

Supporting Information for

Ozone alters heat-driven Biogenic VOC responses: evidence from forest and urban tree species under sequential stress

Biplob Dey^{1,3}, Clémence Depp¹, Yichen Gu¹, Toke Due Sjøgren⁴, Peeyush Khare¹, Georgios I. Gkatzelis¹, Yizhen Wu¹, Sindhu Vasireddy⁶, Alexander Knohl^{3,5}, Riikka Rinnan⁴, Anna Novelli¹, Hendrik Fuchs^{1,7}, Thorsten Hohaus¹, Eva Y. Pfannerstill^{1,2}

¹Institute of Climate and Energy Systems: Troposphere (ICE-3), Forschungszentrum Jülich, Jülich, Germany

²Institute of Geophysics and Meteorology, University of Cologne, Cologne, Germany

³Bioclimatology, Faculty of Forest Sciences and Forest Ecology, University of Göttingen, Göttingen, Germany

⁴Department of Biology, Center for Volatile Interactions (VOLT), University of Copenhagen, Copenhagen, Denmark

⁵Centre of Biodiversity and Sustainable Land Use (CBL), University of Göttingen, Göttingen, Germany

⁶Jülich Supercomputing Centre, Forschungszentrum Jülich, Jülich, Germany

⁷Department of Physics, University of Cologne, Cologne, Germany

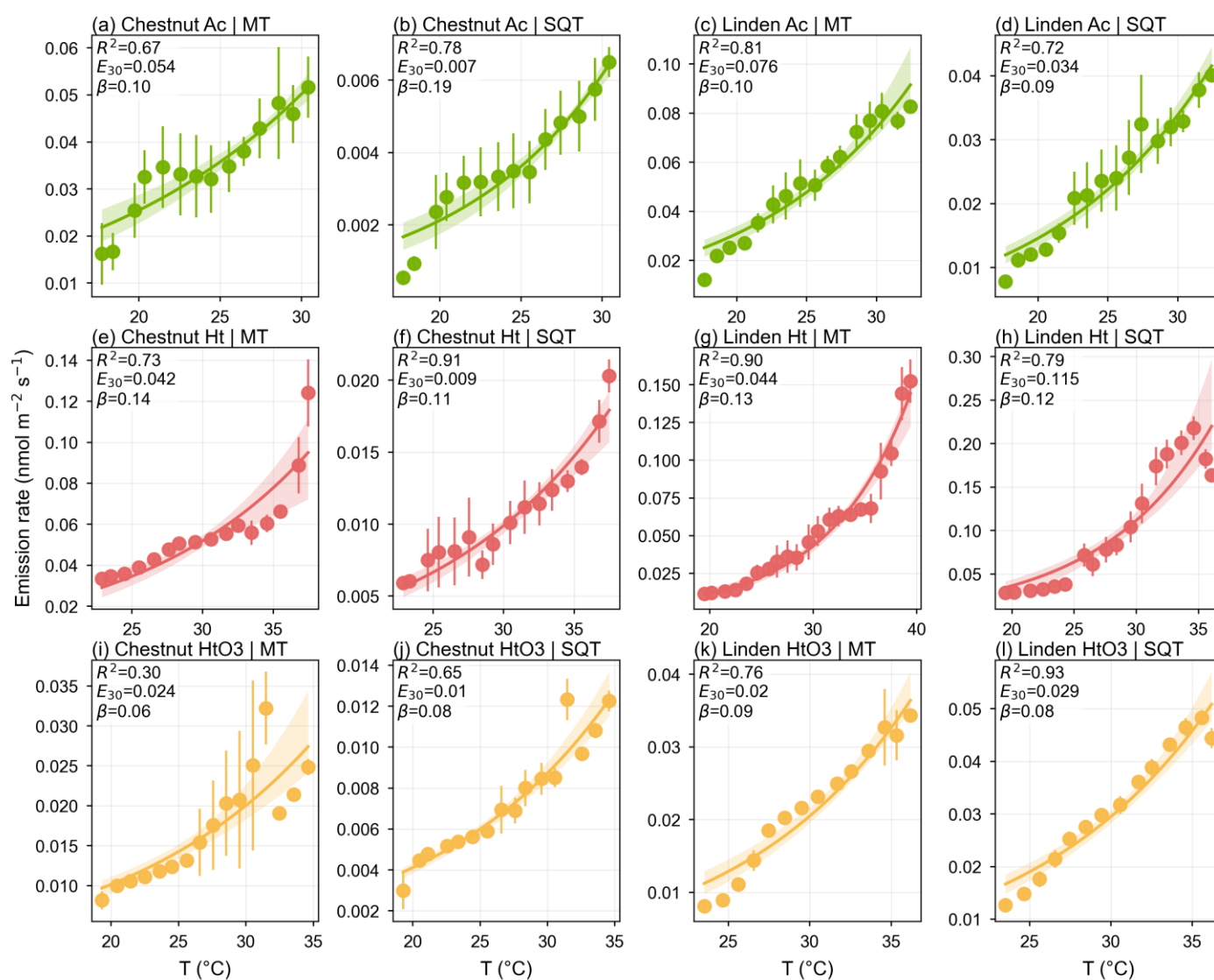


Figure 1 Temperature dependence of monoterpene (MT) and sesquiterpene (SQT) emissions under stress. Emission rates are shown as a function of temperature for chestnut and linden under acclimation (Ac), heat stress (Ht), and combined

heat + ozone stress (HtO₃). Points represent binned means (\pm s.d.), and lines show exponential fits $E = E_{30} \exp [\beta(T - 30)]$ with shaded uncertainty. Fitted parameters (E_{30} , β) and R^2 are indicated in each subplot.

