

## Article

# Global Atmospheric $\delta^{13}\text{CH}_4$ and $\text{CH}_4$ Trends for 2000–2020 from the Atmospheric Transport Model TM5 Using $\text{CH}_4$ from Carbon Tracker Europe– $\text{CH}_4$ Inversions

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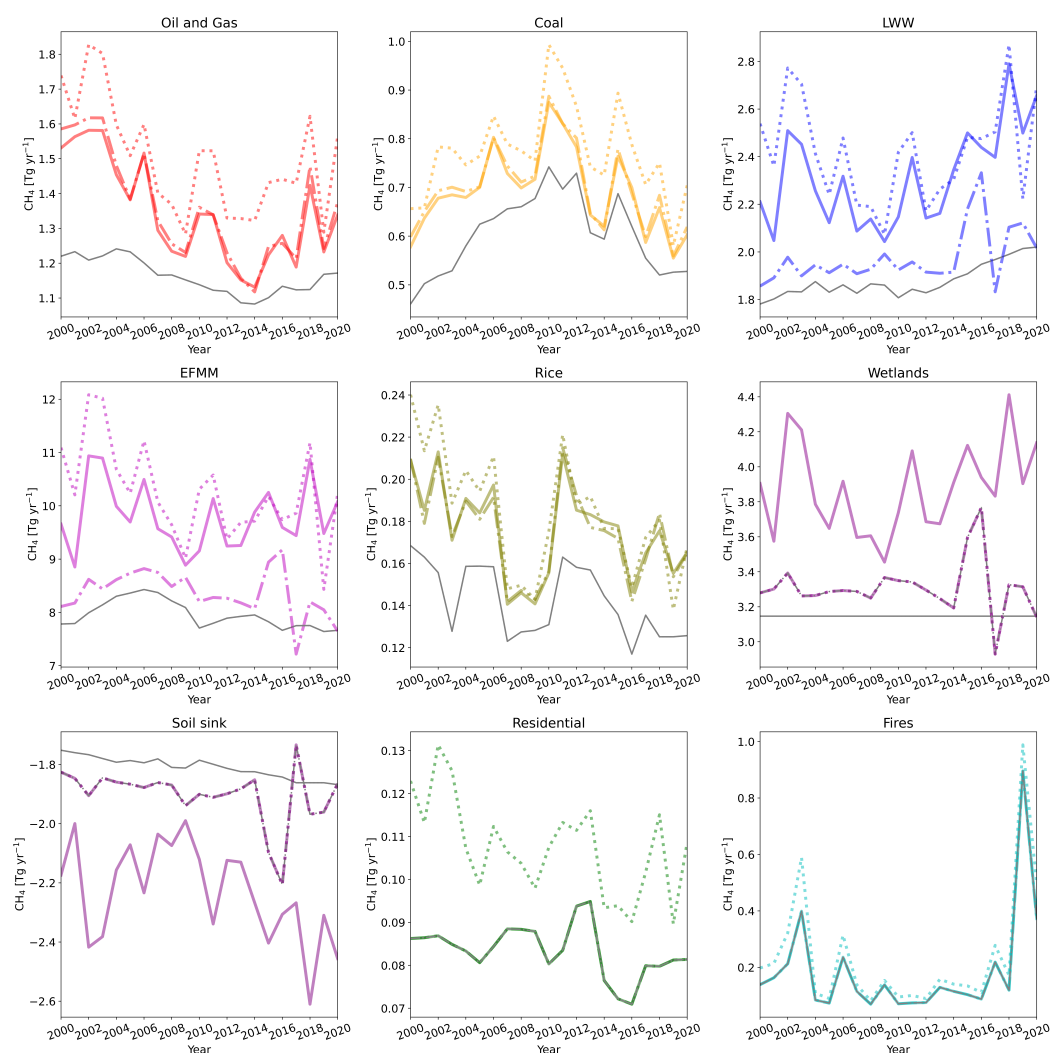
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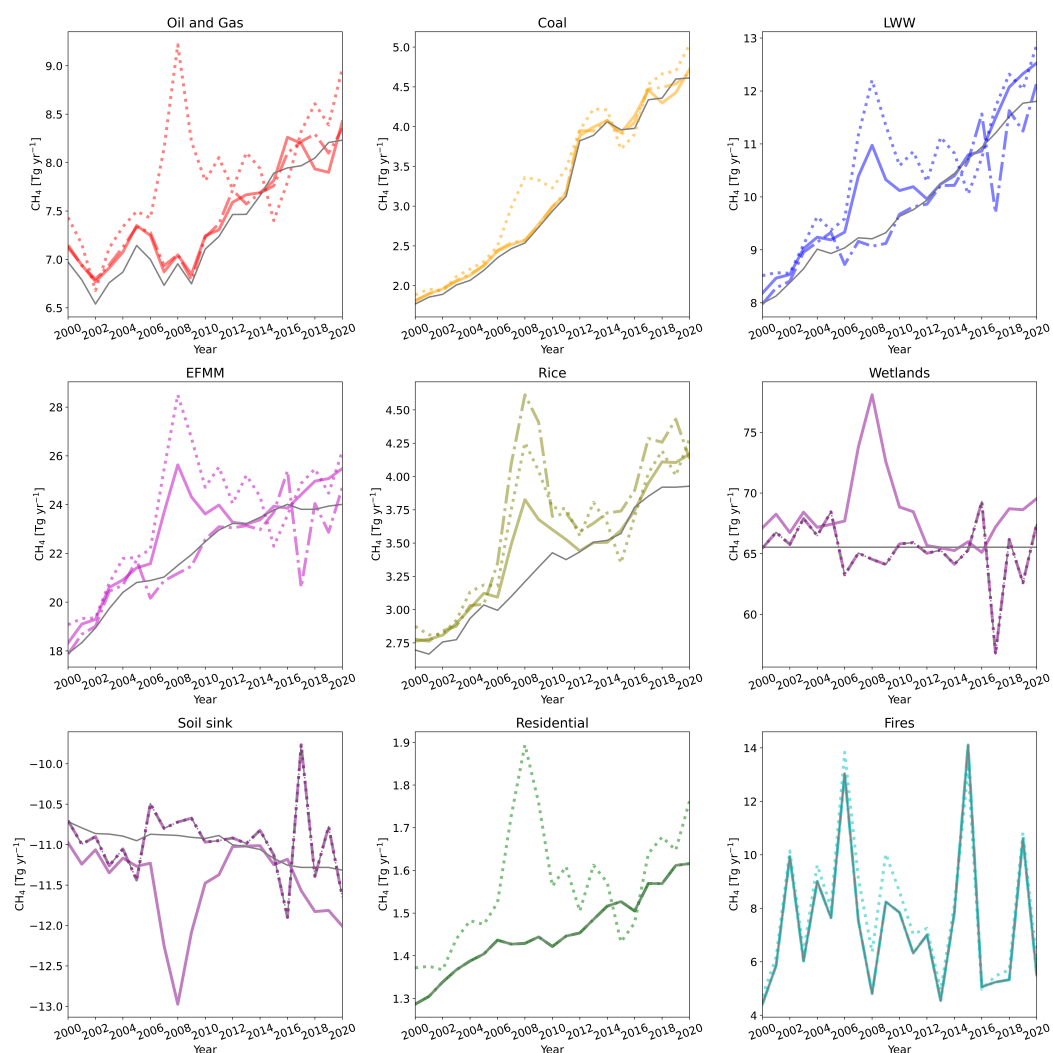
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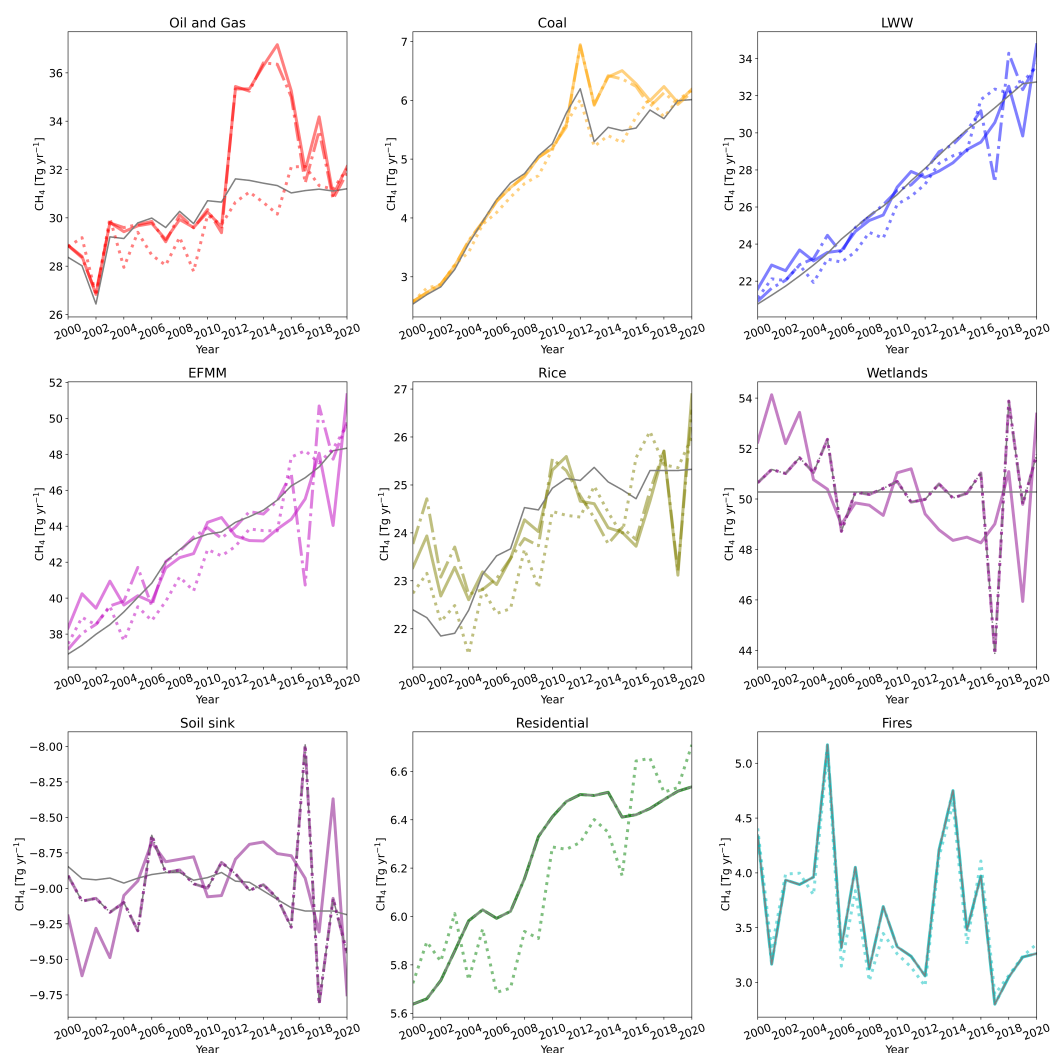
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**Figure S1.** 90° S–30° S prior and posterior CH<sub>4</sub> emissions by sector. Solid lines are SET1, dash dot lines are SET2, and dotted are ORIG. Posterior emission are bolded, and prior emissions are presented in gray. For emissions from residential and fires, please note that priors (SET1, SET2 and ORIG) are the same as posteriors for SET1 and SET2.

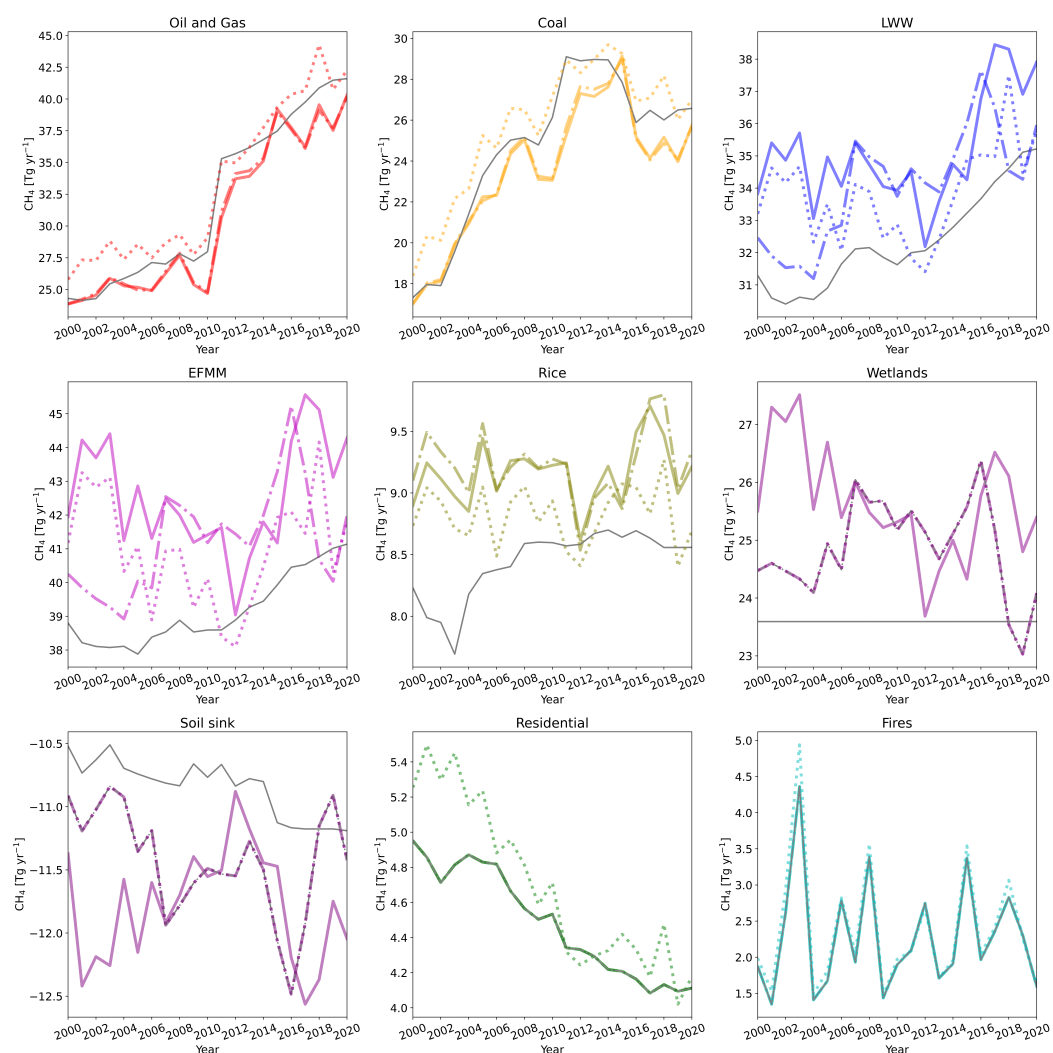


**Figure S2.** 30° S-EQ prior and posterior CH<sub>4</sub> emissions by sector. Solid lines are SET1, dash dot lines are SET2, and dotted are ORIG. Posterior emission are bolded, and prior emissions are presented in gray. For emissions from residential and fires, please note that priors (SET1, SET2 and ORIG) are the same as posteriors for SET1 and SET2.

