Atmospheric
Chemistry
and Physics

Supplement of

Simulating impacts on UK air quality from net-zero forest planting scenarios

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Supplementary material

Figure S1. EMEP4UK (2018) model runs for 4 planting scenarios showing isoprene emissions (top row), the difference in emissions between planting scenario and base case (middle row) and the percentage difference in emissions between planting scenarios and base case (bottom row)

Table S1. EMEP4UK (2018) model runs for baseline and 4 planting scenarios showing monthly isoprene emissions for UK

Figure S2. EMEP4UK (2018) model runs for 4 planting scenarios showing total monoterpene emissions (top row), the difference in emissions between planting scenario and base case (middle row) and the percentage difference in emissions between planting scenarios and base case (bottom row)

Table S2. EMEP4UK (2018) model runs for baseline and 4 planting scenarios showing monthly total monoterpene emissions for UK

Table S3. EMEP4UK (2018) model runs for baseline and 4 planting scenarios showing monthly ozone concentrations for UK
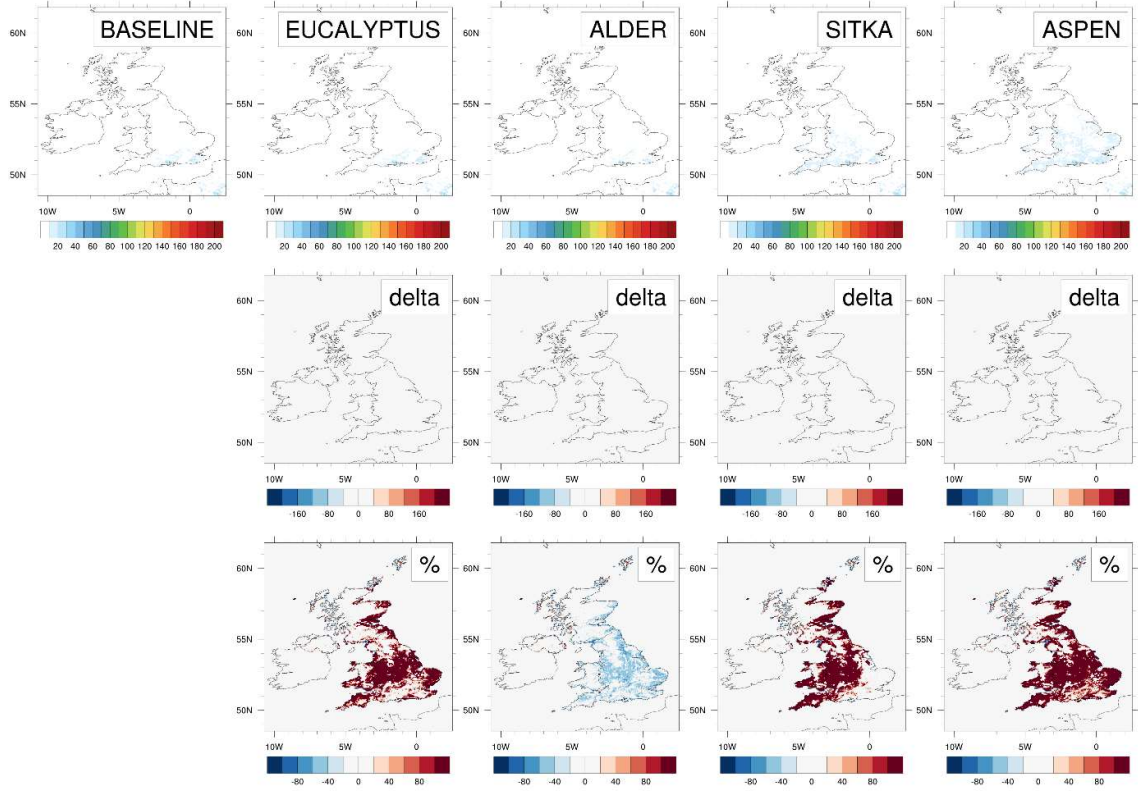
Table S4. EMEP4UK (2018) model runs for baseline and 4 planting scenarios showing monthly $PM_{2.5}$ concentrations for UK

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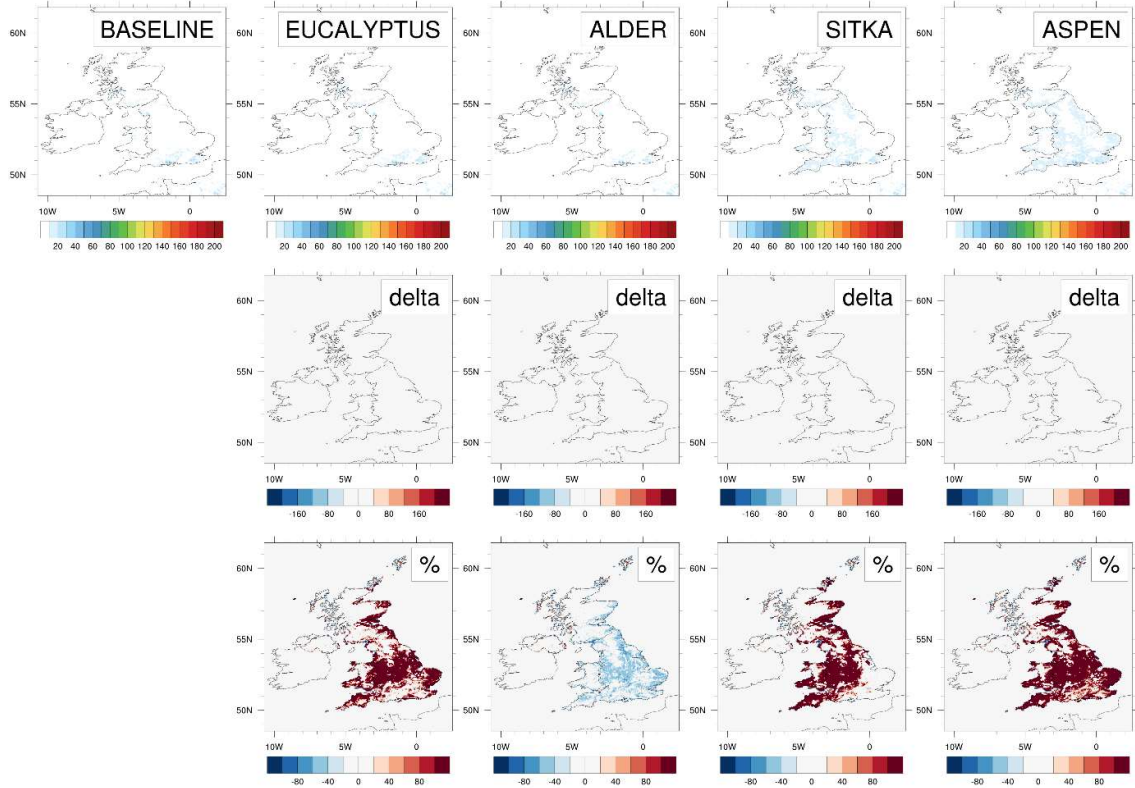
Table S6. Uncertainties of isoprene (E_{iso}) and monoterpene (E_{mtp}) emissions used in the model scenarios for alder, aspen, sitka spruce and eucalyptus and taken from experimental data in Purser et al, 2021.