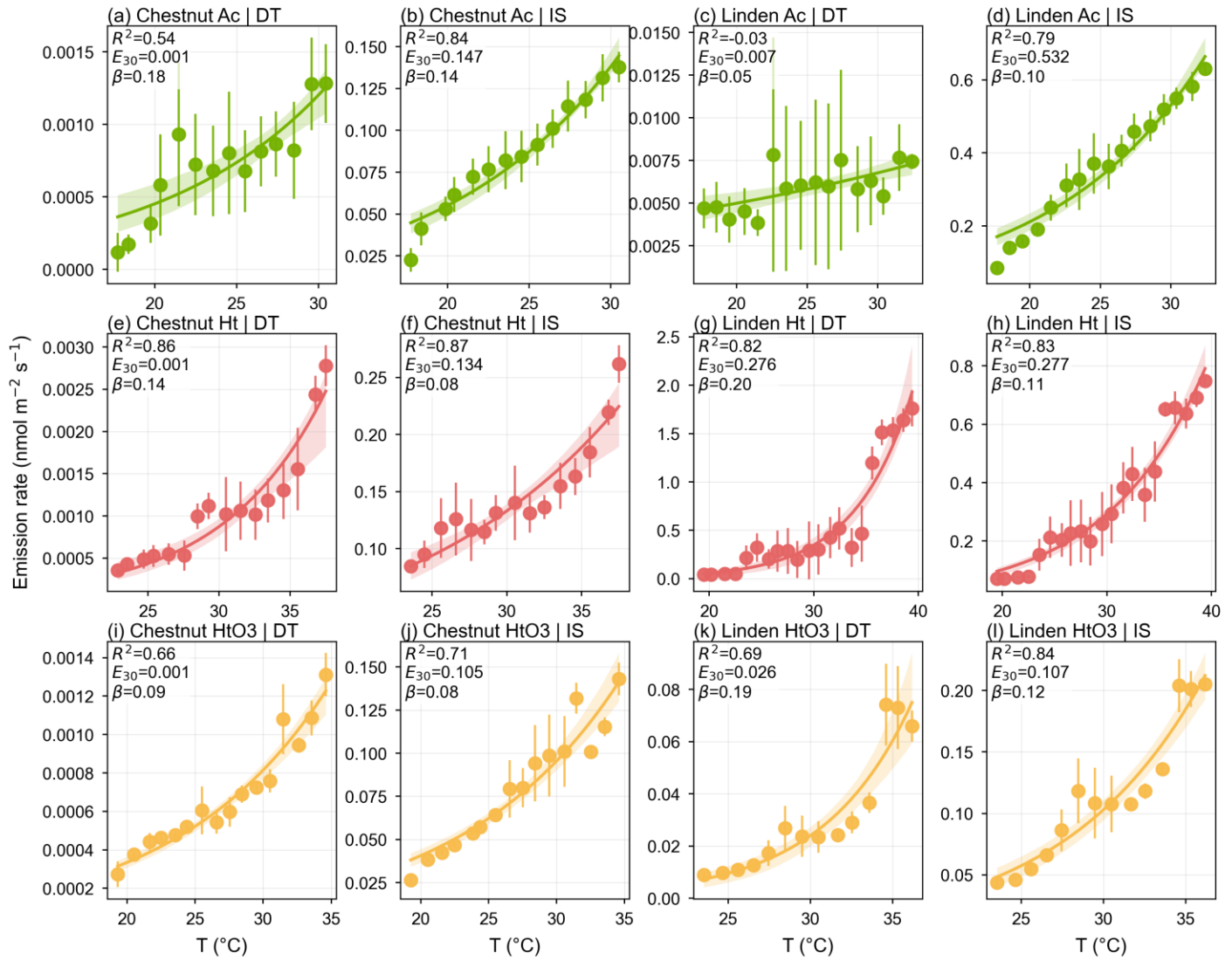


Figure 2 Temperature dependence of isoprene (IS) and diterpene (DT) emissions under stress. Emission rates are shown as a function of temperature for chestnut and linden under acclimation (Ac), heat stress (Ht), and combined heat + ozone stress (HtO₃). Points represent binned means (\pm s.d.), and lines show exponential fits $E = E_{30} \exp [\beta(T - 30)]$ with shaded uncertainty. Fitted parameters (E_{30} , β) and R^2 are indicated in each subplot.

