Supplement of Earth Syst. Dynam., 13, 1667–1675, 2022
https://doi.org/10.5194/esd-13-1667-2022-supplement

Earth System Dynamics
Open Access

Supplement of

Evidence of localised Amazon rainforest dieback in CMIP6 models

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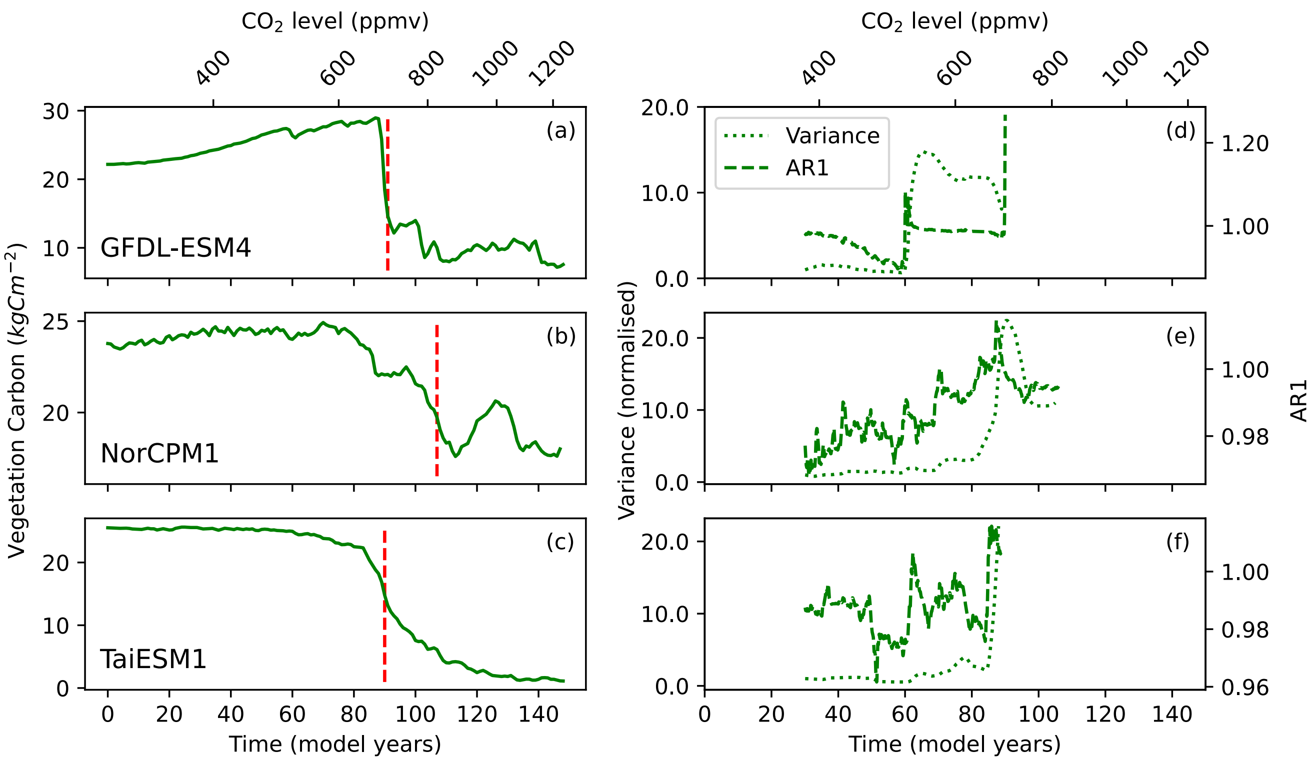

Figure S1. Plots demonstrating how variance and lag 1 autocorrelation perform as early warning signals for Amazonian vegetation dieback for three example grid points in different models. (a-c) Example time series of identified dieback shifts for three models at grid points 5°S 65°W, 0° 60°W and 0° 60°W respectively. The red dotted line indicates the midpoint of the 15 year period where the abrupt shift is detected by the algorithm. **(d-f)** Plots showing variance and autocorrelation lag 1 in vegetation carbon calculated for a 30 year moving window up to a detected abrupt shift.