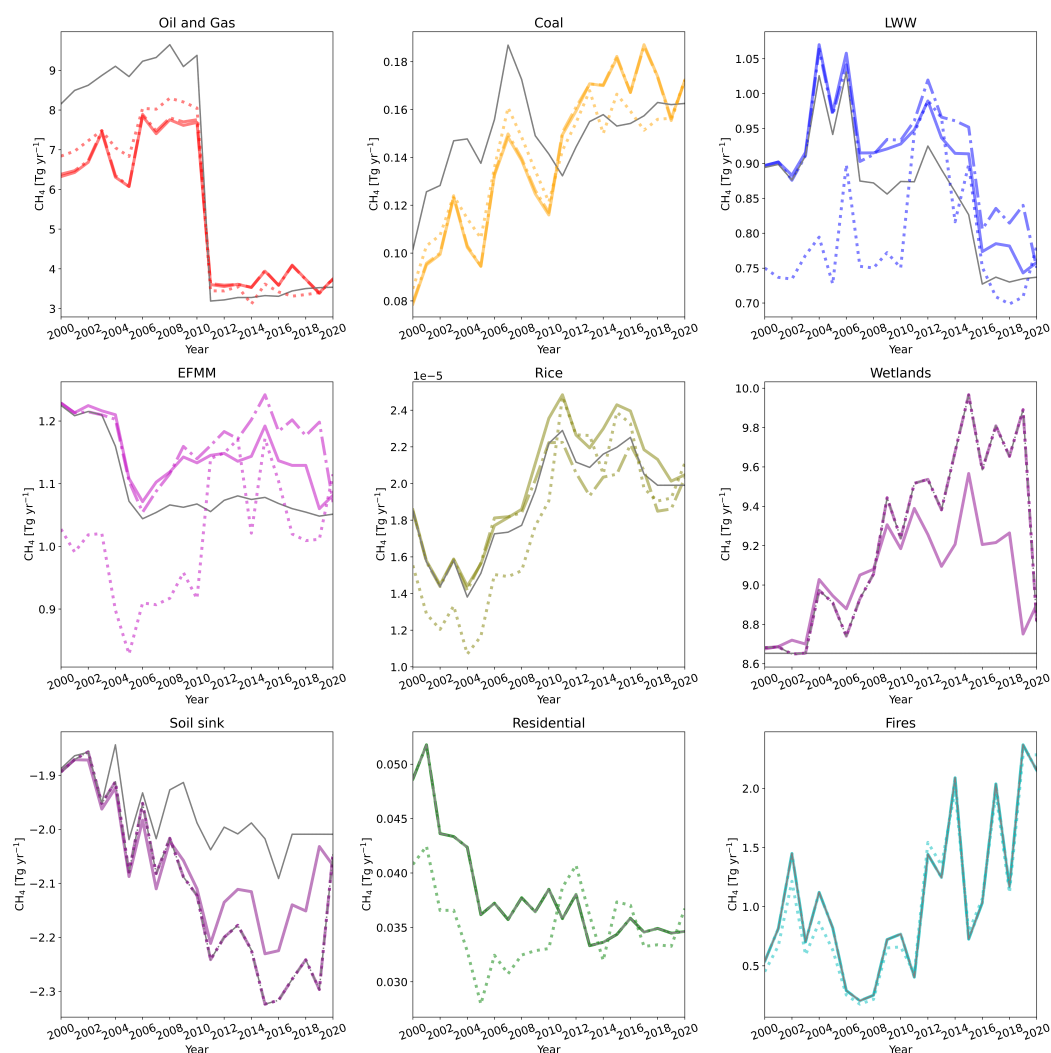


**Figure S3.** EQ-30° N prior and posterior  $\text{CH}_4$  emissions by sector. Solid lines are SET1, dash dot lines are SET2, and dotted are ORIG. Posterior emission are bolded, and prior emissions are presented in gray. For emissions from residential and fires, please note that priors (SET1, SET2 and ORIG) are the same as posteriors for SET1 and SET2.

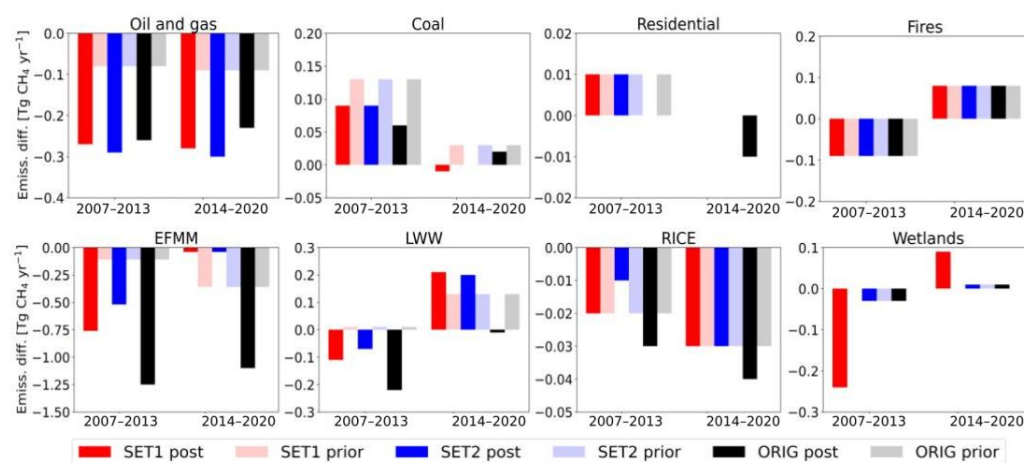




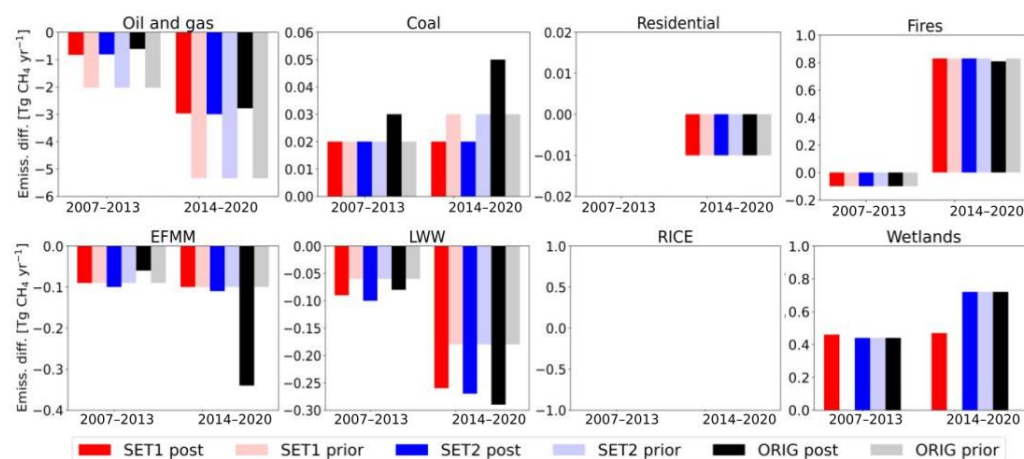
**Figure S4.** 30° N–60° N prior and posterior CH<sub>4</sub> emissions by sector. Solid lines are SET1, dash dot lines are SET2, and dotted are ORIG. Posterior emission are bolded, and prior emissions are presented in gray. For emissions from residential and fires, please note that priors (SET1, SET2 and ORIG) are the same as posteriors for SET1 and SET2.



**Figure S5.** 60° N–90° N prior and posterior CH<sub>4</sub> emissions by sector. Solid lines are SET1, dash dot lines are SET2, and dotted are ORIG. Posterior emission are bolded, and prior emissions are presented in gray. For emissions from residential and fires, please note that priors (SET1, SET2 and ORIG) are the same as posteriors for SET1 and SET2.



**Figure S6.** Difference in prior and posterior emissions at 90° S–30° S from three different inversions compared to the years 2000–2006.



**Figure S7.** Difference in prior and posterior emissions at 60° N–90° N from three different inversions compared to the years 2000–2006.

**Table S1.** List of stations.

Station	Station code	Country	Latitude	Longitude	Elevation [m a.s.l.]	intake height [m a. g.]
Alert	ALT	Nunavut, Canada	82.45° N	62.51° W	195	5
Terceira Island	AZR	Azores, Portugal	38.77° N	27.38° W	19	5
Tae-ahn Peninsula	TAP	Republic of Korea	36.74° N	126.13° E	16	5
Mt. Waliguan	WLG	Peoples Republic of China	36.29° N	100.90° E	3810	5
Cape Kumukahi	KUM	Hawaii, United States	19.56° N	154.89° W	3–8	3–5
Mauna Loa	MLO	Hawaii, United States	19.54° N	155.58° W	3397	5–40
Ascension Island	ASC	United Kingdom	7.97° S	14.4° W	85	5
Tutuila	SMO	American Samoa	14.25° S	170.56° W	42	5–18.3
Cape Grim	CGO	Tasmania, Australia	40.68° S	144.69° E	94	70

**Table S2.** Annual mean CH<sub>4</sub> emissions for 30° latitudinal bands during 2000–2020. Emissions are shown for the different simulations.