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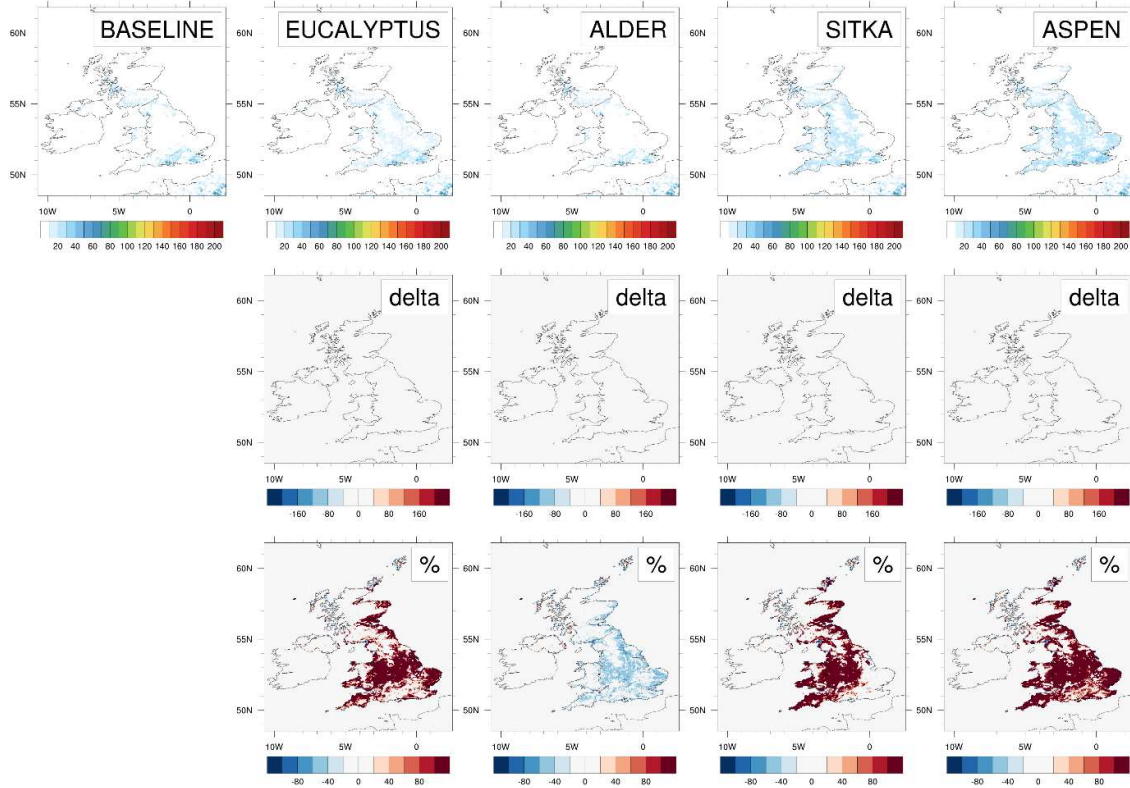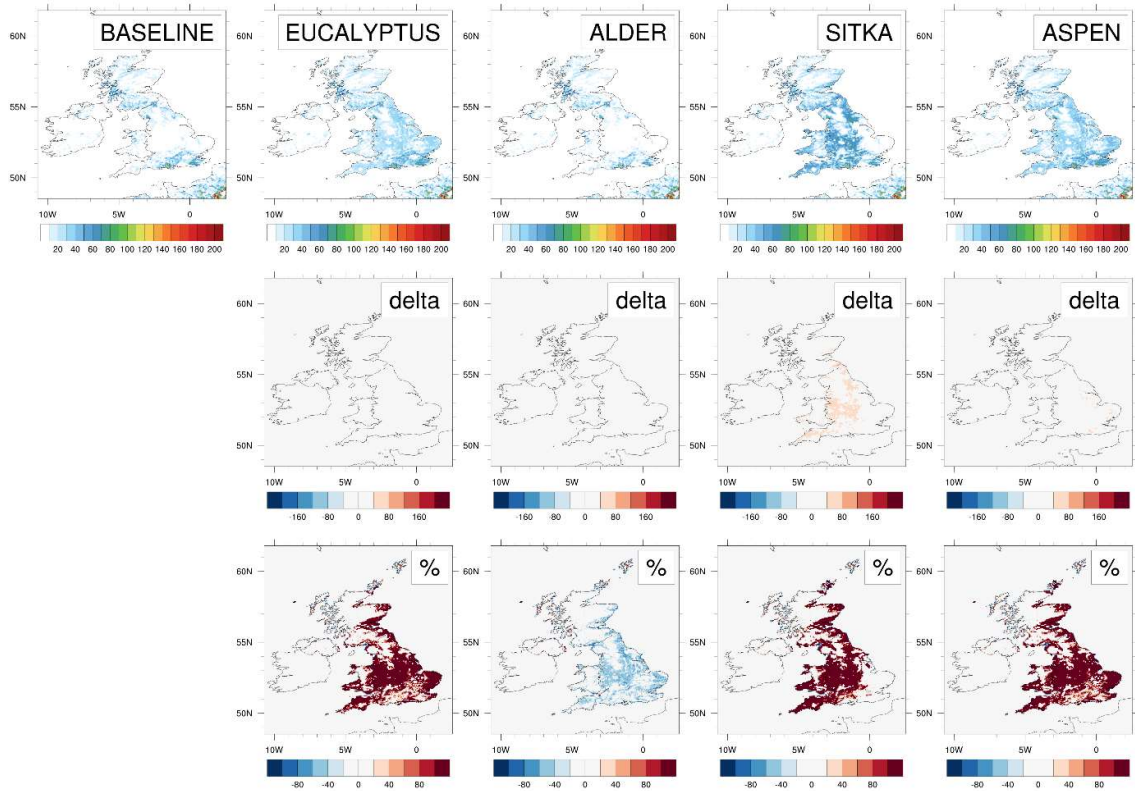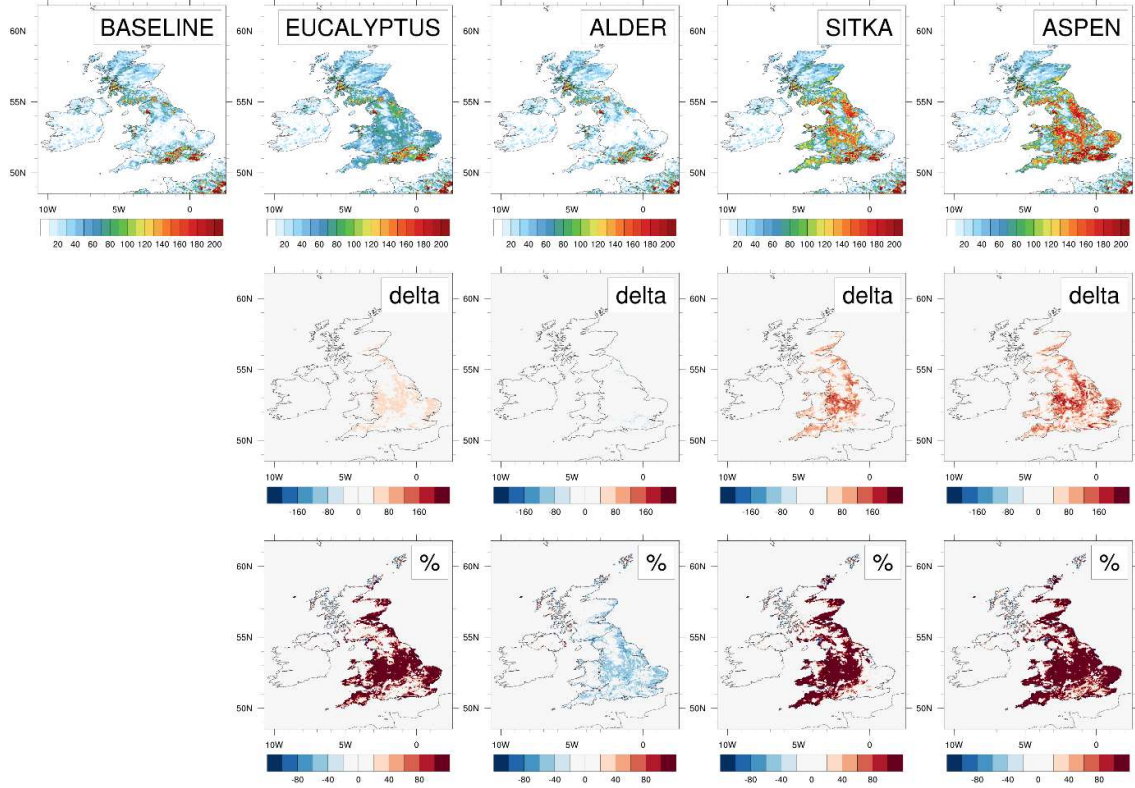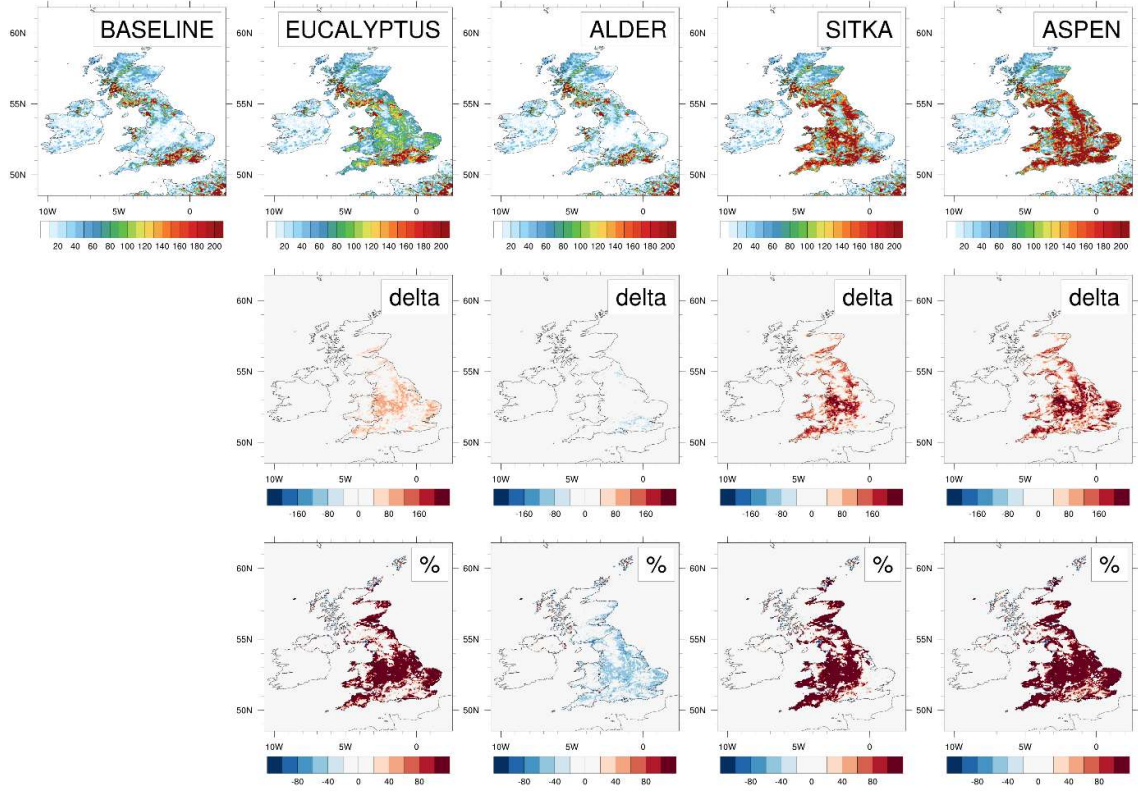
Jan 2018