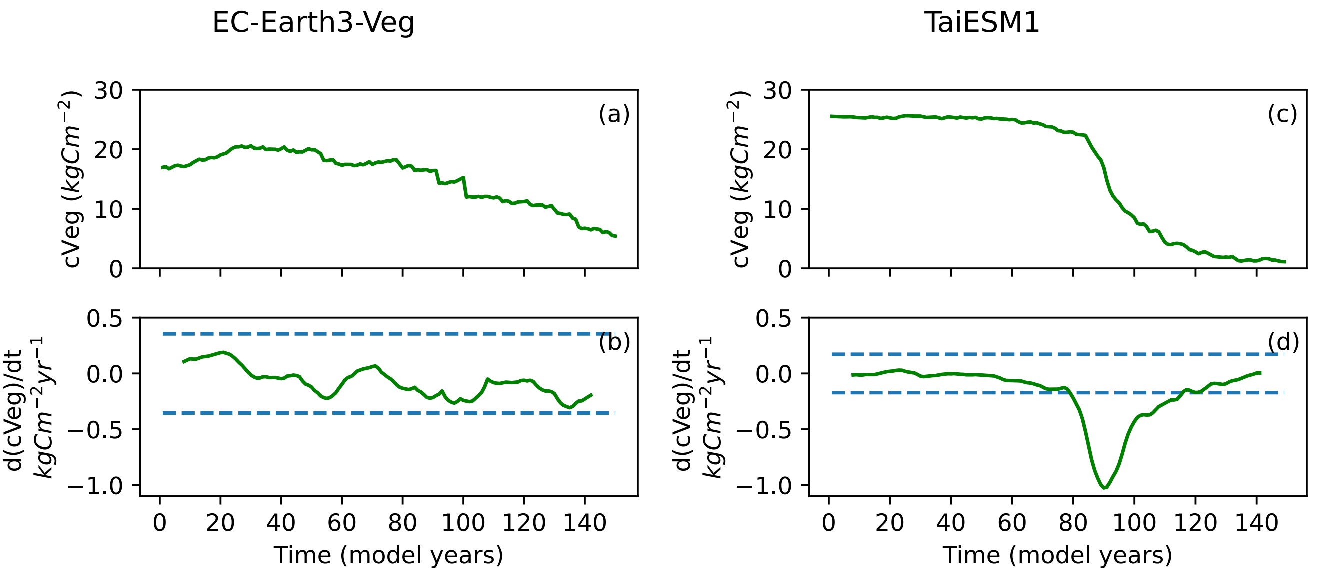

Figure S2. Plots demonstrating the mechanics of the third criterion of the detection algorithm described in section 2.2. (a-b) An example from EC-Earth3-Veg (10°S 68°W) of a grid point that would otherwise be detected but is rejected by the third criterion as the mean rate of change does not exceed three standard deviations of the rates of change in the unforced control run, indicated by the dashed blue lines. **(c-d)** An example from TaiESM1 (0° 60°W) of a grid point that passes the third criterion.