Source	Simulation	90° S–30° S	30° S–EQ	EQ–30° N	30° N–60° N	60° N–90° N	Global
LWW							
Posterior	SET1	2.25 ± 0.18	10.62 ± 0.80	26.86 ± 1.68	35.02 ± 1.25	0.86 ± 0.05	75.61 ± 0.92
	SET2	2.23 ± 0.16	10.73 ± 0.93	26.87 ± 1.90	35.21 ± 1.40	0.85 ± 0.07	75.89 ± 1.04
	ORIG	2.31 ± 0.16	10.53 ± 0.91	26.35 ± 1.53	33.34 ± 2.20	0.85 ± 0.13	73.37 ± 1.16
Prior	SET1	1.88 ± 0.19	9.80 ± 0.79	26.82 ± 1.83	32.34 ± 1.70	0.86 ± 0.05	71.70 ± 1.07
	SET2	1.88 ± 0.17	9.80 ± 0.96	26.82 ± 2.06	32.34 ± 1.88	0.86 ± 0.08	71.70 ± 1.21
	ORIG	1.88 ± 0.17	9.80 ± 0.92	26.82 ± 1.85	32.34 ± 2.33	0.86 ± 0.15	71.70 ± 1.28
EFMM							
Posterior	SET1	9.93 ± 0.78	24.54 ± 1.84	43.98 ± 2.74	42.90 ± 1.53	1.10 ± 0.06	122.46 ± 1.55
	SET2	9.84 ± 0.70	24.75 ± 2.12	44.02 ± 3.11	43.16 ± 1.72	1.10 ± 0.09	122.87 ± 1.74
	ORIG	10.18 ± 0.69	24.38 ± 2.11	43.30 ± 2.50	41.90 ± 2.77	1.07 ± 0.16	120.83 ± 1.80
Prior	SET1	7.96 ± 0.79	21.91 ± 1.77	42.95 ± 2.91	39.15 ± 2.05	1.10 ± 0.07	113.07 ± 1.69
	SET2	7.96 ± 0.71	21.91 ± 2.14	42.95 ± 3.29	39.15 ± 2.28	1.10 ± 0.10	113.07 ± 1.90
	ORIG	7.96 ± 0.73	21.91 ± 2.05	42.95 ± 2.95	39.15 ± 2.81	1.10 ± 0.18	113.07 ± 1.91
RICE							
Posterior	SET1	0.17 ± 0.01	3.17 ± 0.24	23.16 ± 1.44	8.96 ± 0.32	0.00 ± 0.00	35.46 ± 0.61
	SET2	0.17 ± 0.01	3.16 ± 0.28	22.94 ± 1.62	9.02 ± 0.36	0.00 ± 0.00	35.29 ± 0.69
	ORIG	0.18 ± 0.01	3.12 ± 0.27	22.29 ± 1.29	8.24 ± 0.54	0.00 ± 0.00	33.81 ± 0.58
Prior	SET1	0.14 ± 0.01	3.32 ± 0.27	24.12 ± 1.63	8.43 ± 0.44	0.00 ± 0.00	36.02 ± 0.70
	SET2	0.14 ± 0.01	3.32 ± 0.33	24.12 ± 1.85	8.43 ± 0.49	0.00 ± 0.00	36.02 ± 0.79
	ORIG	0.14 ± 0.01	3.32 ± 0.31	24.12 ± 1.65	8.43 ± 0.61	0.00 ± 0.00	36.02 ± 0.73
Soil sink							
Posterior	SET1	-2.30 ± 0.18	-12.59 ± 0.94	-8.98 ± 0.56	-11.40 ± 0.41	-2.01 ± 0.11	-37.29 ± 0.49
	SET2	-1.85 ± nan	-10.82 ± nan	-8.83 ± nan	-10.64 ± nan	-1.97 ± nan	-34.11 ± nan
	ORIG	-1.85 ± 0.47	-10.82 ± 1.06	-8.83 ± 0.71	-10.64 ± 0.64	-1.97 ± 0.12	-34.11 ± 0.65
Prior	SET1	-1.81 ± 0.18	-11.01 ± 0.89	-8.99 ± 0.61	-10.85 ± 0.57	-1.97 ± 0.12	-34.62 ± 0.51
	SET2	-1.85 ± 0.00	-10.82 ± nan	-8.83 ± nan	-10.64 ± nan	-1.97 ± nan	-34.11 ± 0.00
	ORIG	-1.81 ± 0.49	-11.01 ± 1.08	-8.99 ± 0.73	-10.85 ± 0.70	-1.97 ± 0.13	-34.62 ± 0.67
Termites							
Posterior	SET1	0.53 ± nan	4.18 ± nan	2.76 ± nan	2.43 ± nan	0.00 ± nan	9.91 ± nan
	SET2	0.53 ± nan	4.18 ± nan	2.76 ± nan	2.43 ± nan	0.00 ± nan	9.91 ± nan
	ORIG	0.53 ± nan	4.18 ± nan	2.76 ± nan	2.43 ± nan	0.00 ± nan	9.91 ± nan
Prior	SET1	0.53 ± nan	4.18 ± nan	2.76 ± nan	2.43 ± nan	0.00 ± nan	9.91 ± nan
	SET2	0.53 ± nan	4.18 ± nan	2.76 ± nan	2.43 ± nan	0.00 ± nan	9.91 ± nan
	ORIG	0.53 ± nan	4.18 ± nan	2.76 ± nan	2.43 ± nan	0.00 ± nan	9.91 ± nan
Ocean							
Posterior	SET1	0.65 ± nan	2.95 ± nan	3.79 ± nan	1.90 ± nan	2.19 ± nan	11.48 ± nan
	SET2	0.65 ± nan	2.95 ± nan	3.79 ± nan	1.90 ± nan	2.19 ± nan	11.48 ± nan
	ORIG	0.65 ± nan	2.95 ± nan	3.79 ± nan	1.90 ± nan	2.19 ± nan	11.48 ± nan
Prior	SET1	0.65 ± nan	2.95 ± nan	3.79 ± nan	1.90 ± nan	2.19 ± nan	11.48 ± nan
	SET2	0.65 ± nan	2.95 ± nan	3.79 ± nan	1.90 ± nan	2.19 ± nan	11.48 ± nan
	ORIG	0.65 ± nan	2.95 ± nan	3.79 ± nan	1.90 ± nan	2.19 ± nan	11.48 ± nan
Wetlands							
Posterior	SET1	3.88 ± 0.31	67.68 ± 5.06	49.96 ± 3.11	25.18 ± 0.89	9.09 ± 0.50	155.79 ± 2.47
	SET2	3.24 ± nan	64.44 ± nan	49.59 ± nan	23.79 ± nan	8.95 ± nan	150.00 ± nan
	ORIG	3.24 ± 0.83	64.44 ± 6.32	49.59 ± 3.99	23.79 ± 1.43	8.95 ± 0.54	150.00 ± 3.15
Prior	SET1	3.15 ± 0.31	65.53 ± 5.28	50.28 ± 3.40	23.59 ± 1.23	8.65 ± 0.52	151.20 ± 2.63
	SET2	3.24 ± 0.00	64.44 ± nan	49.59 ± nan	23.79 ± nan	8.95 ± nan	150.00 ± 0.00
	ORIG	3.15 ± 0.85	65.53 ± 6.43	50.28 ± 4.06	23.59 ± 1.51	8.65 ± 0.55	151.20 ± 3.21
Oil and gas							
Posterior	SET1	1.35 ± 0.23	7.40 ± 1.16	31.94 ± 3.38	34.10 ± 4.19	5.43 ± 1.26	80.22 ± 2.31
	SET2	1.36 ± 0.23	7.42 ± 1.16	31.84 ± 3.38	34.11 ± 4.18	5.46 ± 1.26	80.19 ± 2.31
	ORIG	1.44 ± 0.10	7.51 ± 0.65	29.28 ± 1.69	33.48 ± 2.31	5.31 ± 0.93	77.03 ± 1.26
Prior	SET1	1.16 ± 0.23	7.32 ± 1.18	30.17 ± 3.38	31.98 ± 3.82	6.30 ± 1.74	76.93 ± 2.26
	SET2	1.16 ± 0.23	7.32 ± 1.18	30.17 ± 3.38	31.98 ± 3.82	6.30 ± 1.74	76.93 ± 2.26
	ORIG	1.16 ± 0.11	7.32 ± 0.68	30.17 ± 2.06	31.98 ± 2.38	6.30 ± 1.36	76.93 ± 1.43

Table S2. Cont.

Source	Simulation	90° S–30° S	30° S–EQ	EQ–30° N	30° N–60° N	60° N–90° N	Global
Coal							
Posterior	SET1	0.69 ± 0.12	3.22 ± 0.55	4.48 ± 0.49	20.05 ± 2.41	0.15 ± 0.03	28.59 ± 1.03
	SET2	0.70 ± 0.12	3.23 ± 0.55	4.45 ± 0.49	20.19 ± 2.42	0.15 ± 0.03	28.73 ± 1.04
	ORIG	0.84 ± 0.06	3.23 ± 0.29	4.41 ± 0.26	23.81 ± 1.58	0.16 ± 0.02	32.45 ± 0.67
Prior	SET1	0.60 ± 0.12	3.12 ± 0.55	4.76 ± 0.56	24.67 ± 2.94	0.15 ± 0.03	33.31 ± 1.24
	SET2	0.60 ± 0.12	3.12 ± 0.55	4.76 ± 0.56	24.67 ± 2.94	0.15 ± 0.03	33.31 ± 1.24
	ORIG	0.60 ± 0.06	3.12 ± 0.31	4.76 ± 0.34	24.67 ± 1.82	0.15 ± 0.02	33.31 ± 0.77
Residential							
Posterior	SET1	0.08 ± nan	1.45 ± nan	6.22 ± nan	4.48 ± nan	0.04 ± nan	12.28 ± nan
	SET2	0.08 ± nan	1.45 ± nan	6.22 ± nan	4.48 ± nan	0.04 ± nan	12.28 ± nan
	ORIG	0.08 ± 0.01	1.44 ± 0.12	6.13 ± 0.35	4.46 ± 0.29	0.04 ± 0.01	12.15 ± 0.19
Prior	SET1	0.08 ± nan	1.45 ± nan	6.22 ± nan	4.48 ± nan	0.04 ± nan	12.28 ± nan
	SET2	0.08 ± nan	1.45 ± nan	6.22 ± nan	4.48 ± nan	0.04 ± nan	12.28 ± nan
	ORIG	0.08 ± 0.01	1.45 ± 0.14	6.22 ± 0.43	4.48 ± 0.32	0.04 ± 0.01	12.28 ± 0.22
Geological							
Posterior	SET1	0.54 ± nan	1.76 ± nan	2.80 ± nan	15.53 ± nan	2.37 ± nan	23.00 ± nan
	SET2	0.54 ± nan	1.76 ± nan	2.80 ± nan	15.53 ± nan	2.37 ± nan	23.00 ± nan
	ORIG	0.54 ± nan	1.76 ± nan	2.80 ± nan	15.53 ± nan	2.37 ± nan	23.00 ± nan
Prior	SET1	0.54 ± nan	1.76 ± nan	2.80 ± nan	15.53 ± nan	2.37 ± nan	23.00 ± nan
	SET2	0.54 ± nan	1.76 ± nan	2.80 ± nan	15.53 ± nan	2.37 ± nan	23.00 ± nan
	ORIG	0.54 ± nan	1.76 ± nan	2.80 ± nan	15.53 ± nan	2.37 ± nan	23.00 ± nan
Fires							
Posterior	SET1	0.19 ± nan	7.42 ± nan	3.67 ± nan	2.27 ± nan	1.06 ± nan	14.61 ± nan
	SET2	0.19 ± nan	7.42 ± nan	3.67 ± nan	2.27 ± nan	1.06 ± nan	14.61 ± nan
	ORIG	0.19 ± 0.02	7.33 ± 0.71	3.63 ± 0.21	2.22 ± 0.15	1.04 ± 0.14	14.40 ± 0.32
Prior	SET1	0.19 ± nan	7.42 ± nan	3.67 ± nan	2.27 ± nan	1.06 ± nan	14.61 ± nan
	SET2	0.19 ± nan	7.42 ± nan	3.67 ± nan	2.27 ± nan	1.06 ± nan	14.61 ± nan
	ORIG	0.19 ± 0.02	7.42 ± 0.77	3.67 ± 0.25	2.27 ± 0.17	1.06 ± 0.16	14.61 ± 0.34

**Table S3.** Posterior mean emissions for 30 degree latitudinal bands for different time periods. Emissions are shown for the different simulations. Prior mean emissions are shown in *italic*.

Lat. band	Category	2000–2006			2007–2013			2014–2020		
90S–30S		SET1	SET2	ORIG	SET1	SET2	ORIG	SET1	SET2	ORIG
	LWW	2.22 ± 0.13 <i>1.83 ± 0.13</i>	2.19 ± 0.11 <i>1.83 ± 0.12</i>	2.39 ± 0.11 <i>1.83 ± 0.12</i>	2.11 ± 0.12 <i>1.84 ± 0.13</i>	2.12 ± 0.11 <i>1.84 ± 0.12</i>	2.17 ± 0.11 <i>1.84 ± 0.12</i>	2.43 ± 0.13 <i>1.96 ± 0.14</i>	2.39 ± 0.11 <i>1.96 ± 0.12</i>	2.38 ± 0.11 <i>1.96 ± 0.13</i>
	EFMM	10.20 ± 0.58 <i>8.11 ± 0.57</i>	10.02 ± 0.52 <i>8.11 ± 0.52</i>	10.96 ± 0.52 <i>8.11 ± 0.53</i>	9.44 ± 0.55 <i>8.00 ± 0.56</i>	9.50 ± 0.49 <i>8.00 ± 0.51</i>	9.71 ± 0.48 <i>8.00 ± 0.52</i>	10.16 ± 0.54 <i>7.75 ± 0.55</i>	9.98 ± 0.47 <i>7.75 ± 0.49</i>	9.86 ± 0.47 <i>7.75 ± 0.50</i>
	RICE	0.19 ± 0.01 <i>0.16 ± 0.01</i>	0.18 ± 0.01 <i>0.16 ± 0.01</i>	0.20 ± 0.01 <i>0.16 ± 0.01</i>	0.17 ± 0.01 <i>0.14 ± 0.01</i>	0.17 ± 0.01 <i>0.14 ± 0.01</i>	0.17 ± 0.01 <i>0.14 ± 0.01</i>	0.16 ± 0.01 <i>0.13 ± 0.01</i>	0.15 ± 0.01 <i>0.13 ± 0.01</i>	0.16 ± 0.01 <i>0.13 ± 0.01</i>
	Soil sink	-2.30 ± -0.13 <i>-1.78 ± -0.13</i>	-1.83 ± nan <i>-1.83 ± 0.00</i>	-1.83 ± -0.33 <i>-1.78 ± -0.33</i>	-2.13 ± -0.12 <i>-1.80 ± -0.13</i>	-1.82 ± nan <i>-1.82 ± 0.00</i>	-1.82 ± -0.33 <i>-1.80 ± -0.34</i>	-2.47 ± -0.13 <i>-1.85 ± -0.13</i>	-1.90 ± nan <i>-1.90 ± 0.00</i>	-1.90 ± -0.35 <i>-1.85 ± -0.36</i>
	Termites	0.53 ± nan <i>0.53 ± nan</i>	0.53 ± nan <i>0.53 ± nan</i>	0.53 ± nan <i>0.53 ± nan</i>	0.53 ± nan <i>0.53 ± nan</i>	0.53 ± nan <i>0.53 ± nan</i>	0.53 ± nan <i>0.53 ± nan</i>	0.53 ± nan <i>0.53 ± nan</i>	0.53 ± nan <i>0.53 ± nan</i>	0.53 ± nan <i>0.53 ± nan</i>
	Ocean	0.65 ± nan <i>0.65 ± nan</i>	0.65 ± nan <i>0.65 ± nan</i>	0.65 ± nan <i>0.65 ± nan</i>	0.65 ± nan <i>0.65 ± nan</i>	0.65 ± nan <i>0.65 ± nan</i>	0.65 ± nan <i>0.65 ± nan</i>	0.65 ± nan <i>0.65 ± nan</i>	0.65 ± nan <i>0.65 ± nan</i>	0.65 ± nan <i>0.65 ± nan</i>
	Wetlands	3.93 ± 0.22 <i>3.15 ± 0.22</i>	3.24 ± nan <i>3.24 ± 0.00</i>	3.24 ± 0.58 <i>3.15 ± 0.59</i>	3.69 ± 0.21 <i>3.15 ± 0.22</i>	3.21 ± nan <i>3.21 ± 0.00</i>	3.21 ± 0.58 <i>3.15 ± 0.60</i>	4.02 ± 0.21 <i>3.15 ± 0.22</i>	3.25 ± nan <i>3.25 ± 0.00</i>	3.25 ± 0.60 <i>3.15 ± 0.62</i>
	Oil and gas	1.53 ± 0.18 <i>1.22 ± 0.18</i>	1.56 ± 0.18 <i>1.22 ± 0.18</i>	1.61 ± 0.08 <i>1.22 ± 0.08</i>	1.26 ± 0.15 <i>1.14 ± 0.15</i>	1.27 ± 0.15 <i>1.14 ± 0.15</i>	1.35 ± 0.07 <i>1.14 ± 0.07</i>	1.25 ± 0.15 <i>1.13 ± 0.16</i>	1.26 ± 0.15 <i>1.13 ± 0.16</i>	1.38 ± 0.07 <i>1.13 ± 0.07</i>
	Coal	0.66 ± 0.08 <i>0.55 ± 0.08</i>	0.67 ± 0.08 <i>0.55 ± 0.08</i>	0.82 ± 0.04 <i>0.55 ± 0.04</i>	0.75 ± 0.09 <i>0.68 ± 0.09</i>	0.76 ± 0.09 <i>0.68 ± 0.09</i>	0.88 ± 0.04 <i>0.68 ± 0.04</i>	0.65 ± 0.08 <i>0.58 ± 0.08</i>	0.67 ± 0.08 <i>0.58 ± 0.08</i>	0.84 ± 0.04 <i>0.58 ± 0.04</i>
	Residential	0.08 ± nan <i>0.08 ± nan</i>	0.08 ± nan <i>0.08 ± nan</i>	0.09 ± 0.00 <i>0.08 ± 0.01</i>	0.09 ± nan <i>0.09 ± nan</i>	0.09 ± nan <i>0.09 ± nan</i>	0.09 ± 0.00 <i>0.09 ± 0.01</i>	0.08 ± nan <i>0.08 ± nan</i>	0.08 ± nan <i>0.08 ± nan</i>	0.08 ± 0.00 <i>0.08 ± 0.01</i>
	Geological	0.54 ± nan <i>0.54 ± nan</i>	0.54 ± nan <i>0.54 ± nan</i>	0.54 ± nan <i>0.54 ± nan</i>	0.54 ± nan <i>0.54 ± nan</i>	0.54 ± nan <i>0.54 ± nan</i>	0.54 ± nan <i>0.54 ± nan</i>	0.54 ± nan <i>0.54 ± nan</i>	0.54 ± nan <i>0.54 ± nan</i>	0.54 ± nan <i>0.54 ± nan</i>
	Fires	0.19 ± nan <i>0.19 ± nan</i>	0.19 ± nan <i>0.19 ± nan</i>	0.19 ± 0.01 <i>0.19 ± 0.01</i>	0.10 ± nan <i>0.10 ± nan</i>	0.10 ± nan <i>0.10 ± nan</i>	0.10 ± 0.00 <i>0.10 ± 0.01</i>	0.27 ± nan <i>0.27 ± nan</i>	0.27 ± nan <i>0.27 ± nan</i>	0.27 ± 0.01 <i>0.27 ± 0.02</i>

