Supplementary Material

Revealing dominant patterns of aerosols regimes in the lower troposphere and their evolution from preindustrial times to the future in global climate model simulations

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The Fig.S1 demonstrates how good Random Forest learned from its training data. The internal aerosol properties for each primary aerosol regime are compared among time slices. The REF-2015 panel is the 'ground truth' of Random Forest learning, and other panels are the application of Random-Forest-learned decision rules.

Firstly, similar internal aerosol properties are displayed for each identified aerosol regime for REF-2015, the preindustrial and future time slices. This suggests that the Random Forest correctly learns the classification criteria and is well suited for this study.

Secondly, there is a discrepancy for dust-dominated regimes (regime 5 and 7). The data distributions of the dust-dominated level 1 regime (regime 5) in the preindustrial times and in 2050-SSP1-1.9 is characterized by many outliers compared with the distribution in REF-2015, which should instead be assigned to the dust-dominated level 2 regime (regime 7). This discrepancy suggests that it would be more appropriate to discuss the two dust-dominated regimes as a single one and the differences between these two regimes should not be over-emphasized, because the regime differences between the dust-dominated regimes are caused by numerical artifacts of the algorithm but not by real regime changes in the model simulations.

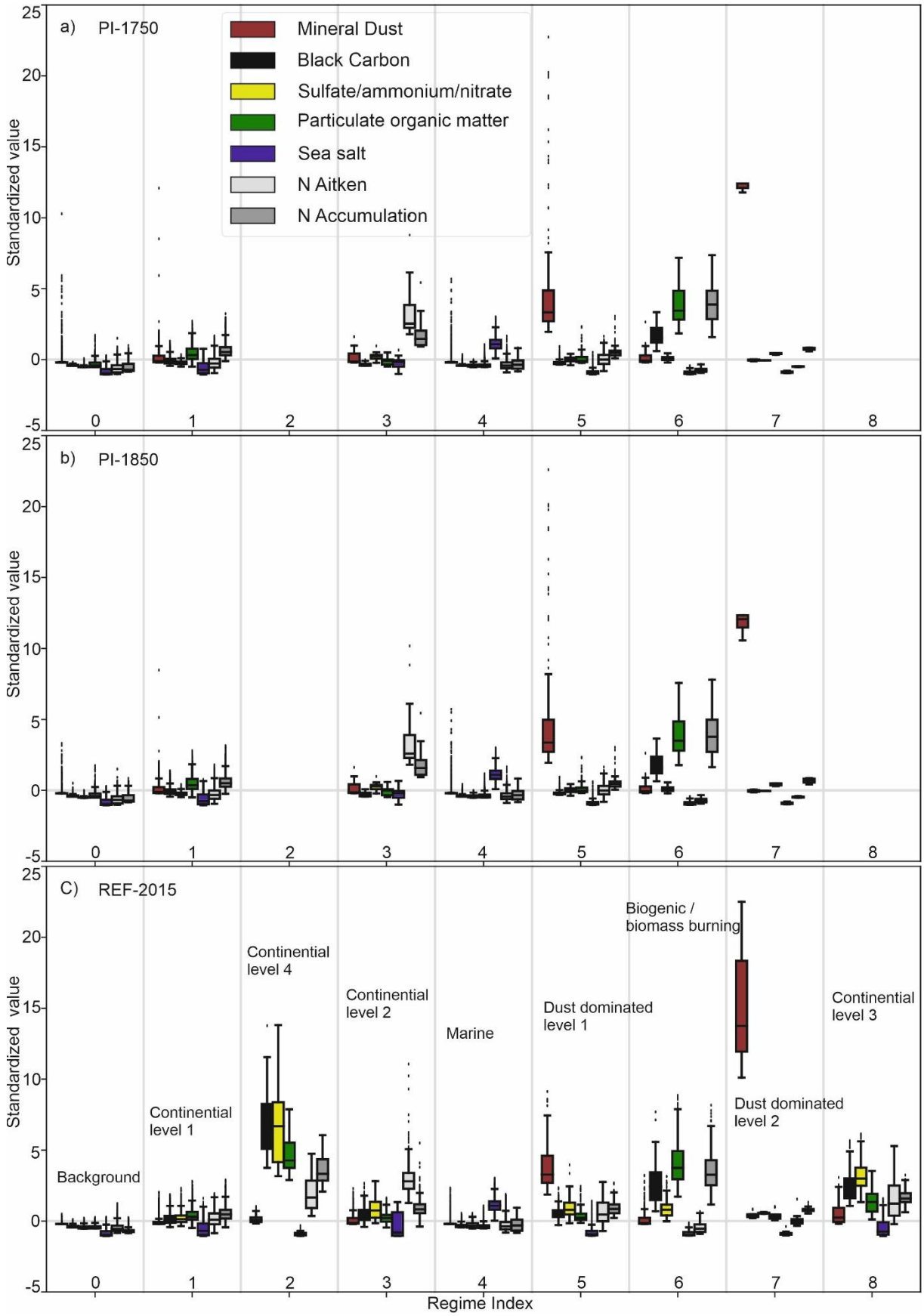

Figure S1. Evaluation of internal aerosol properties of the global aerosol regimes among time slices. To be continued.