Feb 2018

Mar 2018

Apr 2018

May 2018

Jun 2018

Jul 2018

Aug 2018

Sep 2018

Oct 2018

Nov 2018

Dec 2018

Table S1. EMEP4UK (2018) model runs for baseline and 4 planting scenarios showing monthly isoprene emissions for UK

Isoprene (kt)

	Baseline	Alder	Aspen	Eucalyptus	Spruce
Jan	0.55	0.46	1.35	0.84	1.06
Feb	0.73	0.63	1.67	1.07	1.35
Mar	1.33	1.15	3.1	1.98	2.48
Apr	2.66	2.33	5.43	4.73	5.93
May	8.67	7.55	19.95	12.89	16.03
Jun	12.76	11.14	28.98	18.73	23.37
Jul	17.08	14.55	41.26	25.96	31.86
Aug	10.53	8.93	26.14	16.28	19.89
Sep	5.74	4.89	13.88	8.74	10.78
Oct	2.18	1.89	4.59	3.95	4.93
Nov	1.13	0.97	2.7	1.7	2.11
Dec	0.53	0.44	1.29	0.8	1.01

Figure S2. EMEP4UK (2018) model runs for 4 planting scenarios showing total monoterpene emissions (top row), the difference in emissions between planting scenario and base case (middle row) and the percentage difference in emissions between planting scenarios and base case (bottom row)
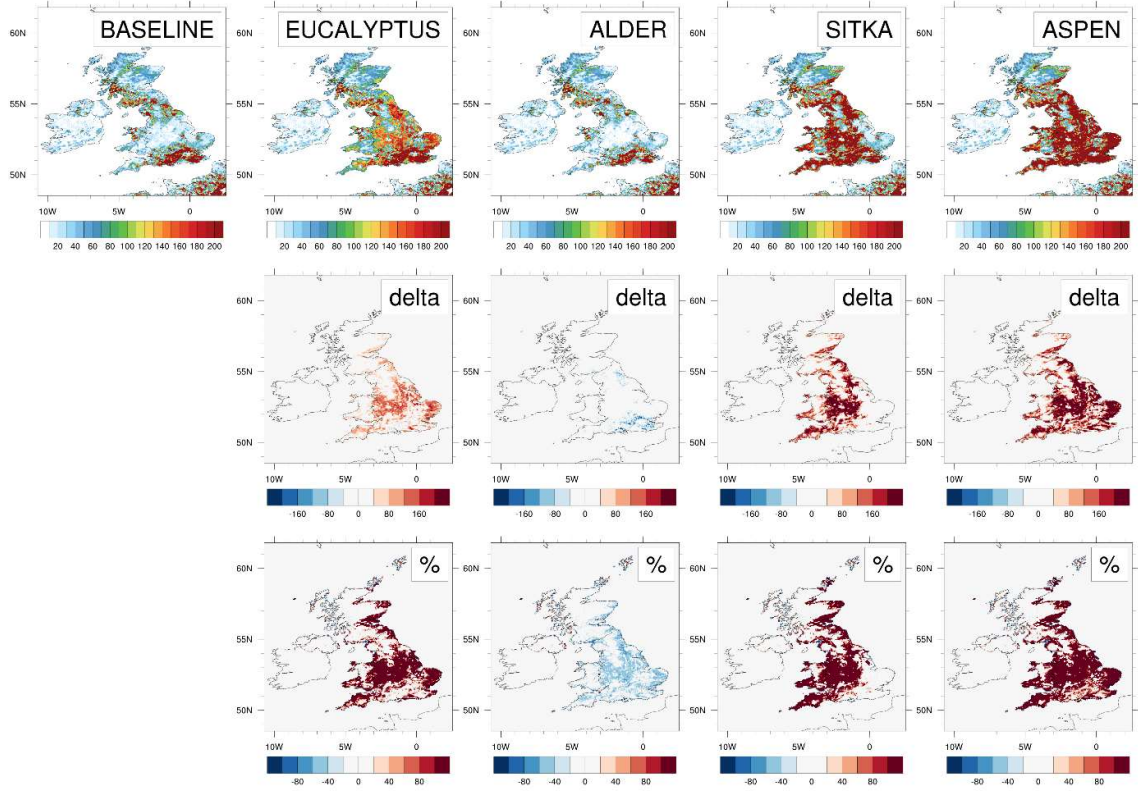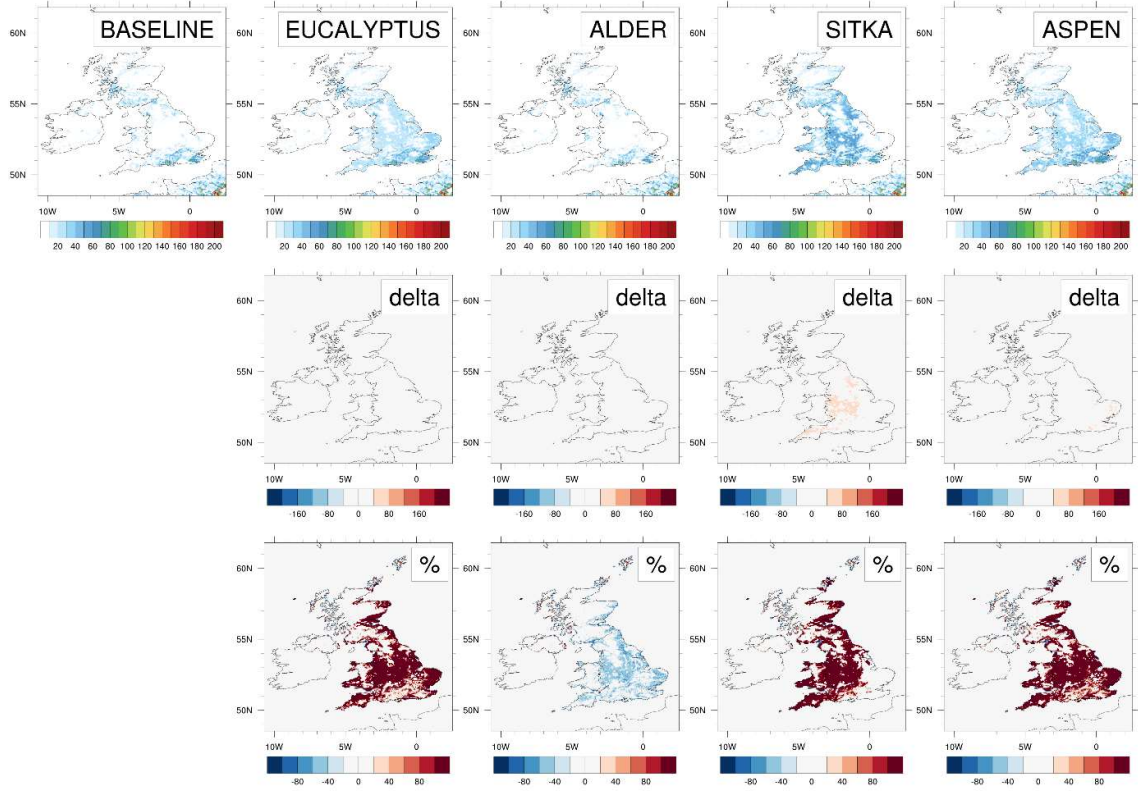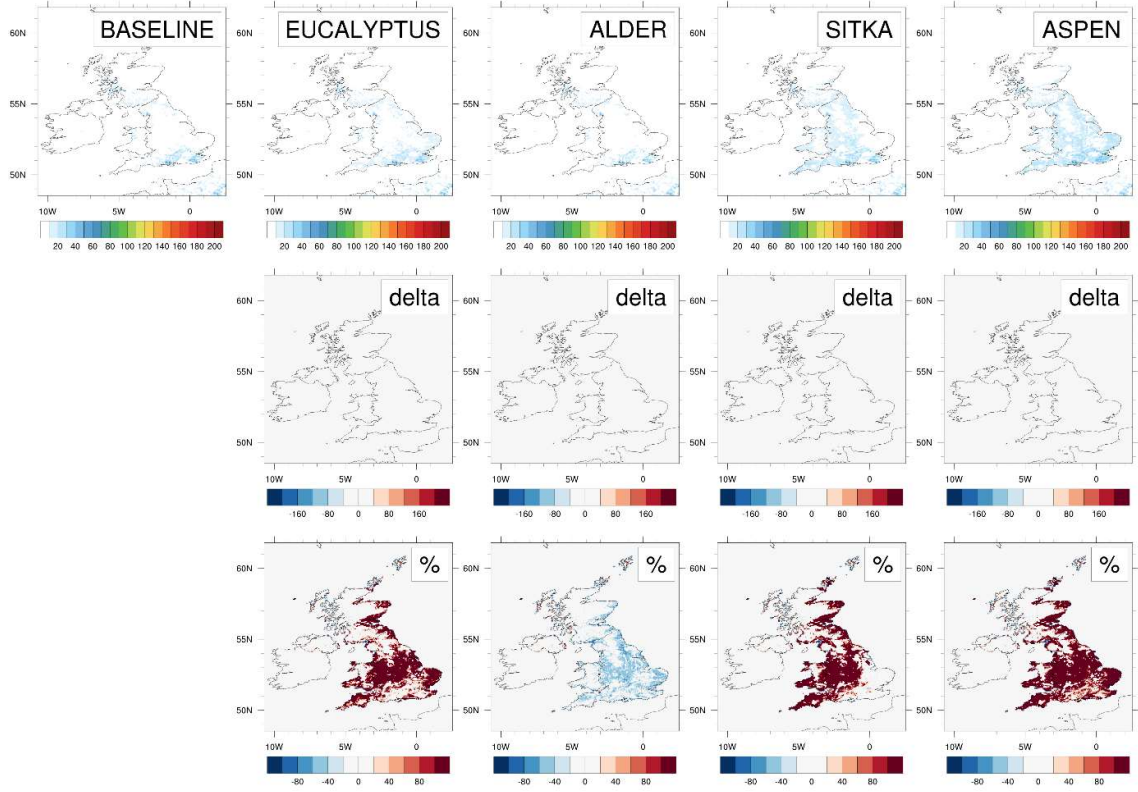
Jan 2018

