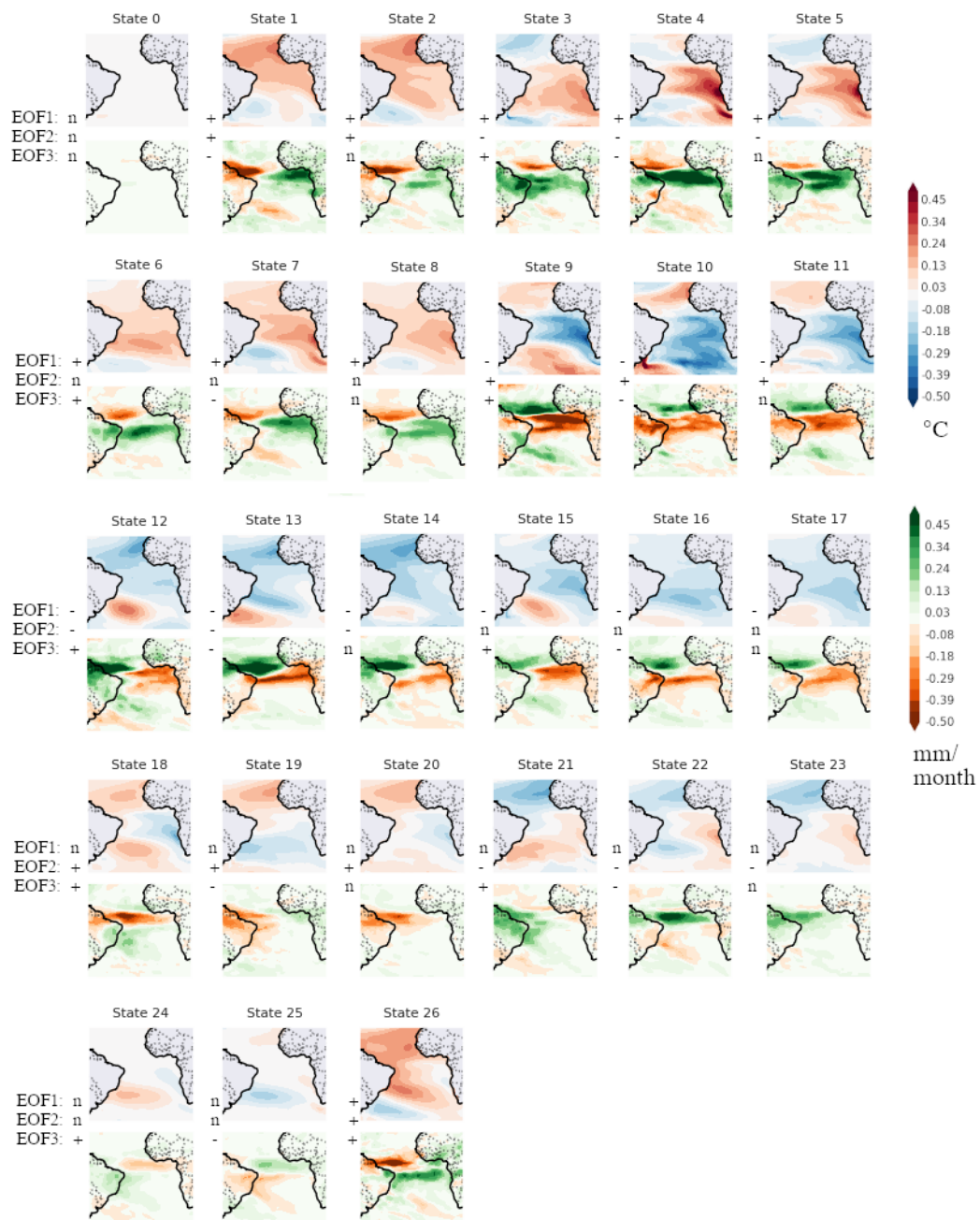
Figure S1. Each state is a decadal SST (top) and precipitation (bottom) anomaly pattern from the Tropical and South Atlantic Ocean region. From states 0 to 26, these states are retrieved from the principal component analysis of the two variables, and each state is a combination of negative (-), positive (+), or neutral (n) phases of the respective principal components (EOF1, EOF2 and EOF3). SST color bar in Celsius: Blue indicating negative SST anomalies and red for positive. Precipitation color bar in mm/month: Orange indicating negative precipitation anomalies and green for positive.