Table S3. Cont.

Lat. band	Category	2000–2006			2007–2013			2014–2020		
30S-EQ		SET1	SET2	ORIG	SET1	SET2	ORIG	SET1	SET2	ORIG
	LWW	8.87 ± 0.69 8.59 ± 0.70	8.85 ± 0.82 8.59 ± 0.84	8.86 ± 0.78 8.59 ± 0.79	11.04 ± 0.79 9.62 ± 0.77	11.36 ± 0.89 9.62 ± 0.93	11.24 ± 0.89 9.62 ± 0.88	11.96 ± 0.89 11.20 ± 0.90	11.97 ± 1.05 11.20 ± 1.09	11.49 ± 1.04 11.20 ± 1.07
	EFMM	20.70 ± 1.60 19.57 ± 1.58	20.56 ± 1.91 19.57 ± 1.91	20.79 ± 1.83 19.57 ± 1.80	26.54 ± 1.91 22.34 ± 1.80	27.37 ± 2.13 22.34 ± 2.17	27.01 ± 2.14 22.34 ± 2.04	26.40 ± 1.98 23.83 ± 1.91	26.31 ± 2.31 23.83 ± 2.32	25.34 ± 2.30 23.83 ± 2.28
	RICE	2.85 ± 0.22 2.84 ± 0.23	2.85 ± 0.26 2.84 ± 0.28	2.81 ± 0.25 2.84 ± 0.26	3.22 ± 0.23 3.34 ± 0.27	3.22 ± 0.26 3.34 ± 0.32	3.22 ± 0.26 3.34 ± 0.30	3.44 ± 0.26 3.78 ± 0.30	3.40 ± 0.30 3.78 ± 0.37	3.32 ± 0.30 3.78 ± 0.36
	Soil sink	-12.29 ± -0.95 -10.85 ± -0.88	-10.84 ± nan -10.84 ± nan	-10.84 ± -1.06 -10.85 ± -1.06	-12.40 ± -0.89 -10.93 ± -0.88	-10.66 ± nan -10.66 ± nan	-10.66 ± -1.05 -10.93 ± -1.07	-13.09 ± -0.98 -11.24 ± -0.90	-10.97 ± nan -10.97 ± nan	-10.97 ± -1.08 -11.24 ± -1.11
	Termites	4.18 ± nan 4.18 ± nan	4.18 ± nan 4.18 ± nan	4.18 ± nan 4.18 ± nan	4.18 ± nan 4.18 ± nan	4.18 ± nan 4.18 ± nan	4.18 ± nan 4.18 ± nan	4.18 ± nan 4.18 ± nan	4.18 ± nan 4.18 ± nan	4.18 ± nan 4.18 ± nan
	Ocean	2.95 ± nan 2.95 ± nan	2.95 ± nan 2.95 ± nan	2.95 ± nan 2.95 ± nan	2.95 ± nan 2.95 ± nan	2.95 ± nan 2.95 ± nan	2.95 ± nan 2.95 ± nan	2.95 ± nan 2.95 ± nan	2.95 ± nan 2.95 ± nan	2.95 ± nan 2.95 ± nan
	Wetlands	68.17 ± 5.27 65.53 ± 5.31	65.42 ± nan 65.42 ± nan	65.42 ± 6.37 65.53 ± 6.41	68.13 ± 4.91 65.53 ± 5.27	64.18 ± nan 64.18 ± nan	64.18 ± 6.32 65.53 ± 6.43	66.74 ± 4.99 65.53 ± 5.26	63.73 ± nan 63.73 ± nan	63.73 ± 6.29 65.53 ± 6.45
	Oil and gas	6.98 ± 0.96 6.87 ± 0.98	7.00 ± 0.96 6.87 ± 0.98	6.96 ± 0.61 6.87 ± 0.63	7.18 ± 1.07 7.10 ± 1.09	7.18 ± 1.07 7.10 ± 1.09	7.53 ± 0.60 7.10 ± 0.65	8.03 ± 1.40 7.99 ± 1.42	8.08 ± 1.40 7.99 ± 1.42	8.04 ± 0.73 7.99 ± 0.76
	Coal	2.15 ± 0.30 2.02 ± 0.29	2.17 ± 0.30 2.02 ± 0.29	2.29 ± 0.20 2.02 ± 0.19	3.18 ± 0.48 3.07 ± 0.47	3.19 ± 0.48 3.07 ± 0.47	3.22 ± 0.26 3.07 ± 0.28	4.33 ± 0.75 4.27 ± 0.76	4.34 ± 0.75 4.27 ± 0.76	4.19 ± 0.38 4.27 ± 0.41
	Residential	1.36 ± nan 1.36 ± nan	1.36 ± nan 1.36 ± nan	1.35 ± 0.12 1.36 ± 0.13	1.44 ± nan 1.44 ± nan	1.44 ± nan 1.44 ± nan	1.42 ± 0.11 1.44 ± 0.13	1.56 ± nan 1.56 ± nan	1.56 ± nan 1.56 ± nan	1.54 ± 0.14 1.56 ± 0.15
	Geological	1.76 ± nan 1.76 ± nan	1.76 ± nan 1.76 ± nan	1.76 ± nan 1.76 ± nan	1.76 ± nan 1.76 ± nan	1.76 ± nan 1.76 ± nan	1.76 ± nan 1.76 ± nan	1.76 ± nan 1.76 ± nan	1.76 ± nan 1.76 ± nan	1.76 ± nan 1.76 ± nan
	Fires	7.99 ± nan 7.99 ± nan	7.99 ± nan 7.99 ± nan	7.93 ± 0.71 7.99 ± 0.75	6.61 ± nan 6.61 ± nan	6.61 ± nan 6.61 ± nan	6.50 ± 0.52 6.61 ± 0.61	7.67 ± nan 7.67 ± nan	7.67 ± nan 7.67 ± nan	7.55 ± 0.71 7.67 ± 0.75

Table S3. Cont.

Lat. band	Category	2000–2006			2007–2013			2014–2020		
EQ-30N		SET1	SET2	ORIG	SET1	SET2	ORIG	SET1	SET2	ORIG
	LWW	23.21 ± 1.46 22.38 ± 1.53	23.23 ± 1.66 22.38 ± 1.75	22.26 ± 1.31 22.38 ± 1.53	26.35 ± 1.64 26.78 ± 1.82	26.32 ± 1.87 26.78 ± 2.05	25.74 ± 1.50 26.78 ± 1.83	31.02 ± 1.89 31.31 ± 2.09	31.06 ± 2.14 31.31 ± 2.34	31.04 ± 1.75 31.31 ± 2.15
	EFMM	40.22 ± 2.54 38.70 ± 2.64	40.22 ± 2.87 38.70 ± 3.03	38.87 ± 2.28 38.70 ± 2.64	44.05 ± 2.75 43.43 ± 2.95	44.14 ± 3.14 43.43 ± 3.33	43.06 ± 2.51 43.43 ± 2.97	47.66 ± 2.91 46.73 ± 3.12	47.72 ± 3.30 46.73 ± 3.49	47.97 ± 2.70 46.73 ± 3.20
	RICE	23.27 ± 1.47 22.49 ± 1.54	23.47 ± 1.67 22.49 ± 1.76	22.24 ± 1.30 22.49 ± 1.53	23.60 ± 1.47 24.74 ± 1.68	23.27 ± 1.65 24.74 ± 1.90	22.81 ± 1.33 24.74 ± 1.69	22.61 ± 1.38 25.13 ± 1.68	22.08 ± 1.52 25.13 ± 1.88	21.82 ± 1.23 25.13 ± 1.72
	Soil sink	-8.98 ± -0.57 -8.92 ± -0.61	-8.85 ± nan -8.85 ± nan	-8.85 ± -0.71 -8.92 ± -0.72	-8.60 ± -0.54 -8.92 ± -0.60	-8.71 ± nan -8.71 ± nan	-8.71 ± -0.70 -8.92 ± -0.72	-9.35 ± -0.57 -9.13 ± -0.61	-8.93 ± nan -8.93 ± nan	-8.93 ± -0.72 -9.13 ± -0.74
	Termites	2.76 ± nan 2.76 ± nan	2.76 ± nan 2.76 ± nan	2.76 ± nan 2.76 ± nan	2.76 ± nan 2.76 ± nan	2.76 ± nan 2.76 ± nan	2.76 ± nan 2.76 ± nan	2.76 ± nan 2.76 ± nan	2.76 ± nan 2.76 ± nan	2.76 ± nan 2.76 ± nan
	Ocean	3.79 ± nan 3.79 ± nan	3.79 ± nan 3.79 ± nan	3.79 ± nan 3.79 ± nan	3.79 ± nan 3.79 ± nan	3.79 ± nan 3.79 ± nan	3.79 ± nan 3.79 ± nan	3.79 ± nan 3.79 ± nan	3.79 ± nan 3.79 ± nan	3.79 ± nan 3.79 ± nan
	Wetlands	50.74 ± 3.20 50.28 ± 3.44	50.08 ± nan 50.08 ± nan	50.08 ± 4.02 50.28 ± 4.05	49.89 ± 3.12 50.28 ± 3.41	49.42 ± nan 49.42 ± nan	49.42 ± 3.99 50.28 ± 4.06	49.25 ± 3.01 50.28 ± 3.36	49.27 ± nan 49.27 ± nan	49.27 ± 3.97 50.28 ± 4.08
	Oil and gas	29.09 ± 3.06 28.71 ± 3.07	29.13 ± 3.06 28.71 ± 3.07	26.94 ± 1.58 28.71 ± 1.96	31.79 ± 3.28 30.59 ± 3.29	31.80 ± 3.29 30.59 ± 3.29	27.74 ± 1.61 30.59 ± 2.09	34.96 ± 3.75 31.21 ± 3.73	34.60 ± 3.76 31.21 ± 3.73	33.17 ± 1.87 31.21 ± 2.14
	Coal	3.19 ± 0.34 3.29 ± 0.35	3.20 ± 0.34 3.29 ± 0.35	3.28 ± 0.19 3.29 ± 0.22	4.94 ± 0.51 5.28 ± 0.57	4.91 ± 0.51 5.28 ± 0.57	4.95 ± 0.29 5.28 ± 0.36	5.30 ± 0.58 5.73 ± 0.68	5.25 ± 0.58 5.73 ± 0.68	5.02 ± 0.28 5.73 ± 0.39
	Residential	5.84 ± nan 5.84 ± nan	5.84 ± nan 5.84 ± nan	5.78 ± 0.34 5.84 ± 0.40	6.34 ± nan 6.34 ± nan	6.34 ± nan 6.34 ± nan	6.24 ± 0.36 6.34 ± 0.43	6.48 ± nan 6.48 ± nan	6.48 ± nan 6.48 ± nan	6.37 ± 0.36 6.48 ± 0.44
	Geological	2.80 ± nan 2.80 ± nan	2.80 ± nan 2.80 ± nan	2.80 ± nan 2.80 ± nan	2.80 ± nan 2.80 ± nan	2.80 ± nan 2.80 ± nan	2.80 ± nan 2.80 ± nan	2.80 ± nan 2.80 ± nan	2.80 ± nan 2.80 ± nan	2.80 ± nan 2.80 ± nan
	Fires	3.97 ± nan 3.97 ± nan	3.97 ± nan 3.97 ± nan	3.94 ± 0.23 3.97 ± 0.27	3.53 ± nan 3.53 ± nan	3.53 ± nan 3.53 ± nan	3.48 ± 0.20 3.53 ± 0.24	3.51 ± nan 3.51 ± nan	3.51 ± nan 3.51 ± nan	3.47 ± 0.20 3.51 ± 0.24



Table S3. Cont.