Feb 2018

Mar 2018

Apr 2018

May 2018

Jun 2018

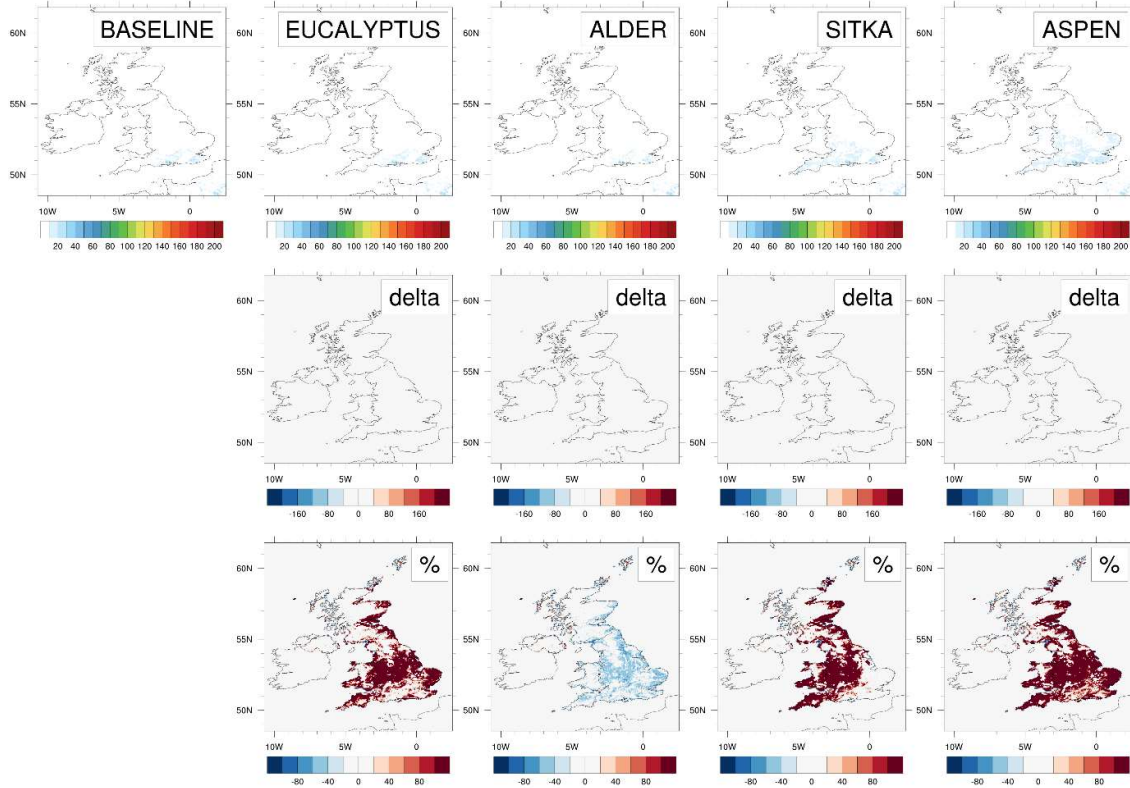Jul 2018

Aug 2018

Sep 2018

Oct 2018

Nov 2018

Dec 2018