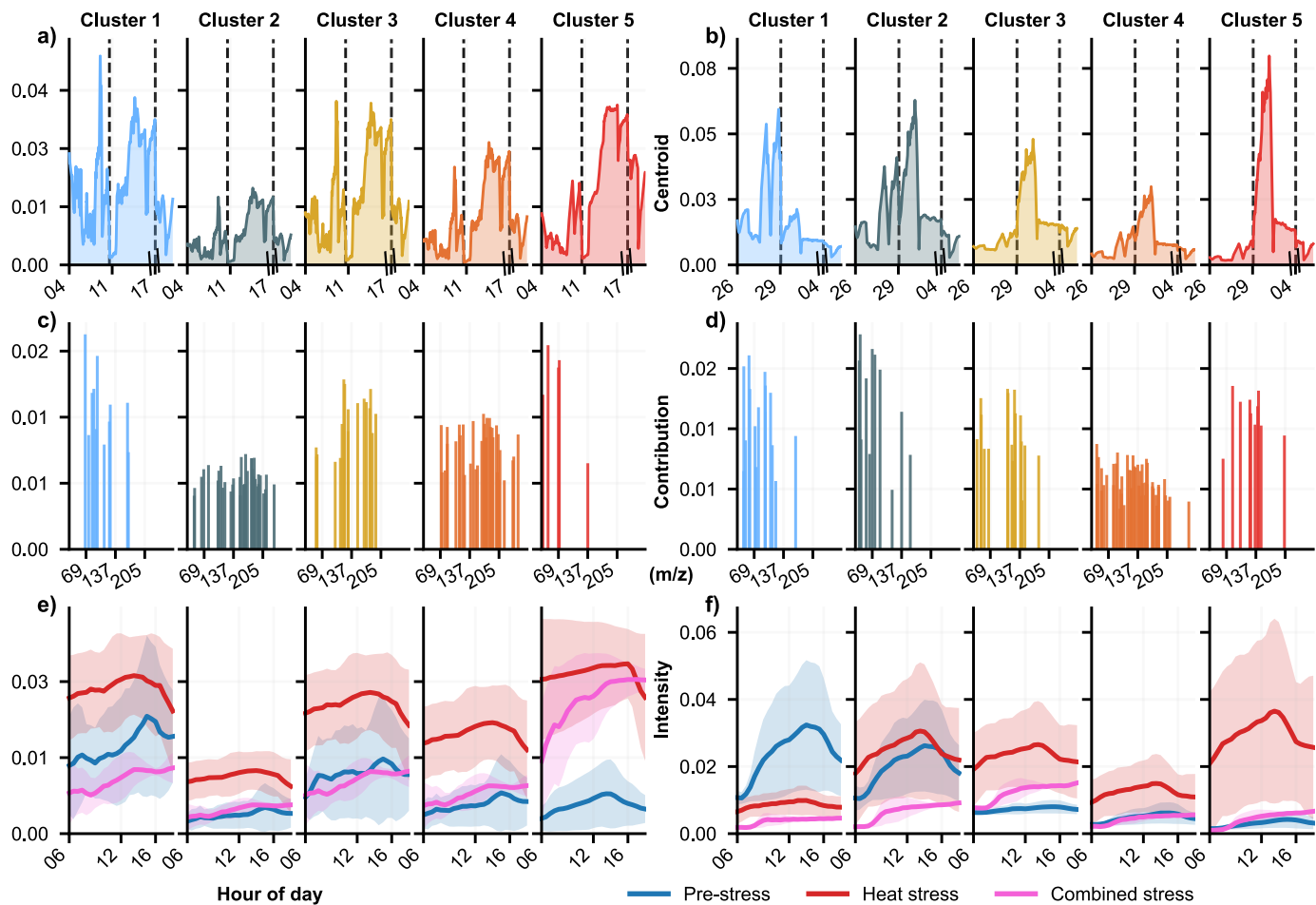


Figure 3 Uncertainty-weighted fuzzy c-means clustering of VOC emissions (5-factor solution) for chestnut (left) and linden (right). (a–b) Temporal evolution of cluster centroids for chestnut (a) and linden (b), with dashed lines indicating transitions between pre-stress, heat stress, and combined heat + ozone stress periods. (c–d) Cluster-specific mass spectral profiles showing dominant m/z features and their relative contributions. (e–f) Diurnal patterns of cluster intensities under pre-stress, heat stress, and combined stress.

Reference

Bourtsoukidis, E., Guenther, A., Wang, H., Economou, T., Lazoglou, G., Christodoulou, A., Christoudias, T., Nölscher, A., Yañez-Serrano, A. M., & Peñuelas, J. (2025). Environmental Change Is Reshaping the Temperature Sensitivity of Sesquiterpene Emissions and Their Atmospheric Impacts. *Global Change Biology*, 31(6), e70258. <https://doi.org/10.1111/GCB.70258>