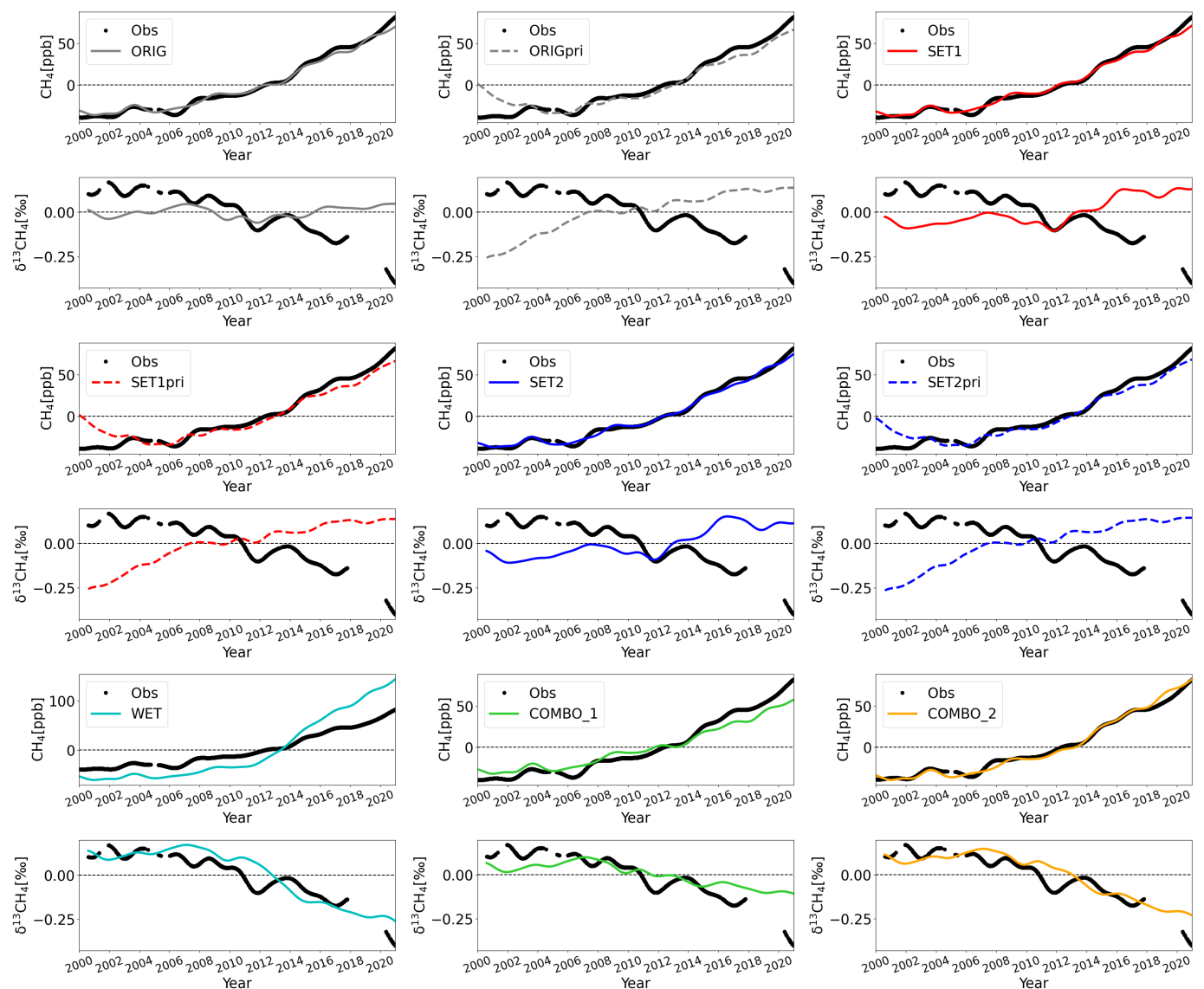
Lat. band	Category	2000–2006			2007–2013			2014–2020		
30N–60N		SET1	SET2	ORIG	SET1	SET2	ORIG	SET1	SET2	ORIG
	LWW	34.83 ± 1.16 30.86 ± 1.52	35.12 ± 1.29 30.86 ± 1.70	32.81 ± 1.92 30.86 ± 2.00	33.82 ± 1.19 32.03 ± 1.67	33.99 ± 1.35 32.03 ± 1.86	32.37 ± 2.25 32.03 ± 2.39	36.40 ± 1.37 34.12 ± 1.87	36.52 ± 1.54 34.12 ± 2.07	34.83 ± 2.38 34.12 ± 2.54
	EFMM	42.49 ± 1.42 38.22 ± 1.89	42.82 ± 1.58 38.22 ± 2.10	40.55 ± 2.37 38.22 ± 2.48	41.44 ± 1.46 38.76 ± 2.02	41.66 ± 1.66 38.76 ± 2.25	40.80 ± 2.84 38.76 ± 2.89	44.79 ± 1.69 40.47 ± 2.22	45.00 ± 1.90 40.47 ± 2.46	44.35 ± 3.04 40.47 ± 3.01
	RICE	9.81 ± 0.33 8.11 ± 0.40	10.11 ± 0.37 8.11 ± 0.45	9.13 ± 0.53 8.11 ± 0.53	8.59 ± 0.30 8.57 ± 0.45	8.62 ± 0.34 8.57 ± 0.50	7.86 ± 0.54 8.57 ± 0.64	8.47 ± 0.32 8.62 ± 0.47	8.34 ± 0.35 8.62 ± 0.52	7.72 ± 0.53 8.62 ± 0.64
	Soil sink	-11.44 ± -0.38 -10.66 ± -0.53	-10.47 ± nan -10.47 ± nan	-10.47 ± -0.64 -10.66 ± -0.67	-11.01 ± -0.39 -10.77 ± -0.56	-10.48 ± nan -10.48 ± nan	-10.48 ± -0.61 -10.77 ± -0.68	-11.76 ± -0.44 -11.12 ± -0.61	-10.96 ± nan -10.96 ± nan	-10.96 ± -0.67 -11.12 ± -0.73
	Termites	2.43 ± nan 2.43 ± nan	2.43 ± nan 2.43 ± nan	2.43 ± nan 2.43 ± nan	2.43 ± nan 2.43 ± nan	2.43 ± nan 2.43 ± nan	2.43 ± nan 2.43 ± nan	2.43 ± nan 2.43 ± nan	2.43 ± nan 2.43 ± nan	2.43 ± nan 2.43 ± nan
	Ocean	1.90 ± nan 1.90 ± nan	1.90 ± nan 1.90 ± nan	1.90 ± nan 1.90 ± nan	1.90 ± nan 1.90 ± nan	1.90 ± nan 1.90 ± nan	1.90 ± nan 1.90 ± nan	1.90 ± nan 1.90 ± nan	1.90 ± nan 1.90 ± nan	1.90 ± nan 1.90 ± nan
	Wetlands	25.22 ± 0.84 23.59 ± 1.17	23.61 ± nan 23.61 ± nan	23.61 ± 1.44 23.59 ± 1.49	25.18 ± 0.89 23.59 ± 1.23	24.01 ± nan 24.01 ± nan	24.01 ± 1.40 23.59 ± 1.50	25.14 ± 0.95 23.59 ± 1.29	23.75 ± nan 23.75 ± nan	23.75 ± 1.45 23.59 ± 1.55
	Oil and gas	25.96 ± 2.84 25.36 ± 2.73	25.98 ± 2.84 25.36 ± 2.73	25.75 ± 1.51 25.36 ± 1.65	33.06 ± 4.25 31.03 ± 3.82	33.22 ± 4.23 31.03 ± 3.82	31.86 ± 2.23 31.03 ± 2.32	43.28 ± 5.09 39.54 ± 4.62	43.11 ± 5.09 39.54 ± 4.62	42.84 ± 2.93 39.54 ± 2.95
	Coal	18.65 ± 2.05 20.25 ± 2.20	18.70 ± 2.05 20.25 ± 2.20	22.96 ± 1.35 20.25 ± 1.33	20.89 ± 2.68 26.87 ± 3.31	21.24 ± 2.71 26.87 ± 3.31	25.46 ± 1.77 26.87 ± 2.01	20.62 ± 2.42 26.89 ± 3.15	20.63 ± 2.43 26.89 ± 3.15	23.00 ± 1.58 26.89 ± 2.00
	Residential	4.84 ± nan 4.84 ± nan	4.84 ± nan 4.84 ± nan	4.87 ± 0.29 4.84 ± 0.31	4.46 ± nan 4.46 ± nan	4.46 ± nan 4.46 ± nan	4.41 ± 0.31 4.46 ± 0.33	4.14 ± nan 4.14 ± nan	4.14 ± nan 4.14 ± nan	4.09 ± 0.28 4.14 ± 0.31
	Geological	15.53 ± nan 15.53 ± nan	15.53 ± nan 15.53 ± nan	15.53 ± nan 15.53 ± nan	15.53 ± nan 15.53 ± nan	15.53 ± nan 15.53 ± nan	15.53 ± nan 15.53 ± nan	15.53 ± nan 15.53 ± nan	15.53 ± nan 15.53 ± nan	15.53 ± nan 15.53 ± nan
	Fires	2.29 ± nan 2.29 ± nan	2.29 ± nan 2.29 ± nan	2.25 ± 0.13 2.29 ± 0.15	2.17 ± nan 2.17 ± nan	2.17 ± nan 2.17 ± nan	2.13 ± 0.15 2.17 ± 0.16	2.33 ± nan 2.33 ± nan	2.33 ± nan 2.33 ± nan	2.29 ± 0.16 2.33 ± 0.17

Table S3. Cont.