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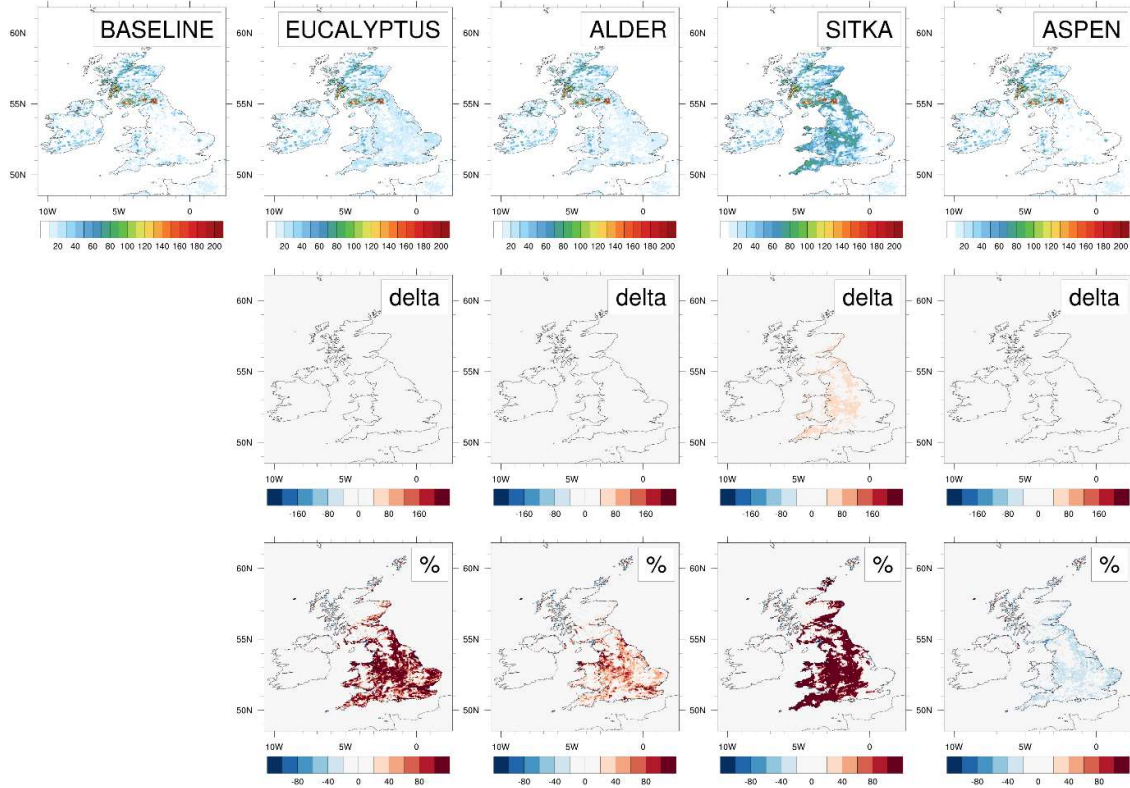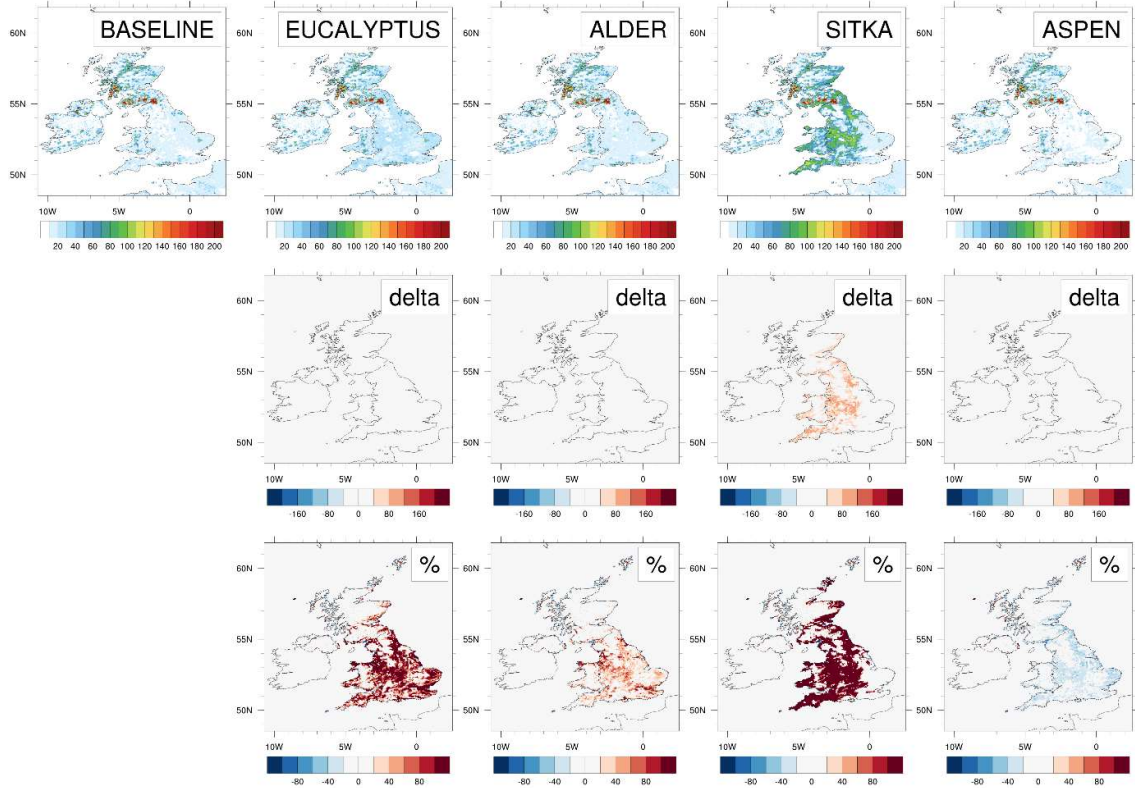