Figure S2. Entropy per SST principal component threshold
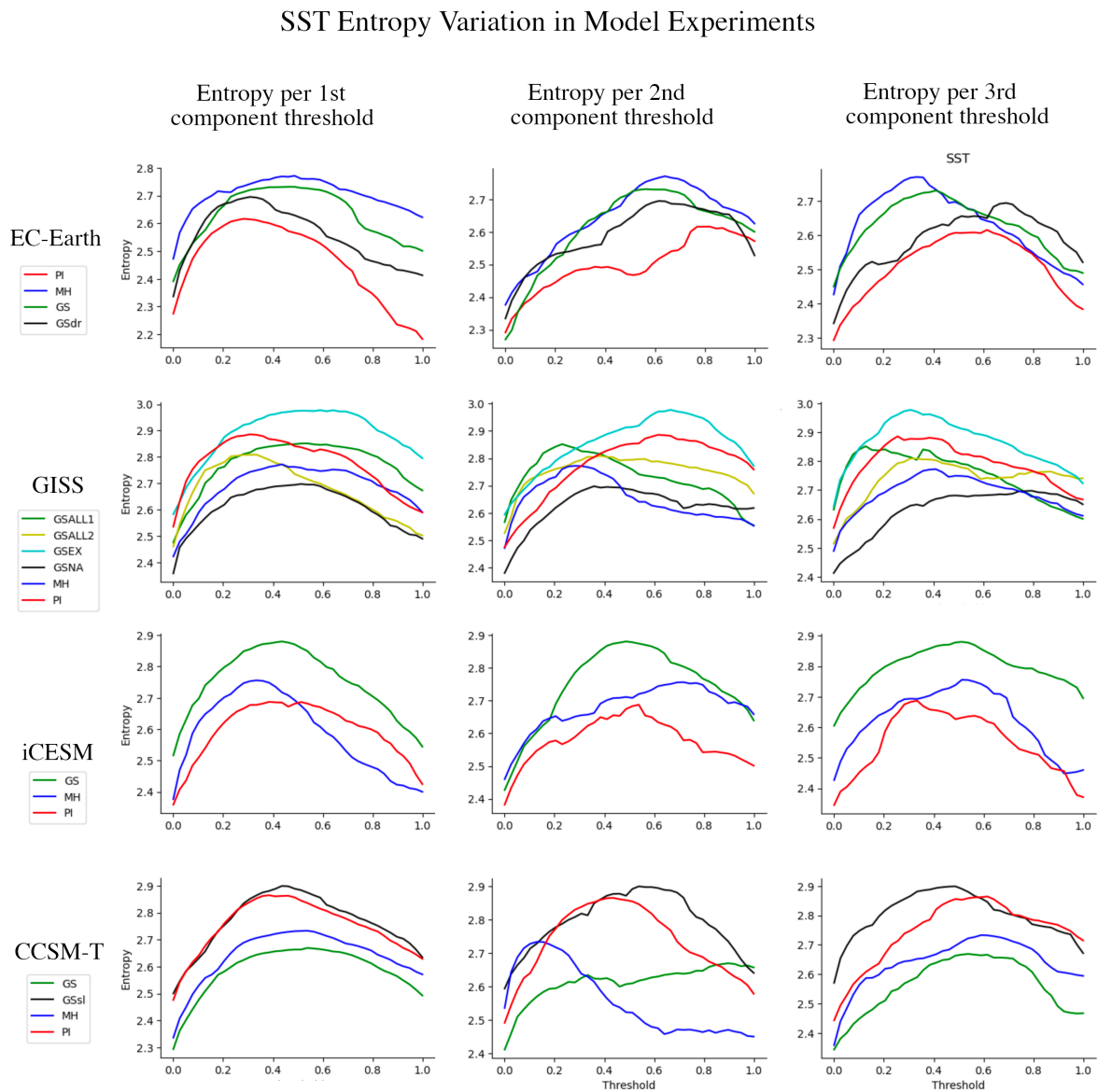

SST Entropy Variation in Model Experiments

Figure S2. SST entropy values for each model scenario with different thresholds. The y-axis is the Entropy value, calculated from equation 1. The x-axis is the threshold used to define the positive, negative and neutral phases of the three main componets (a.k.a possible states) in the PCs' space. At each column, the thresholds from two of the main components are maintained fixed at 0.5, while the remaining component threshold varies. From left to right: the first, second and third components thresholds are varied. From top to bottom, the model runs are: EC-Earth - Pre-Industrial (PI, red), mid-Holocene (MH_{PMIP}, blue), Green Sahara (MH_{GS}, green), and Grenn Sahara with dust reduction (MH_{GSrd}, black); GISS - Full vegetation (MH_{GSALL1}, green; MH_{GSALL2} yellow), Extra-tropical vegetation (MH_{GSEX}, cyan), North Africa vegetation only (MH_{GSNA}, black), MH_{PMIP} (blue) and PI (red); iCESM - MH_{GS} (green), MH_{PMIP} (blue) and PI (red); CCSM-T - MH_{GS} (green), GS with soil and lake inputs (MH_{GSsl}, black), MH_{PMIP} (blue) and PI (red)