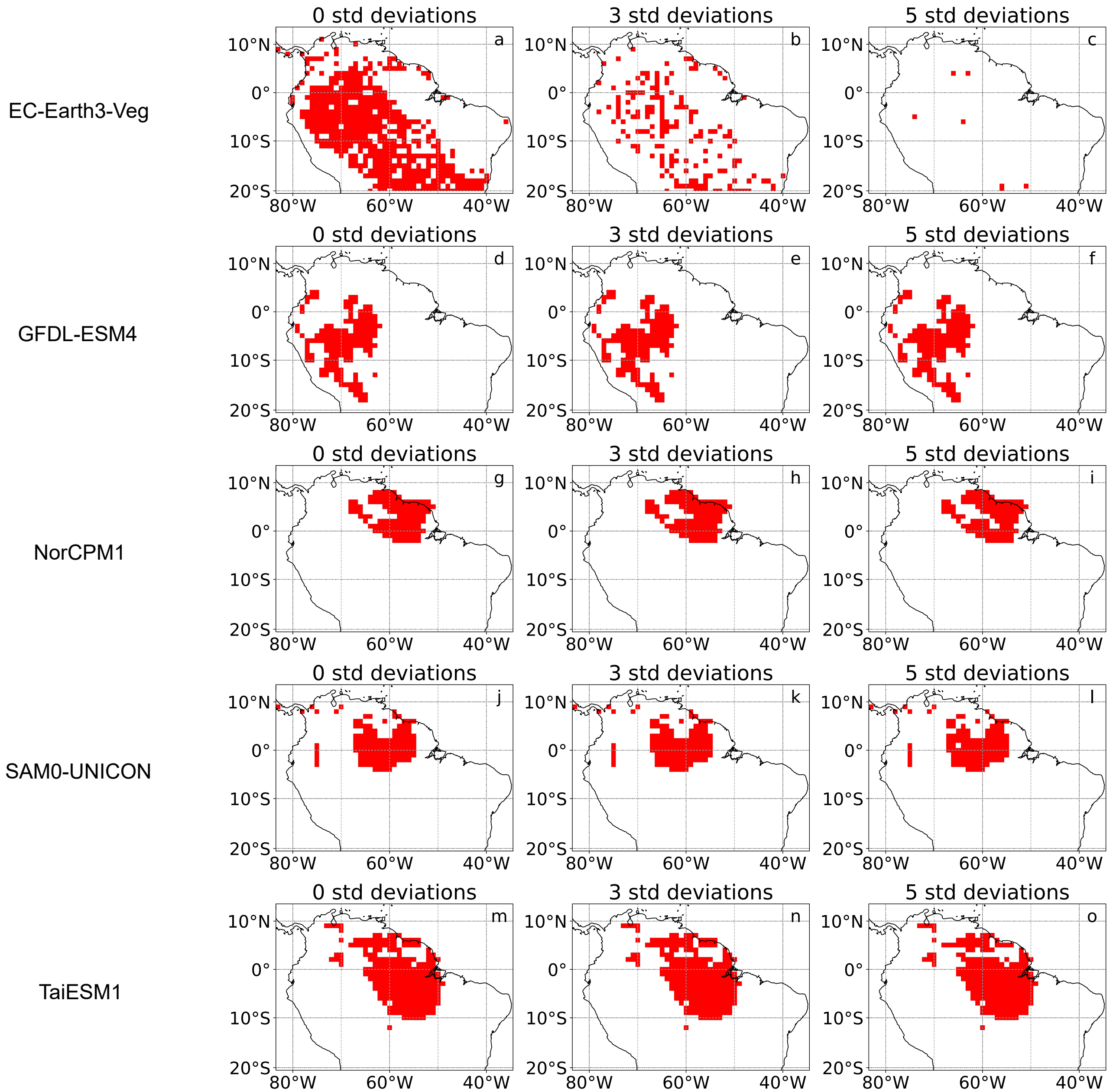

Figure S3. Maps demonstrating how the detection of an abrupt shift using the third criterion in the detection algorithm is dependent on the threshold set for the number of standard deviations. (a-c) Maps for EC-Earth3-Veg which has significant stochastic forcing leading to less spacially coherent abrupt shifts which are largely removed through increasing the threshold. **(d-o)** Maps for the four other models which display a significant number of abrupt shifts. Increasing the threshold has little effect on the detection of abrupt shifts in these models as stochastic forcing in these is less significant.