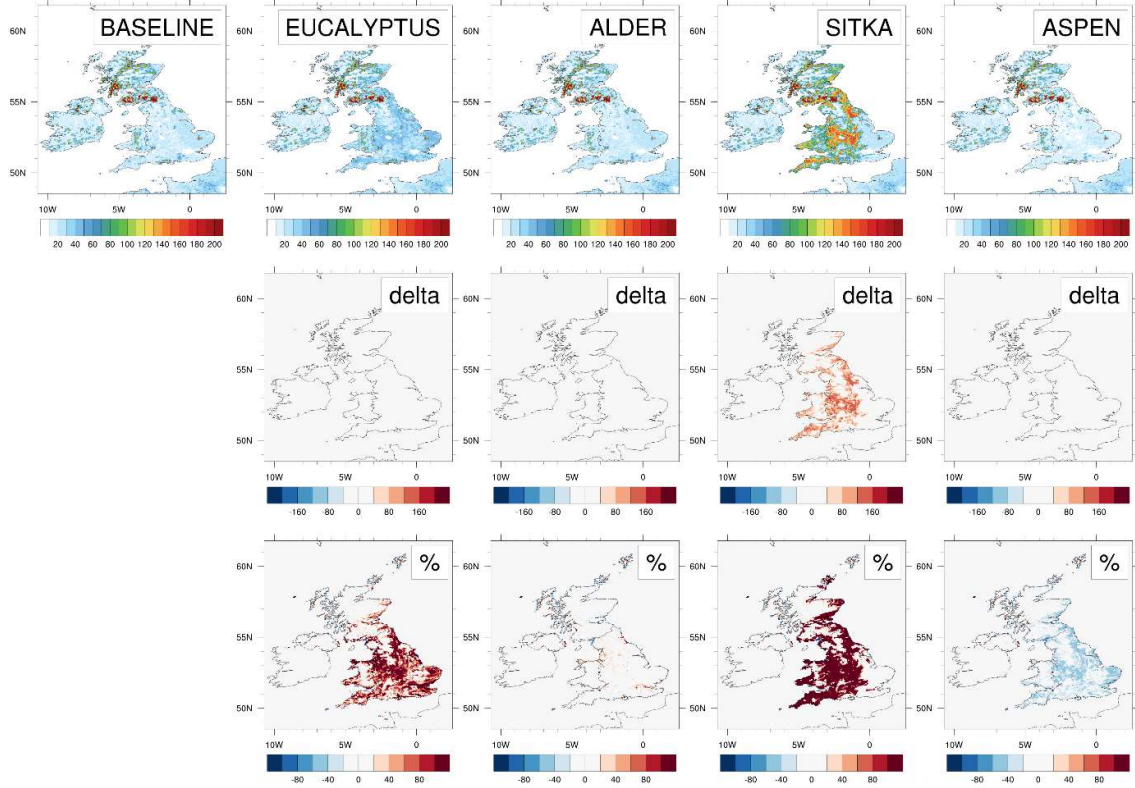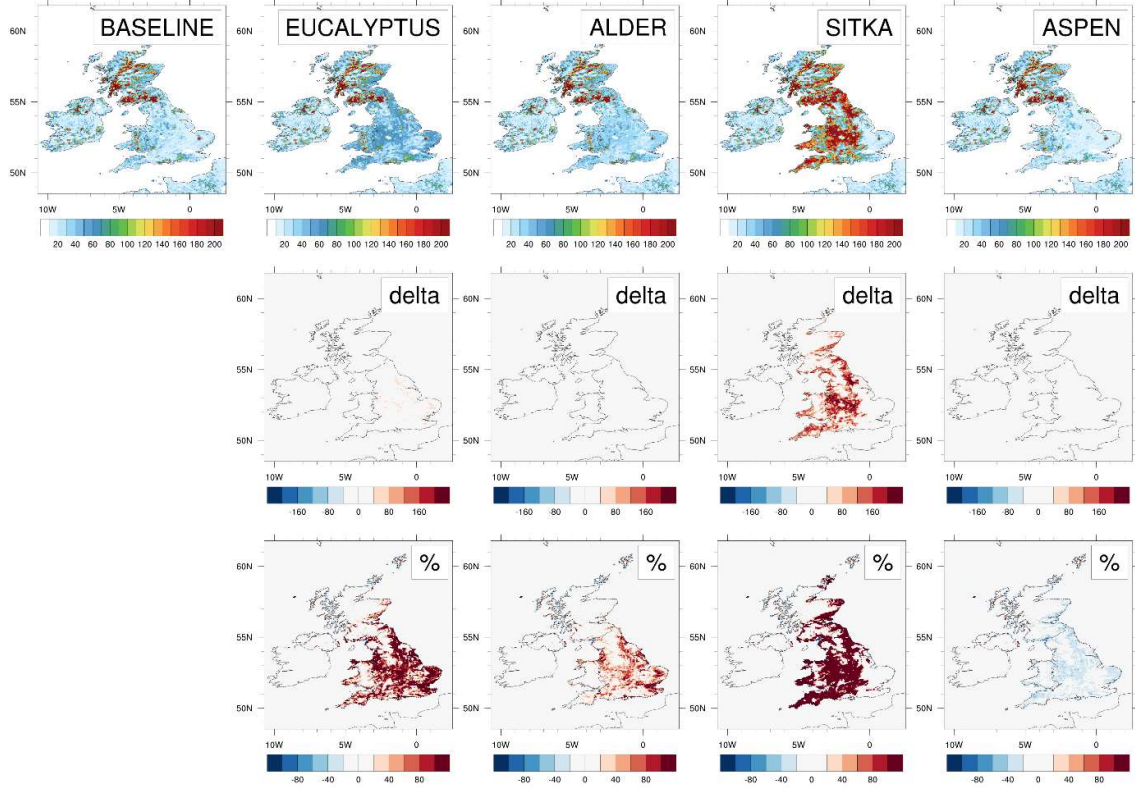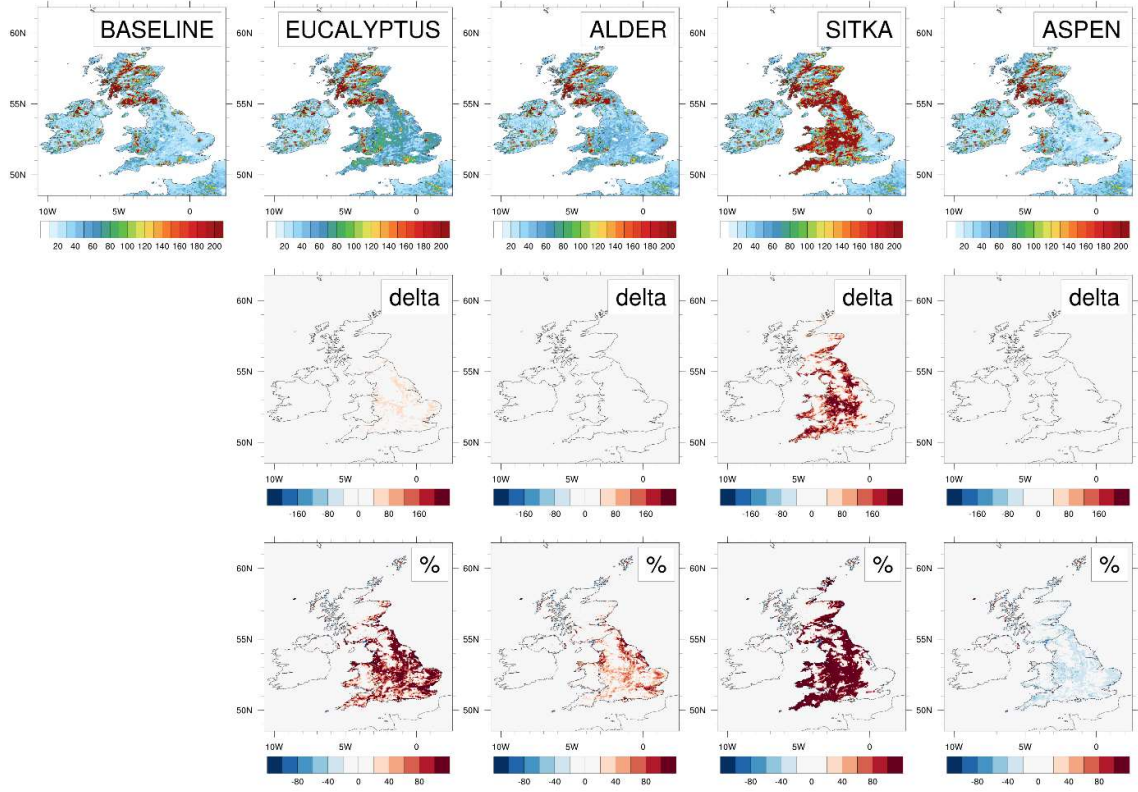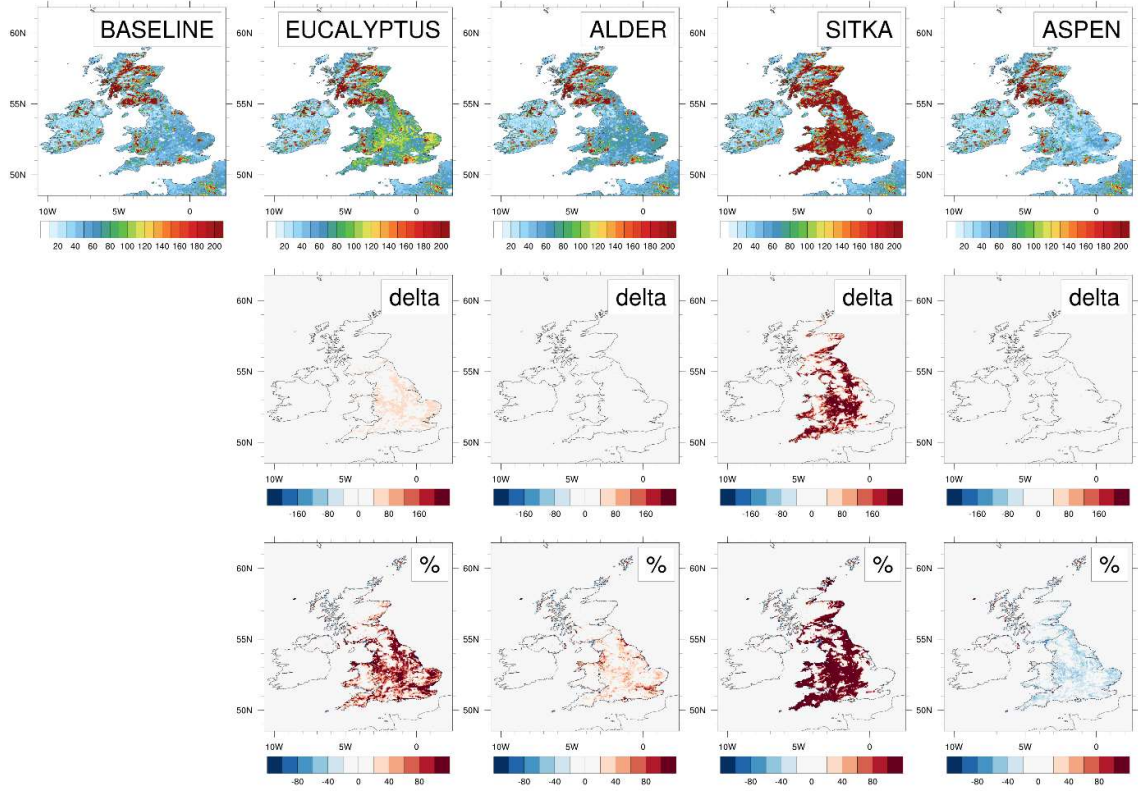