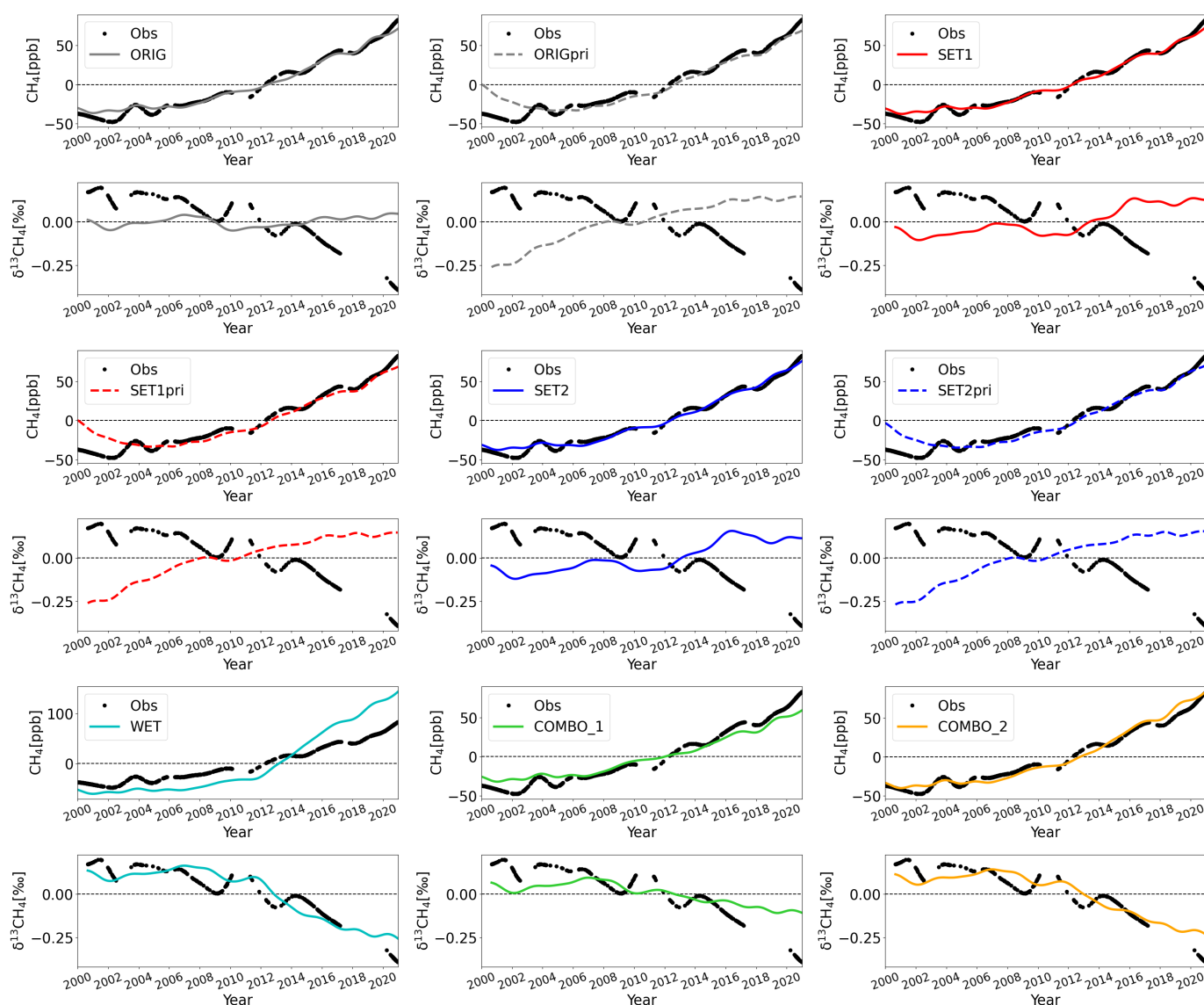
Lat. band	Category	2000–2006			2007–2013			2014–2020		
60N–90N		SET1	SET2	ORIG	SET1	SET2	ORIG	SET1	SET2	ORIG
	LWW	0.97 ± 0.06 0.94 ± 0.06	0.97 ± 0.09 0.94 ± 0.09	0.97 ± 0.18 0.94 ± 0.19	0.88 ± 0.05 0.88 ± 0.05	0.87 ± 0.07 0.88 ± 0.08	0.89 ± 0.12 0.88 ± 0.14	0.71 ± 0.04 0.76 ± 0.05	0.70 ± 0.05 0.76 ± 0.06	0.68 ± 0.06 0.76 ± 0.08
	EFMM	1.17 ± 0.07 1.16 ± 0.07	1.17 ± 0.11 1.16 ± 0.11	1.21 ± 0.22 1.16 ± 0.23	1.08 ± 0.06 1.07 ± 0.06	1.07 ± 0.08 1.07 ± 0.10	1.15 ± 0.16 1.07 ± 0.17	1.07 ± 0.06 1.06 ± 0.06	1.06 ± 0.07 1.06 ± 0.08	0.87 ± 0.08 1.06 ± 0.11
	RICE	0.00 ± 0.00 0.00 ± 0.00	0.00 ± 0.00 0.00 ± 0.00	0.00 ± 0.00 0.00 ± 0.00	0.00 ± 0.00 0.00 ± 0.00	0.00 ± 0.00 0.00 ± 0.00	0.00 ± 0.00 0.00 ± 0.00	0.00 ± 0.00 0.00 ± 0.00	0.00 ± 0.00 0.00 ± 0.00	0.00 ± 0.00 0.00 ± 0.00
	Soil sink	-1.92 ± -0.11 -1.91 ± -0.12	-1.88 ± nan -1.88 ± nan	-1.88 ± -0.12 -1.91 ± -0.12	-2.03 ± -0.11 -1.98 ± -0.12	-1.99 ± nan -1.99 ± nan	-1.99 ± -0.12 -1.98 ± -0.13	-2.08 ± -0.11 -2.02 ± -0.12	-2.06 ± nan -2.06 ± nan	-2.06 ± -0.12 -2.02 ± -0.13
	Termites	0.00 ± nan 0.00 ± nan	0.00 ± nan 0.00 ± nan	0.00 ± nan 0.00 ± nan	0.00 ± nan 0.00 ± nan	0.00 ± nan 0.00 ± nan	0.00 ± nan 0.00 ± nan	0.00 ± nan 0.00 ± nan	0.00 ± nan 0.00 ± nan	0.00 ± nan 0.00 ± nan
	Ocean	2.19 ± nan 2.19 ± nan	2.19 ± nan 2.19 ± nan	2.19 ± nan 2.19 ± nan	2.19 ± nan 2.19 ± nan	2.19 ± nan 2.19 ± nan	2.19 ± nan 2.19 ± nan	2.19 ± nan 2.19 ± nan	2.19 ± nan 2.19 ± nan	2.19 ± nan 2.19 ± nan
	Wetlands	8.78 ± 0.52 8.65 ± 0.53	8.56 ± nan 8.56 ± nan	8.56 ± 0.54 8.65 ± 0.55	9.24 ± 0.50 8.65 ± 0.53	9.00 ± nan 9.00 ± nan	9.00 ± 0.53 8.65 ± 0.55	9.25 ± 0.49 8.65 ± 0.51	9.28 ± nan 9.28 ± nan	9.28 ± 0.53 8.65 ± 0.56
	Oil and gas	6.70 ± 1.66 8.76 ± 2.32	6.73 ± 1.66 8.76 ± 2.32	6.44 ± 1.16 8.76 ± 1.77	5.87 ± 1.15 6.73 ± 1.58	5.92 ± 1.15 6.73 ± 1.58	5.83 ± 0.89 6.73 ± 1.26	3.73 ± 0.38 3.42 ± 0.40	3.73 ± 0.38 3.42 ± 0.40	3.66 ± 0.34 3.42 ± 0.36
	Coal	0.14 ± 0.03 0.13 ± 0.04	0.14 ± 0.03 0.13 ± 0.04	0.13 ± 0.02 0.13 ± 0.03	0.16 ± 0.03 0.15 ± 0.03	0.16 ± 0.03 0.15 ± 0.03	0.16 ± 0.02 0.15 ± 0.03	0.16 ± 0.02 0.16 ± 0.02	0.16 ± 0.02 0.16 ± 0.02	0.18 ± 0.02 0.16 ± 0.02
	Residential	0.04 ± nan 0.04 ± nan	0.04 ± nan 0.04 ± nan	0.04 ± 0.01 0.04 ± 0.01	0.04 ± nan 0.04 ± nan	0.04 ± nan 0.04 ± nan	0.04 ± 0.00 0.04 ± 0.01	0.03 ± nan 0.03 ± nan	0.03 ± nan 0.03 ± nan	0.03 ± 0.00 0.03 ± 0.00
	Geological	2.37 ± nan 2.37 ± nan	2.37 ± nan 2.37 ± nan	2.37 ± nan 2.37 ± nan	2.37 ± nan 2.37 ± nan	2.37 ± nan 2.37 ± nan	2.37 ± nan 2.37 ± nan	2.37 ± nan 2.37 ± nan	2.37 ± nan 2.37 ± nan	2.37 ± nan 2.37 ± nan
	Fires	0.82 ± nan 0.82 ± nan	0.82 ± nan 0.82 ± nan	0.80 ± 0.14 0.82 ± 0.16	0.72 ± nan 0.72 ± nan	0.72 ± nan 0.72 ± nan	0.70 ± 0.08 0.72 ± 0.10	1.65 ± nan 1.65 ± nan	1.65 ± nan 1.65 ± nan	1.61 ± 0.16 1.65 ± 0.18

Table S3. Cont.

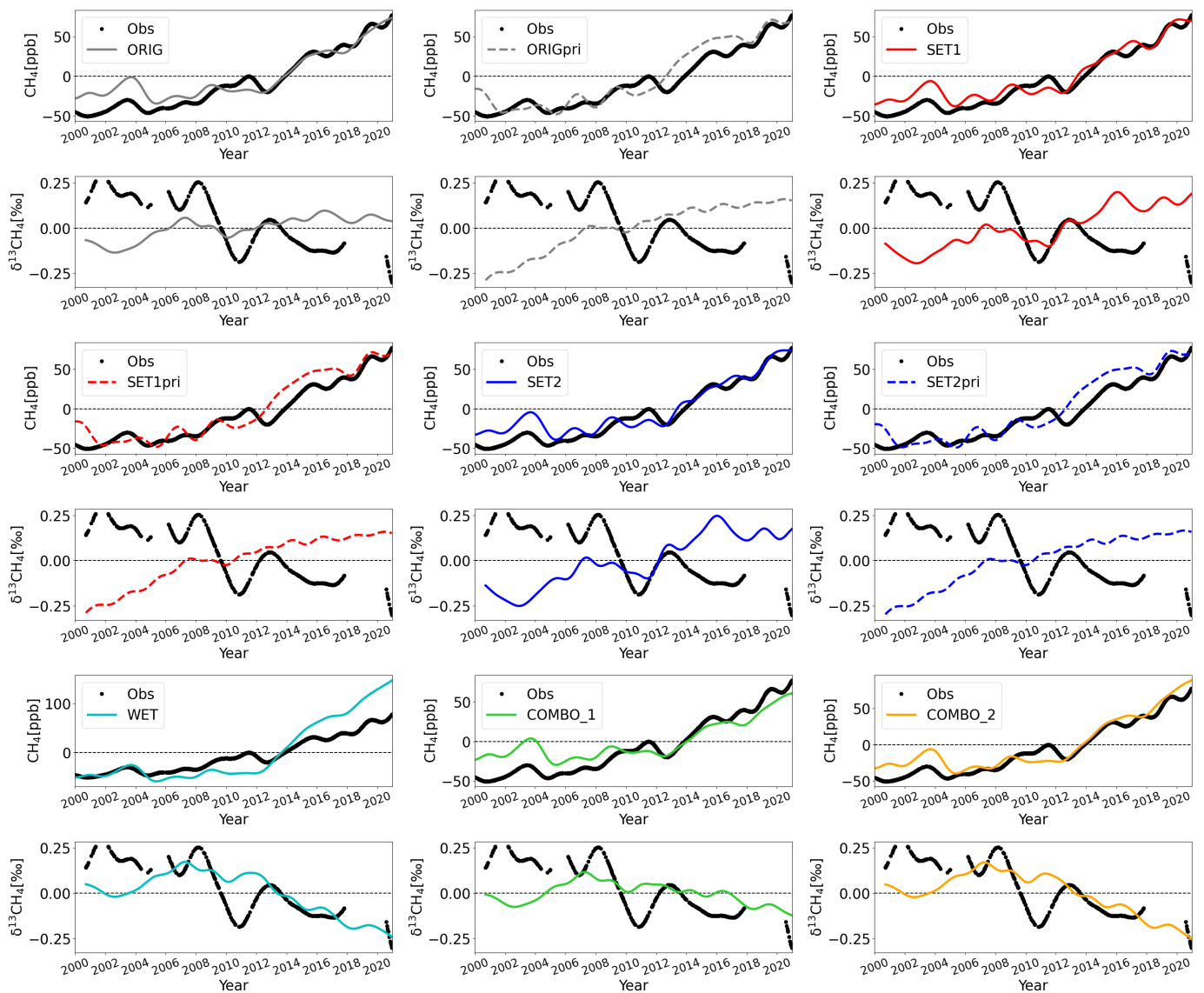
Lat. band	Category	2000–2006			2007–2013			2014–2020		
Global		SET1	SET2	ORIG	SET1	SET2	ORIG	SET1	SET2	ORIG
	LWW	70.11 ± 3.62 64.60 ± 4.06	70.36 ± 4.09 64.60 ± 4.61	67.29 ± 4.41 64.60 ± 4.75	74.20 ± 3.93 71.15 ± 4.57	74.66 ± 4.40 71.15 ± 5.16	72.40 ± 4.97 71.15 ± 5.47	82.52 ± 4.45 79.35 ± 5.18	82.64 ± 5.01 79.35 ± 5.81	80.42 ± 5.46 79.35 ± 6.09
	EFMM	114.79 ± 6.78 105.77 ± 7.33	114.80 ± 7.49 105.77 ± 8.18	112.38 ± 7.74 105.77 ± 8.21	122.53 ± 7.28 113.59 ± 7.95	123.74 ± 8.00 113.59 ± 8.86	121.72 ± 8.59 113.59 ± 9.10	130.07 ± 7.71 119.85 ± 8.41	130.08 ± 8.52 119.85 ± 9.33	128.38 ± 9.05 119.85 ± 9.61
	RICE	36.12 ± 2.03 33.59 ± 2.19	36.61 ± 2.32 33.59 ± 2.50	34.38 ± 2.10 33.59 ± 2.34	35.58 ± 2.03 36.80 ± 2.41	35.27 ± 2.27 36.80 ± 2.74	34.06 ± 2.14 36.80 ± 2.65	34.68 ± 1.97 37.66 ± 2.47	33.98 ± 2.19 37.66 ± 2.79	33.01 ± 2.07 37.66 ± 2.74
	Soil sink	-36.92 ± -2.27 -34.11 ± -2.38	-33.86 ± nan -33.86 ± nan	-33.86 ± -3.18 -34.11 ± -3.24	-36.19 ± -2.18 -34.40 ± -2.42	-33.65 ± nan -33.65 ± nan	-33.65 ± -3.14 -34.40 ± -3.29	-38.75 ± -2.36 -35.35 ± -2.50	-34.82 ± nan -34.82 ± nan	-34.82 ± -3.29 -35.35 ± -3.43
	Termites	9.91 ± nan 9.91 ± nan	9.91 ± nan 9.91 ± nan	9.91 ± nan 9.91 ± nan	9.91 ± nan 9.91 ± nan	9.91 ± nan 9.91 ± nan	9.91 ± nan 9.91 ± nan	9.91 ± nan 9.91 ± nan	9.91 ± nan 9.91 ± nan	9.91 ± nan 9.91 ± nan
	Ocean	11.48 ± nan 11.48 ± nan	11.48 ± nan 11.48 ± nan	11.48 ± nan 11.48 ± nan	11.48 ± nan 11.48 ± nan	11.48 ± nan 11.48 ± nan	11.48 ± nan 11.48 ± nan	11.48 ± nan 11.48 ± nan	11.48 ± nan 11.48 ± nan	11.48 ± nan 11.48 ± nan
	Wetlands	156.84 ± 10.27 151.20 ± 10.88	150.91 ± nan 150.91 ± nan	150.91 ± 13.54 151.20 ± 13.67	156.12 ± 9.84 151.20 ± 10.88	149.82 ± nan 149.82 ± nan	149.82 ± 13.40 151.20 ± 13.73	154.41 ± 9.86 151.20 ± 10.87	149.28 ± nan 149.28 ± nan	149.28 ± 13.44 151.20 ± 13.86
	Oil and gas	70.26 ± 8.89 70.92 ± 9.45	70.40 ± 8.89 70.92 ± 9.45	67.70 ± 5.02 70.92 ± 6.17	79.15 ± 10.05 76.59 ± 10.08	79.40 ± 10.05 76.59 ± 10.08	74.31 ± 5.46 76.59 ± 6.47	91.25 ± 10.92 83.29 ± 10.48	90.77 ± 10.93 83.29 ± 10.48	89.08 ± 6.01 83.29 ± 6.35
	Coal	24.80 ± 2.87 26.24 ± 3.03	24.87 ± 2.87 26.24 ± 3.03	29.48 ± 1.85 26.24 ± 1.84	29.91 ± 3.88 36.05 ± 4.57	30.26 ± 3.90 36.05 ± 4.57	34.67 ± 2.42 36.05 ± 2.76	31.06 ± 3.93 37.63 ± 4.77	31.05 ± 3.94 37.63 ± 4.77	33.22 ± 2.33 37.63 ± 2.90
	Residential	12.17 ± nan 12.17 ± nan	12.17 ± nan 12.17 ± nan	12.14 ± 0.76 12.17 ± 0.86	12.37 ± nan 12.37 ± nan	12.37 ± nan 12.37 ± nan	12.19 ± 0.80 12.37 ± 0.92	12.29 ± nan 12.29 ± nan	12.29 ± nan 12.29 ± nan	12.11 ± 0.79 12.29 ± 0.92
	Geological	23.00 ± nan 23.00 ± nan	23.00 ± nan 23.00 ± nan	23.00 ± nan 23.00 ± nan	23.00 ± nan 23.00 ± nan	23.00 ± nan 23.00 ± nan	23.00 ± nan 23.00 ± nan	23.00 ± nan 23.00 ± nan	23.00 ± nan 23.00 ± nan	23.00 ± nan 23.00 ± nan
	Fires	15.26 ± nan 15.26 ± nan	15.26 ± nan 15.26 ± nan	15.11 ± 1.23 15.26 ± 1.36	13.13 ± nan 13.13 ± nan	13.13 ± nan 13.13 ± nan	12.91 ± 0.96 13.13 ± 1.12	15.44 ± nan 15.44 ± nan	15.44 ± nan 15.44 ± nan	15.18 ± 1.25 15.44 ± 1.38



