

Supplemental material for:

Local and remote temperature response of regional SO₂ emissions

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Table S1. Global and local cloud properties change per emission change in the ERF simulations, i.e. local changes for 0xEU SO₂ are averaged over EU, for 5xNA SO₂ over NA etc. All values presented are 10⁻²/TgSyr⁻¹. The variables are r_{eff} : cloud top effective radius, LWP: liquid water path, IWP: ice water path, PREC: precipitation, CLDt_{tot}: total cloud cover, CLDl_{ow}: low cloud cover.

Experiment	0xEU SO ₂	7xEU SO ₂	5xNA SO ₂	5xEA SO ₂	10xSA SO ₂
Global					
$r_{eff}(\mu m)/\Delta em$	-1.065	-0.228	-0.293	-0.193	-0.141
LWP(gm^{-2})/ Δem	6.657	1.414	3.534	1.976	1.805
IWP(gm^{-2})/ Δem	0.245	-0.350	-0.993	-0.535	0.037
PREC($mm d^{-1}$)/ Δem	0.011	-0.015	-0.131	0.014	0.006
CLDt _{tot} (%)/ Δem	0.108	0.693	-1.518	0.303	-0.119
CLDl _{ow} (%)/ Δem	0.469	-0.154	0.088	-0.156	-0.187
Local					
$r_{eff}(\mu m)/\Delta em$	-12.367	-1.870	-2.035	-1.463	-3.164
LWP(gm^{-2})/ Δem	108.791	18.041	20.359	18.918	13.057
IWP(gm^{-2})/ Δem	3.848	-1.60	-7.520	0.079	-0.665
PREC($mm d^{-1}$)/ Δem	0.259	0.093	0.054	1.031	-0.322
CLDt _{tot} (%)/ Δem	0.472	3.558	-4.008	0.182	-1.410
CLDl _{ow} (%)/ Δem	2.253	-0.227	0.661	0.945	0.115

Table S2. Global and local cloud properties change per emission change in the coupled simulations, i.e. local changes for 0xEU SO₂ are averaged over EU, for 5xNA SO₂ over NA etc. All values presented are 10⁻²/TgSyr⁻¹. The variables are r_{eff} : cloud top effective radius, LWP: liquid water path, IWP: ice water path, PREC: precipitation, CLDt_{tot}: total cloud cover, CLDL_{ow}: low cloud cover.

Experiment	0xEU SO ₂	7xEU SO ₂	5xNA SO ₂	5xEA SO ₂	10xSA SO ₂
Global					
$r_{eff}(\mu m)/\Delta em$	-0.941	-0.387	-0.421	-0.260	-0.248
LWP(gm^{-2})/ Δem	2.066	1.074	1.180	0.957	0.393
IWP(gm^{-2})/ Δem	0.507	0.249	0.286	0.263	0.239
PREC($mm d^{-1}$)/ Δem	-0.078	-0.039	-0.052	-0.041	-0.044
CLDt _{tot} (%)/ Δem	-0.681	-0.236	-0.278	-0.225	-0.279
CLDL _{ow} (%)/ Δem	-0.767	-0.274	-0.406	-0.261	-0.350
Local					
$r_{eff}(\mu m)/\Delta em$	-12.892	-1.880	-2.037	-1.531	-3.031
LWP(gm^{-2})/ Δem	98.090	20.053	19.099	16.213	8.307
IWP(gm^{-2})/ Δem	2.364	0.589	0.774	0.165	-0.841
PREC($mm d^{-1}$)/ Δem	-0.324	-0.105	-0.318	-0.103	-0.739
CLDt _{tot} (%)/ Δem	-0.472	-0.379	-0.234	0.153	-2.715
CLDL _{ow} (%)/ Δem	1.446	0.523	0.392	0.709	-0.111