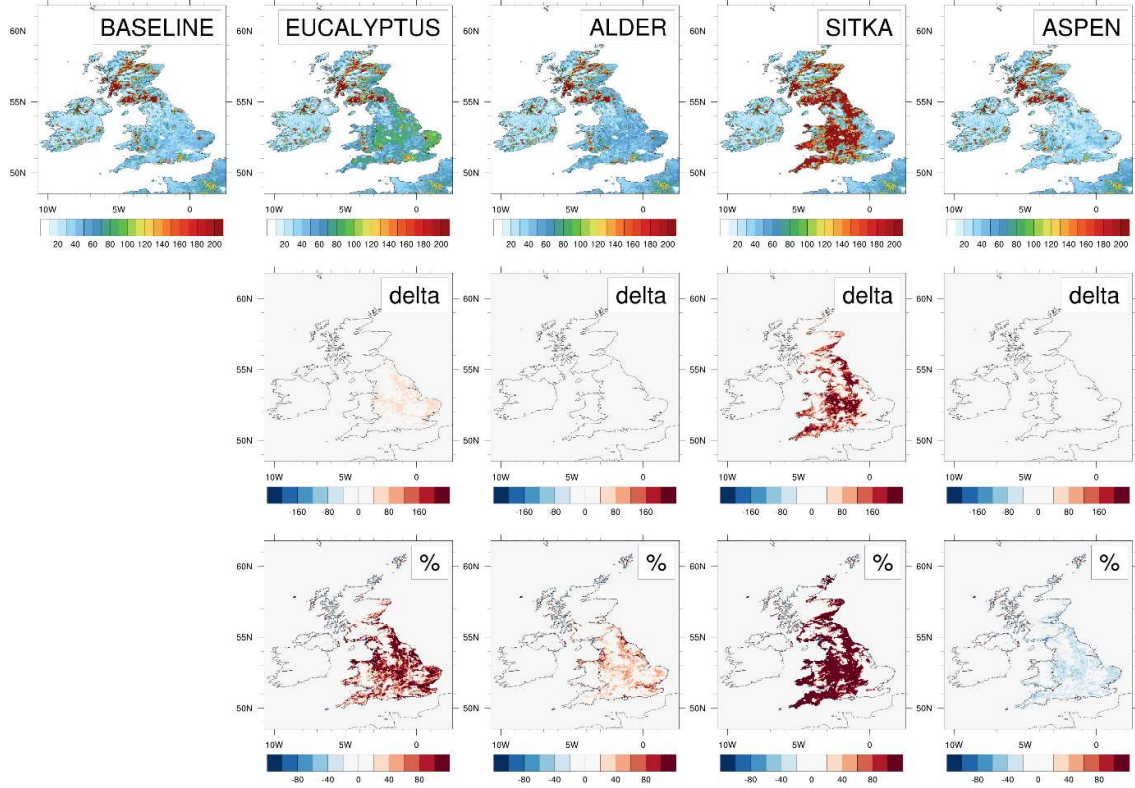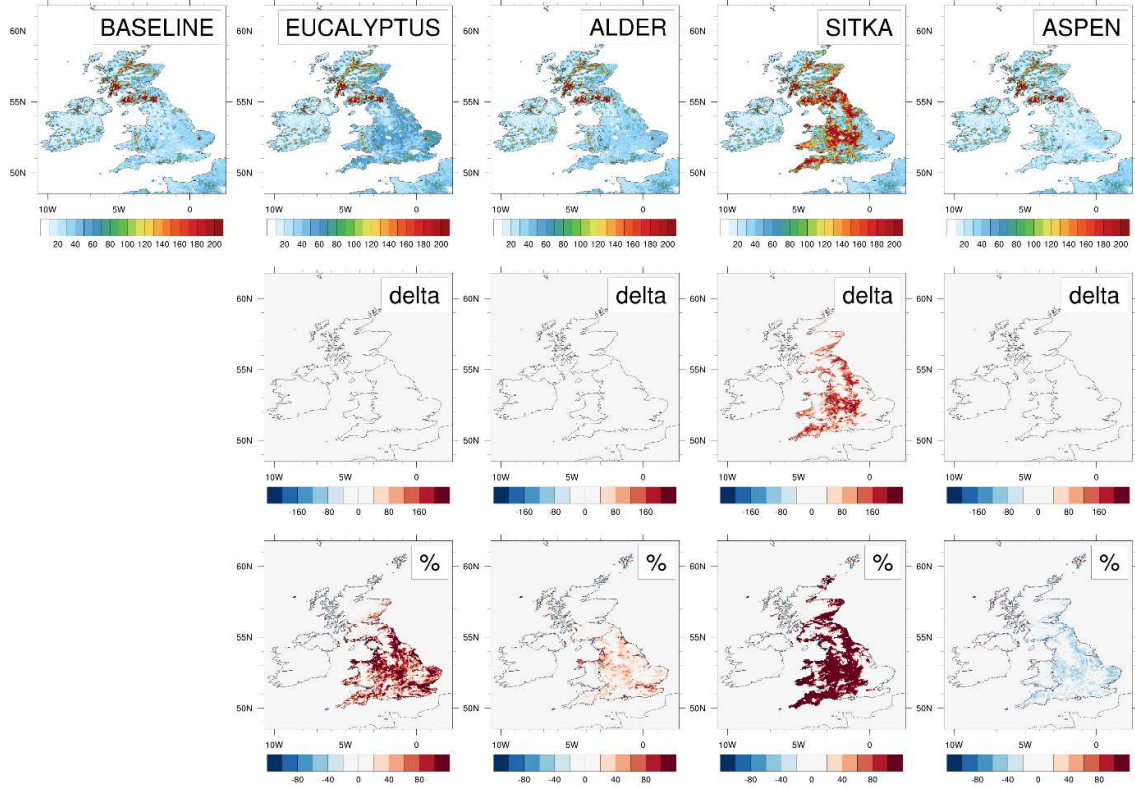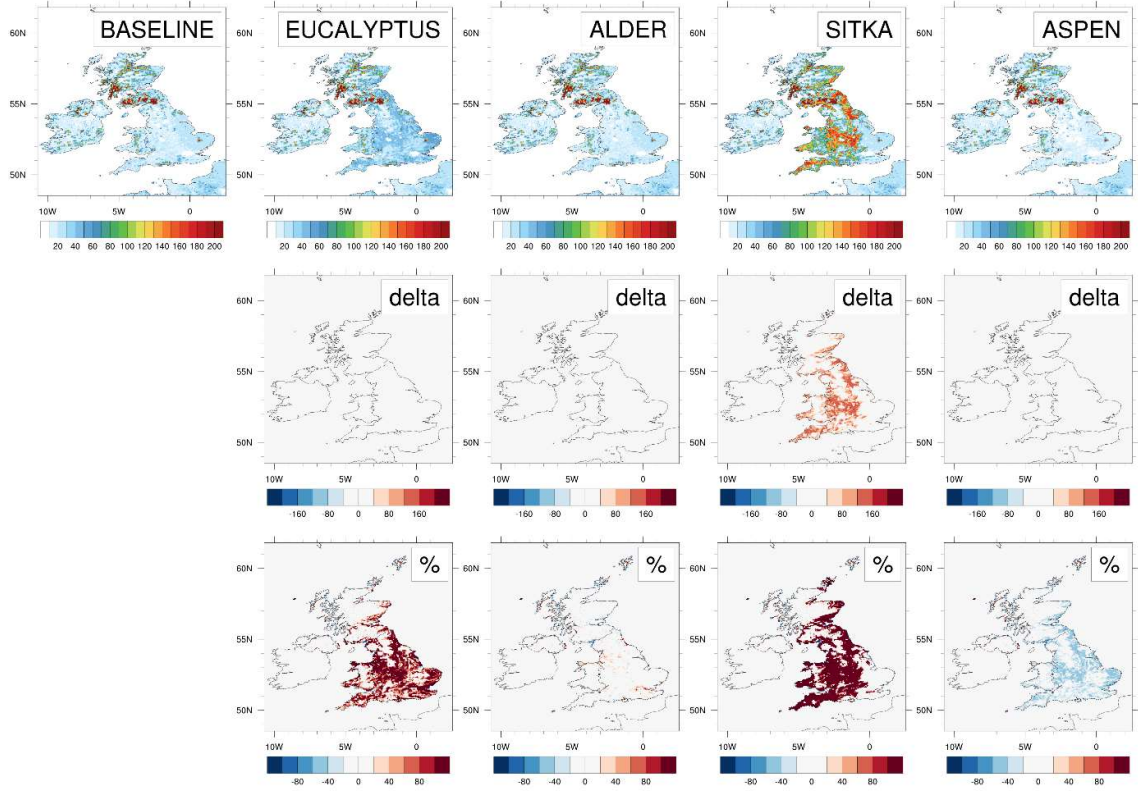
Total monoterpene (kt)