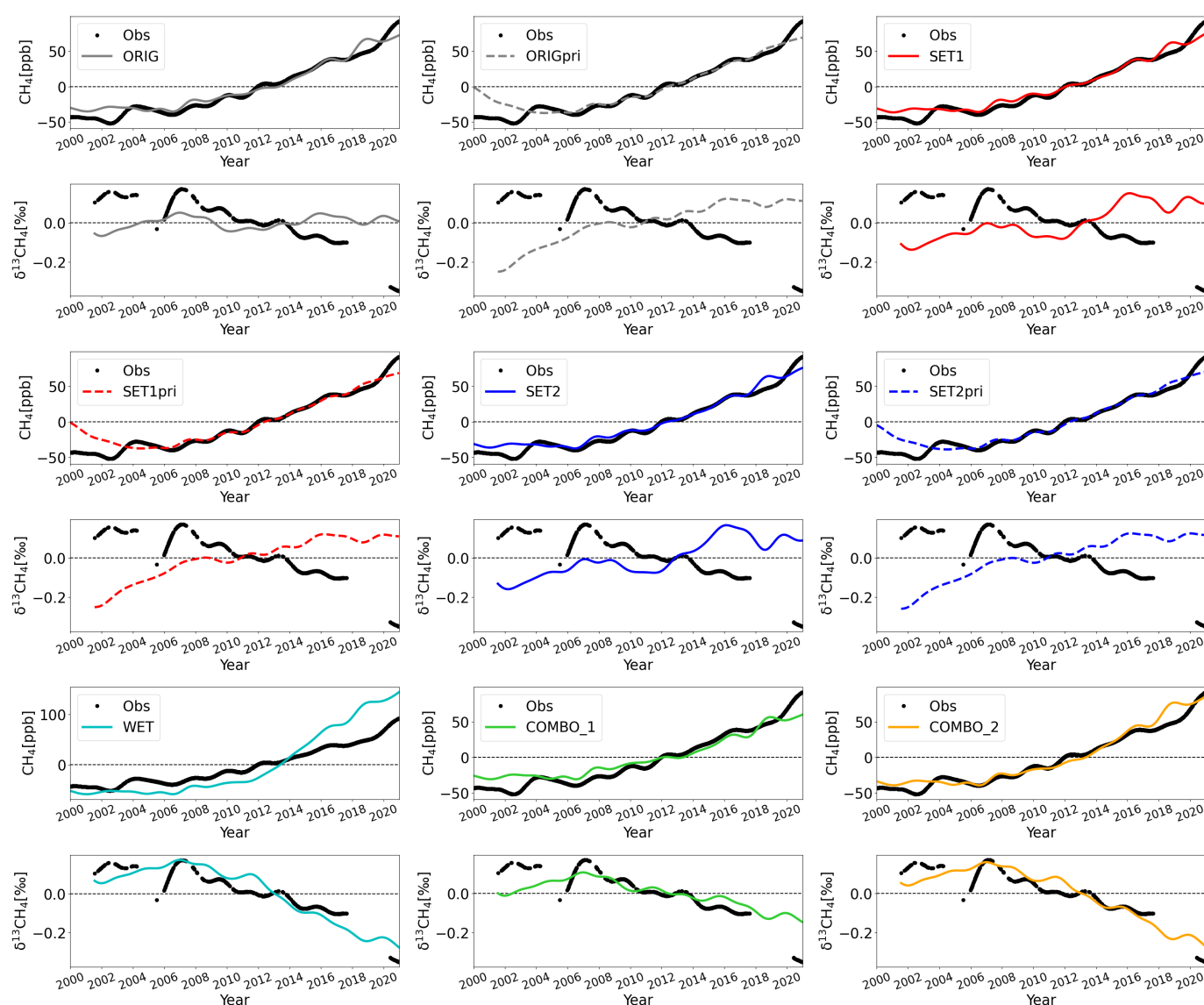
**Figure S8.** Anomalies in the  $\text{CH}_4$  and  $\delta^{13}\text{CH}_4$  trend at Alert, Canada. Different simulations are shown with different colors. Simulations with prior emission are shown as dashed lines. Note that ORIGpri and SET1pri are the same.



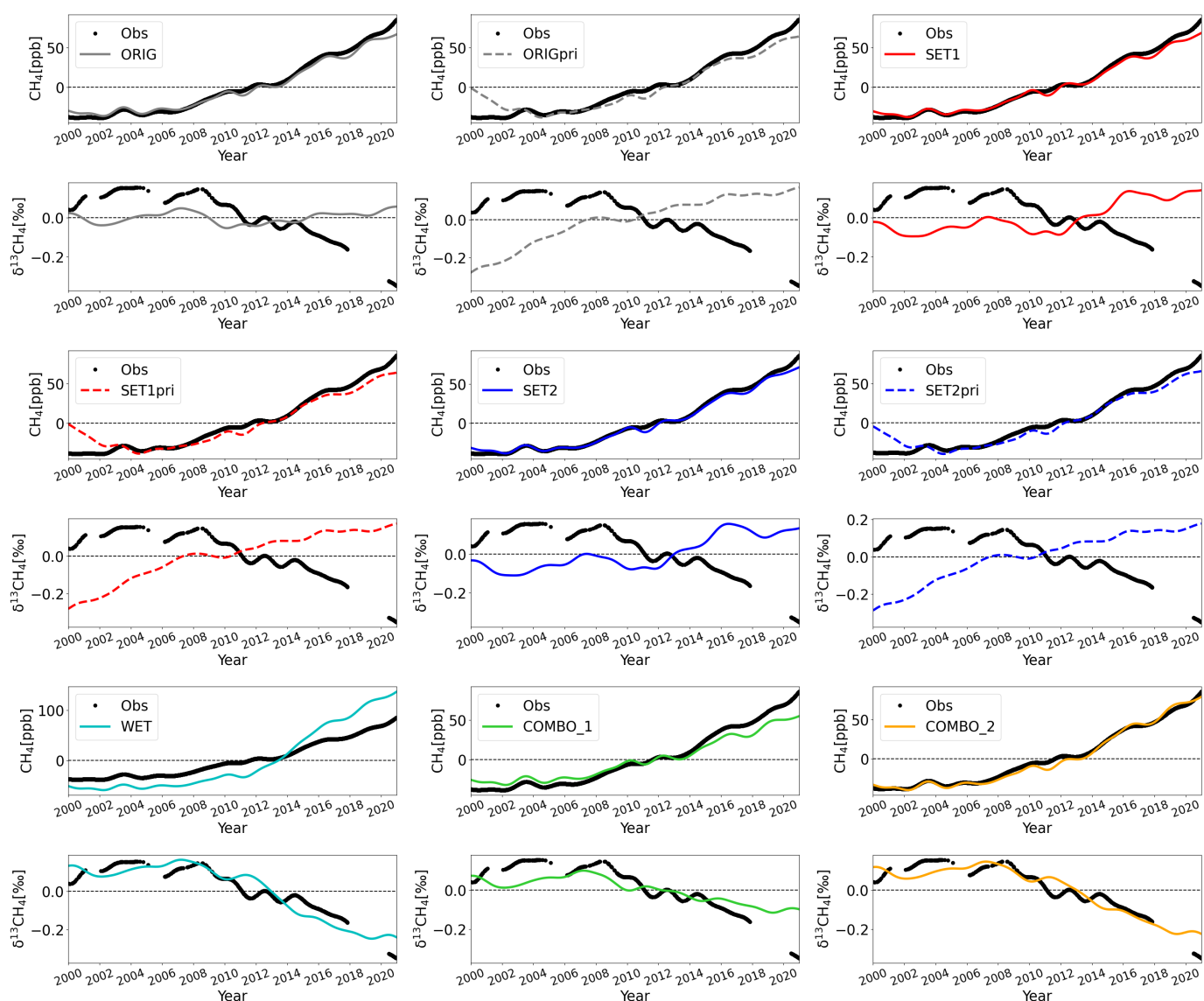
**Figure S9.** Anomalies in the  $\text{CH}_4$  and  $\delta^{13}\text{CH}_4$  trend at Terceira Island, Azores, Portugal. Different simulations are shown with different colors. Simulations with prior emission are shown as dashed lines. Note that ORIGpri and SET1pri are the same.



**Figure S10.** Anomalies in the  $\text{CH}_4$  and  $\delta^{13}\text{CH}_4$  trend at Tae-ahn Peninsula, Republic of Korea. Different simulations are shown with different colors. Simulations with prior emission are shown as dashed lines. Note that ORIGpri and SET1pri are the same.

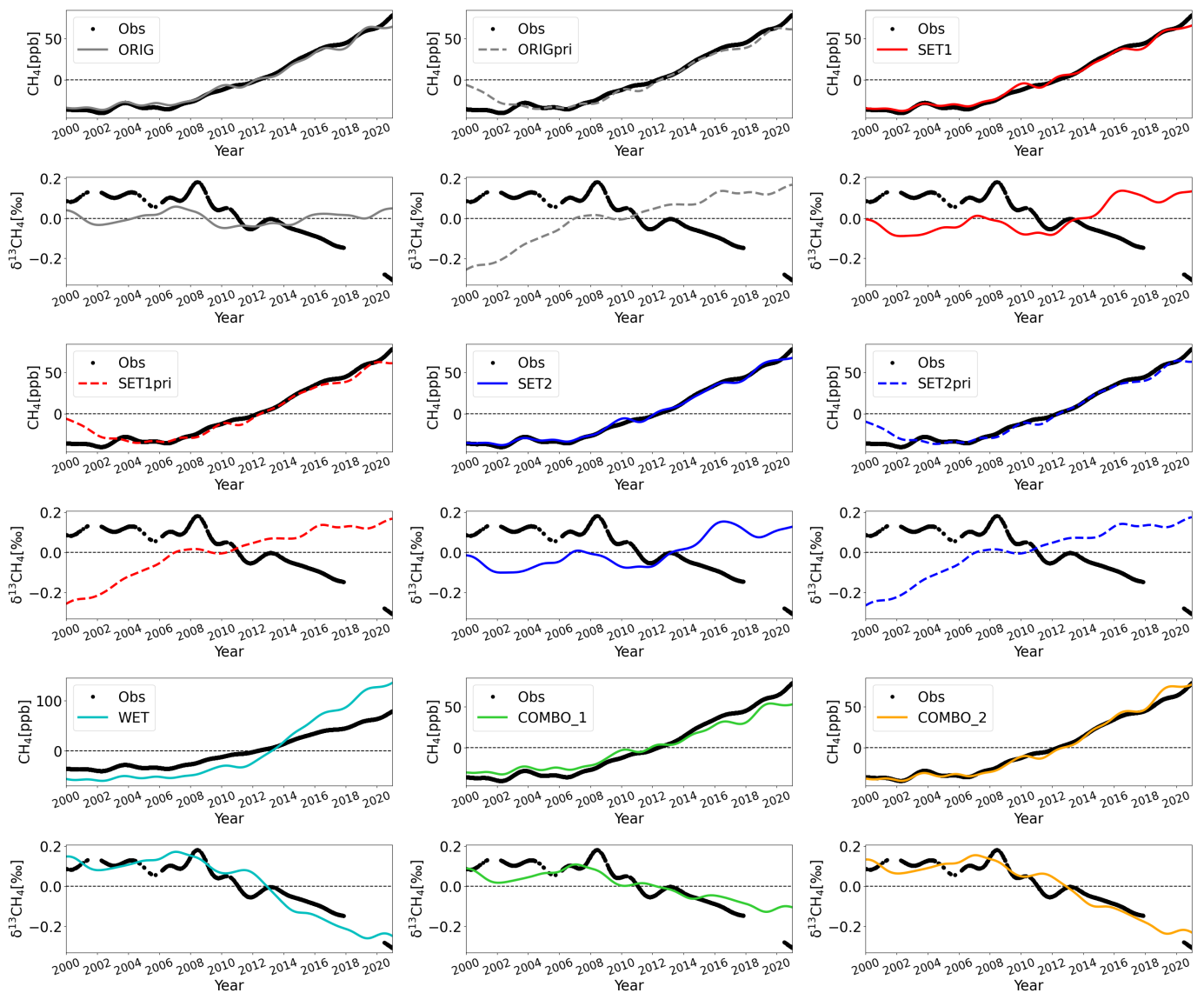


**Figure S11.** Anomalies in the  $\text{CH}_4$  and  $\delta^{13}\text{CH}_4$  trend at Mt. Waliguan, Peoples Republic of China. Different simulations are shown with different colors. Simulations with prior emission are shown as dashed lines. Note that ORIGpri and SET1pri are the same.