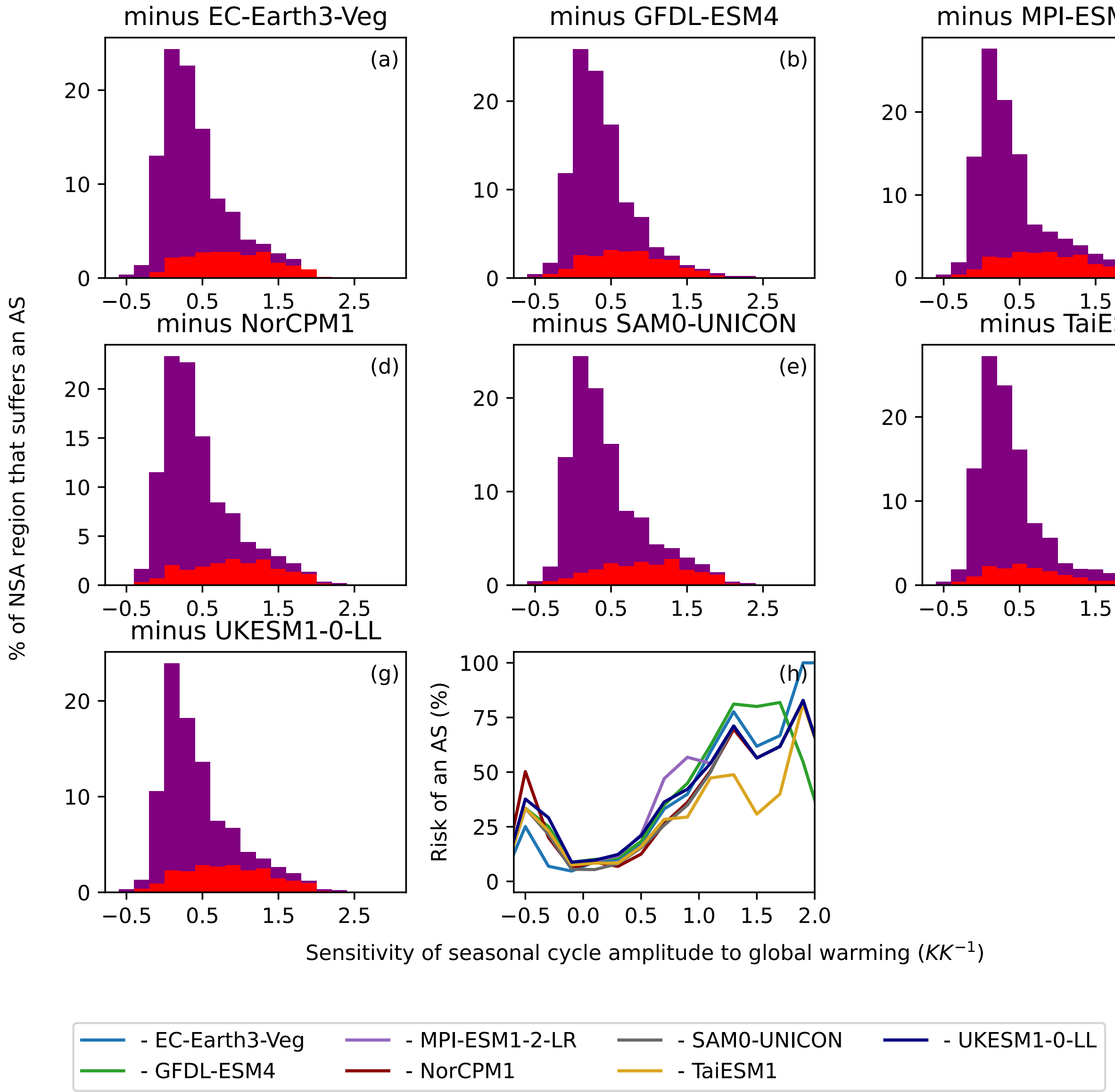

Figure S4. A demonstration of the significance of the role each model plays in the compiled model histograms which demonstrates the efficacy of the temperature seasonal cycle amplitude as method of assessing the risk of an oncoming abrupt dieback shift. (a-g) histograms with a single a single model removed from the analysis referenced in the title of each plot. **(h)** The percentage risk of a grid point experiencing a dieback shift with increasing sensitivity of the temperature seasonal cycle amplitude to global warming for 6 models with one removed from analysis, as indicated in the key.