	Baseline	Alder	Aspen	Eucalyptus	Spruce
Jan	4.97	5.44	4.66	6.36	10.43
Feb	4.34	4.66	4.04	5.36	8.58
Mar	5.54	5.91	5.11	6.8	10.86
Apr	8.18	8.17	7.36	10	15.91
May	12.69	13.52	11.81	15.49	24.18
Jun	16.26	17.18	15.05	19.55	30.35
Jul	20.31	21.26	18.41	24.4	38.15
Aug	15.95	16.87	14.52	19.46	30.67
Sep	11.73	12.33	10.65	14.21	22.44
Oct	8.76	8.72	7.94	10.91	17.44
Nov	6.49	7.02	6.05	8.12	13.07
Dec	5.55	6.1	5.21	7.13	11.77

Table S3. EMEP4UK (2018) model runs for baseline and 4 planting scenarios showing monthly ozone concentrations for UK

UK mean ozone concentrations (ppb)

	Baseline	Alder	Aspen	Eucalyptus	Spruce
Jan	26.72	27.10	27.13	27.16	26.84
Feb	30.24	30.73	30.77	30.79	30.41
Mar	35.17	35.44	35.50	35.46	35.11
Apr	38.16	38.93	39.05	38.86	38.48
May	39.35	39.28	39.37	40.62	40.23
Jun	34.15	34.35	34.72	35.94	35.60
Jul	31.74	32.15	32.70	33.81	33.45
Aug	28.58	28.67	28.80	29.90	29.46
Sep	29.72	29.84	29.85	30.90	30.36
Oct	26.62	27.30	27.32	27.48	27.06
Nov	22.47	23.06	23.10	23.05	22.73
Dec	22.39	22.93	22.97	22.93	22.61

Table S4. EMEP4UK (2018) model runs for baseline and 4 planting scenarios showing monthly PM$_{2.5}$ concentrations for UK

UK mean baseline PM2.5 concentrations (µg m^{-3})

	Baseline	Alder	Aspen	Eucalyptus	Spruce
Jan	6.98	6.71	6.70	6.65	6.71
Feb	6.39	6.18	6.16	6.12	6.16
Mar	8.26	7.94	7.92	7.84	7.92
Apr	9.85	9.28	9.22	9.09	9.33
May	9.02	7.90	7.59	8.18	8.53
Jun	6.17	5.56	5.34	5.79	6.05
Jul	4.35	3.95	3.79	4.14	4.45
Aug	3.14	2.90	2.81	2.99	3.13
Sep	3.93	3.55	3.45	3.69	3.83
Oct	6.69	6.37	6.29	6.35	6.45
Nov	11.65	11.36	11.34	11.25	11.30
Dec	8.11	7.87	7.84	7.79	7.85

Table S5.. EMEP4UK (2018) model runs for baseline and 4 planting scenarios showing monthly SOA concentrations for UK

UK mean SOA concentrations (µg m^{-3})

month	Baseline	Alder	Aspen	Eucalyptus	Spruce
Jan	0.001	0.001	0.001	0.001	0.001
Feb	0.001	0.001	0.001	0.001	0.002
Mar	0.004	0.004	0.004	0.005	0.007
Apr	0.055	0.053	0.051	0.057	0.072
May	0.321	0.288	0.267	0.318	0.366
Jun	0.174	0.157	0.141	0.184	0.242
Jul	0.137	0.128	0.112	0.155	0.214
Aug	0.006	0.006	0.005	0.008	0.015
Sep	0.009	0.009	0.007	0.011	0.017
Oct	0.019	0.019	0.018	0.021	0.028
Nov	0.012	0.012	0.012	0.013	0.015
Dec	0.001	0.001	0.001	0.001	0.002

Table S6.. Uncertainties of isoprene (E_{iso}) and monoterpene (E_{mtp}) emissions used in the model scenarios for alder, aspen, sitka spruce and eucalyptus and taken from experimental data in Purser et al, 2021.

Tree species	E_{iso} / µg C g_{dw}^{-1} h^{-1}	E_{mtp} / µg C g_{dw}^{-1} h^{-1}
Aspen	22.8 ±14.6	0.17 ±0.22
Alder	0.03 ±0.06	0.86 ±1.77
Eucalyptus	7.50 ±7.26	1.30 ±1.42
Sitka spruce	10.9 ±7.66	3.4 ±3.2