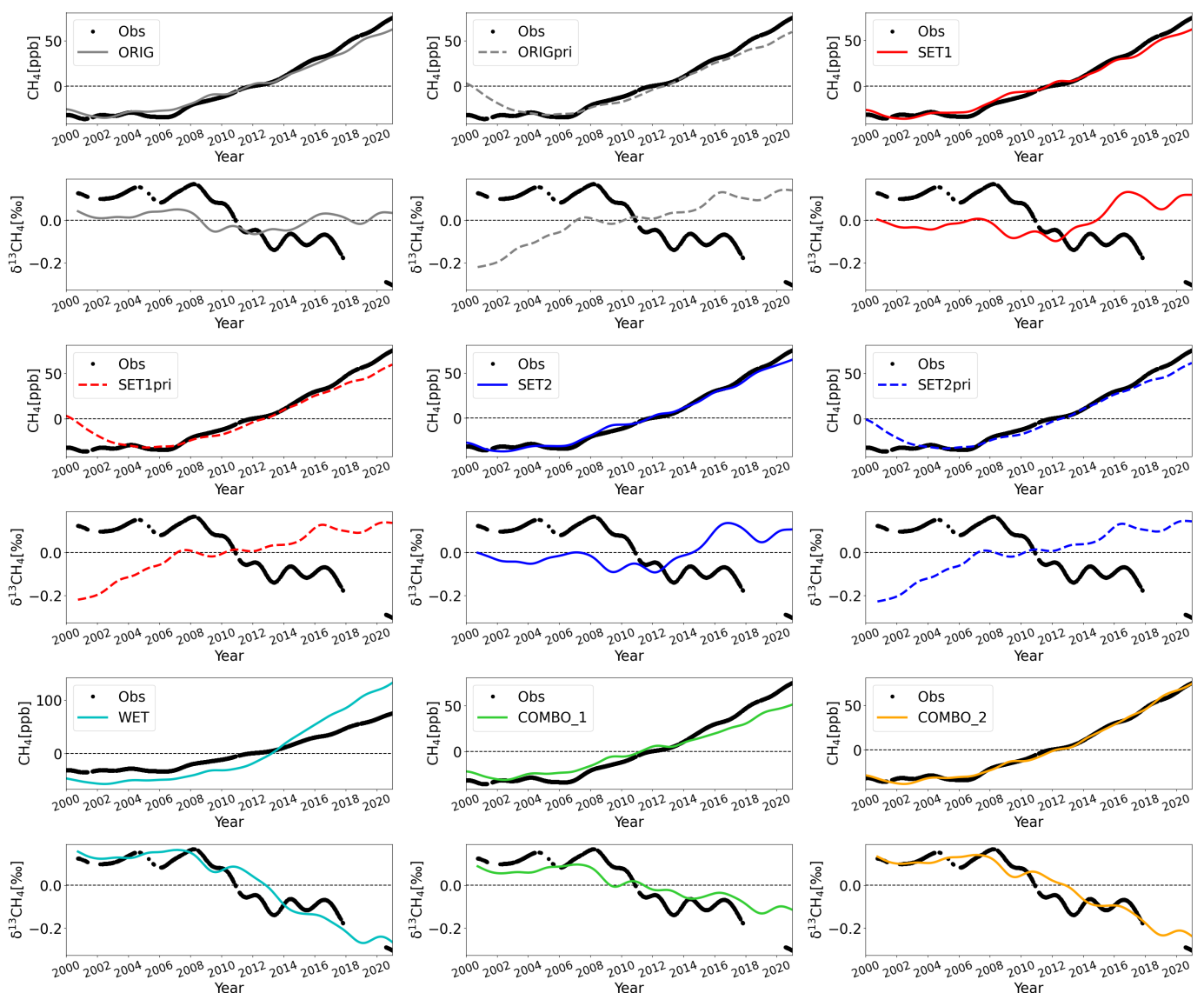


**Figure S12.** Anomalies in the CH<sub>4</sub> and δ<sup>13</sup>CH<sub>4</sub> trend at Cape Kumukahi, Hawaii, United States. Different simulations are shown with different colors. Simulations with prior emission are shown as dashed lines. Note that ORIGpri and SET1pri are the same.

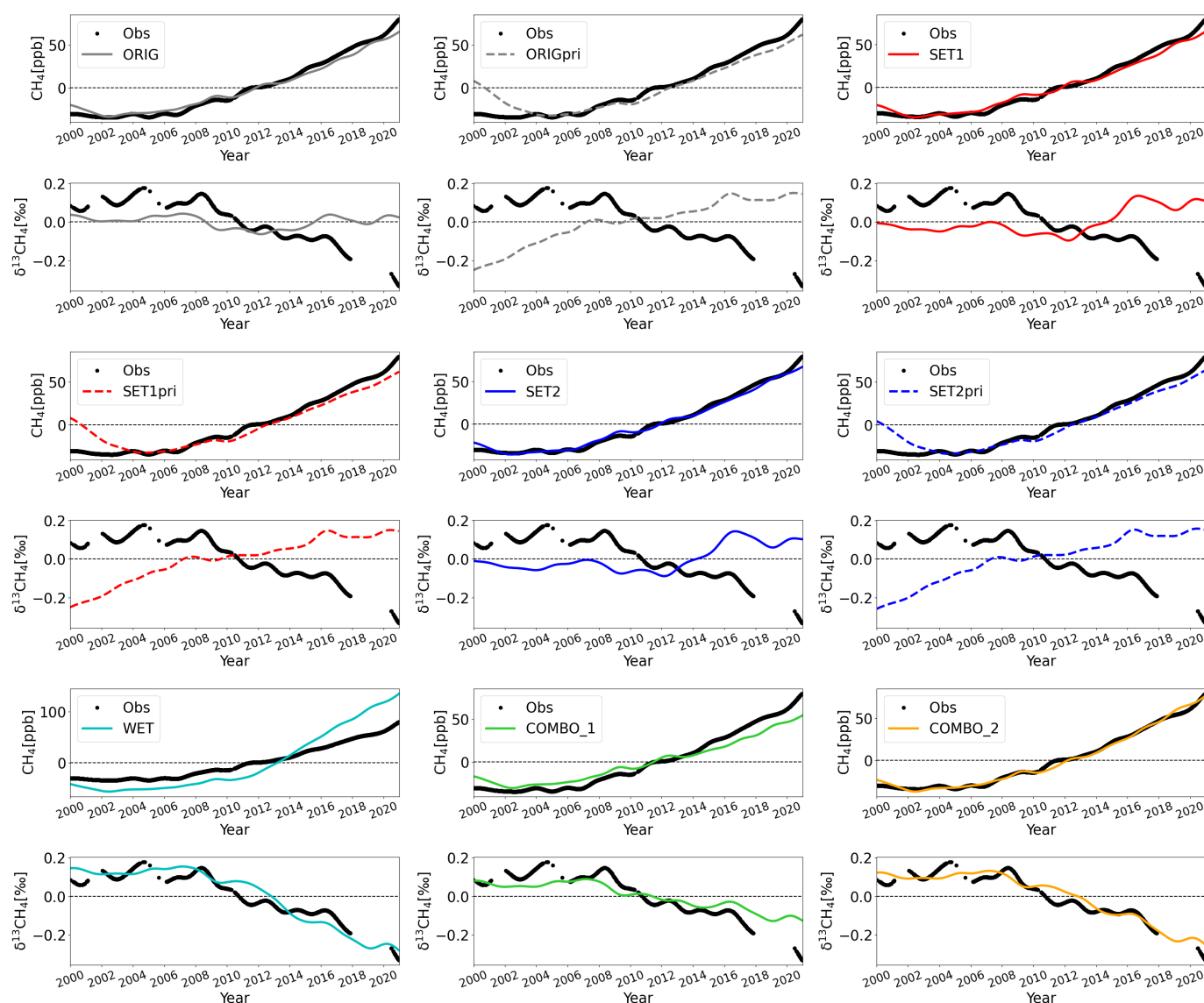




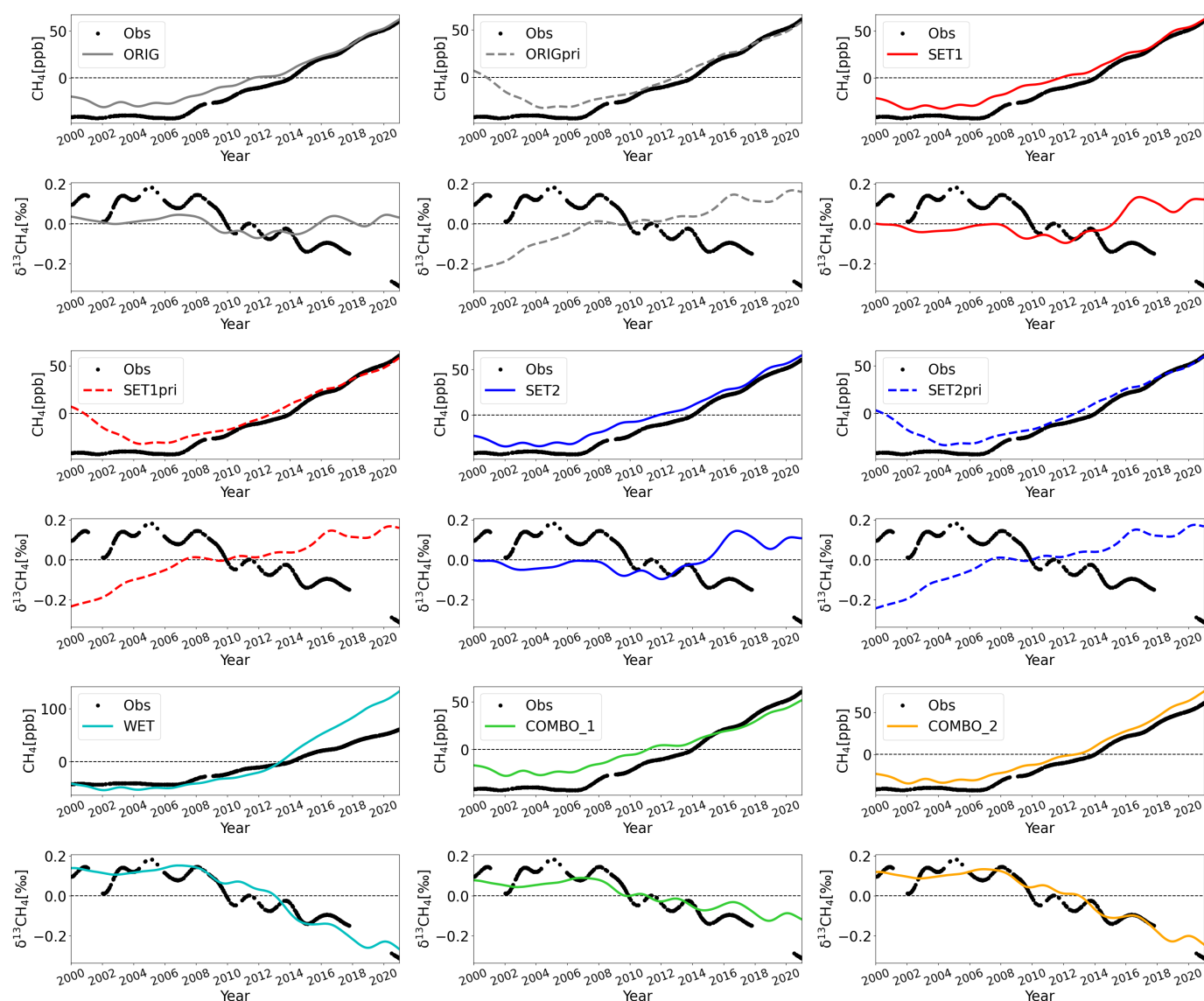
**Figure S13.** Anomalies in the  $\text{CH}_4$  and  $\delta^{13}\text{CH}_4$  trend at Mauna Loa, Hawaii, United States. Different simulations are shown with different colors. Simulations with prior emission are shown as dashed lines. Note that ORIGpri and SET1pri are the same.



**Figure S14.** Anomalies in the  $\text{CH}_4$  and  $\delta^{13}\text{CH}_4$  trend at Ascension Island, United Kingdom. Different simulations are shown with different colors. Simulations with prior emission are shown as dashed lines. Note that ORIGpri and SET1pri are the same.



**Figure S15.** Anomalies in the  $\text{CH}_4$  and  $\delta^{13}\text{CH}_4$  trend at Tutuila, American Samoa. Different simulations are shown with different colors. Simulations with prior emission are shown as dashed lines. Note that ORIGpri and SET1pri are the same.



**Figure S16.** Anomalies in the  $\text{CH}_4$  and  $\delta^{13}\text{CH}_4$  trend at Cape Grim, Tasmania, Australia. Different simulations are shown with different colors. Simulations with prior emission are shown as dashed lines. Note that ORIGpri and SET1pri are the same.