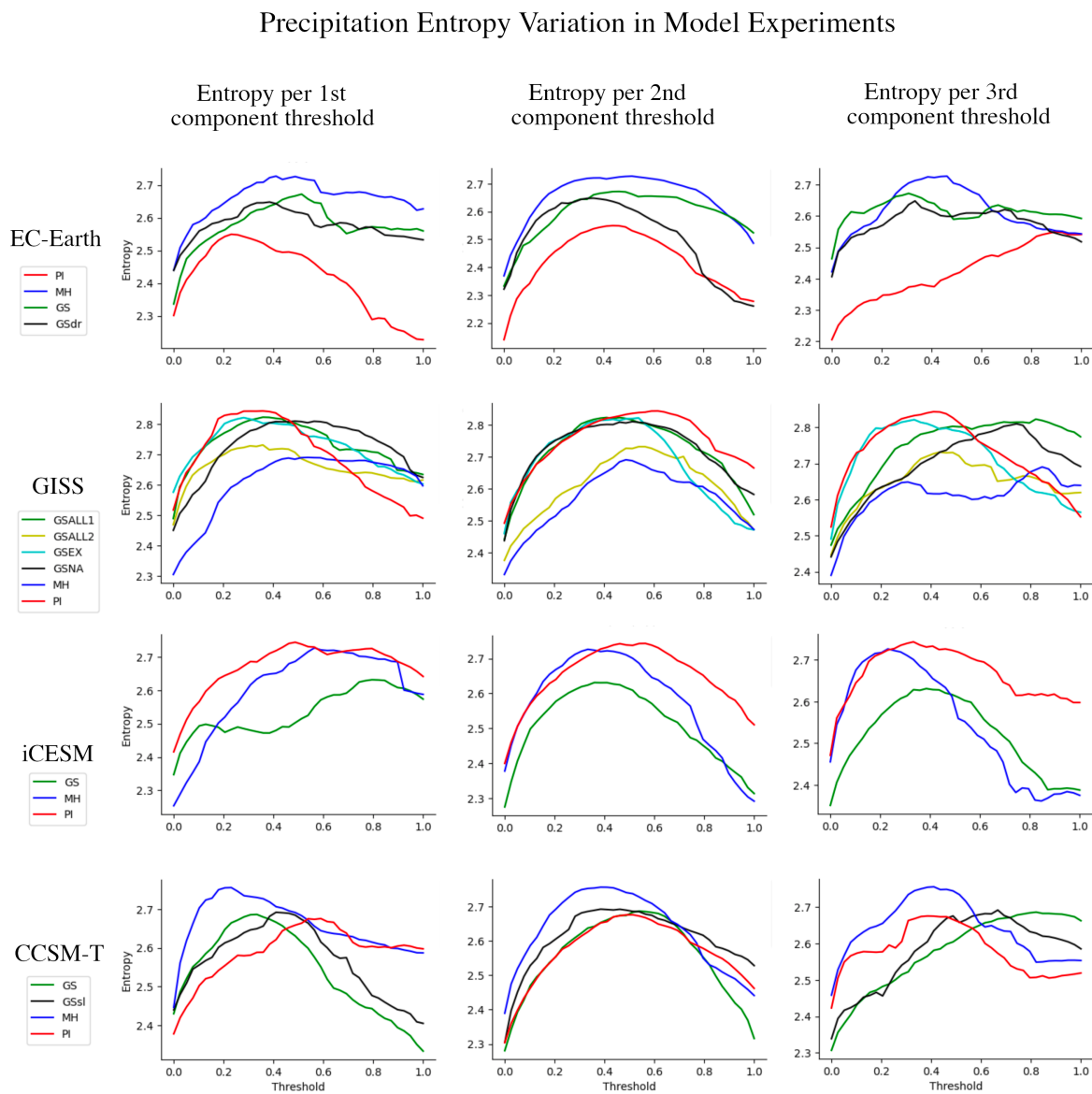Precipitation Entropy Variation in Model Experiments

Figure S3. Precipitation entropy values for each model scenario with different thresholds. The y-axis is the Entropy value, calculated from equation 1. The x-axis is the threshold used to define the positive, negative and neutral phases of the three main componets (a.k.a possible states) in the PCs' space. At each column, the thresholds from two of the main components are maintained fixed at 0.5, while the remaining component threshold varies. From left to right: the first, second and third components thresholds are varied. From top to bottom, the model runs are: EC-Earth - Pre-Industrial (PI, red), mid-Holocene (MH_{PMIP}, blue), Green Sahara (MH_{GS}, green), and Grenn Sahara with dust reduction (MH_{GSrd}, black); GISS - Full vegetation (MH_{GSALL1}, green; MH_{GSALL2} yellow), Extra-tropical vegetation (MH_{GSEX}, cyan), North Africa vegetation only (MH_{GSNA}, black), MH_{PMIP} (blue) and PI (red); iCESM - MH_{GS} (green), MH_{PMIP} (blue) and PI (red); CCSM-T - MH_{GS} (green), GS with soil and lake inputs (MH_{GSsl}, black), MH_{PMIP} (blue) and PI (red)