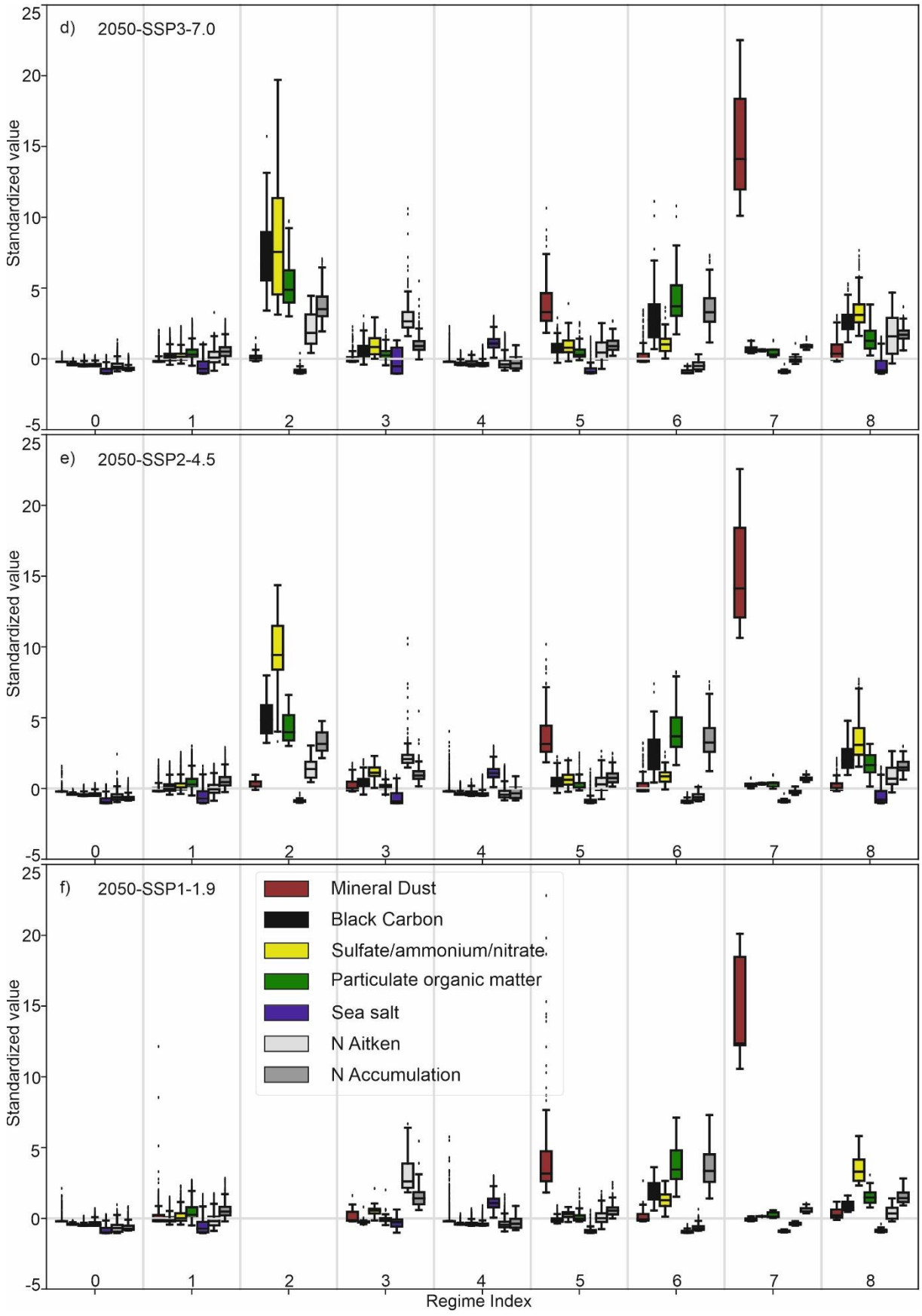

Figure S1. Continued.