

Supplementary Information

Technical Note: Identifying Biomass Burning Emissions During ASIA-AQ Using Greenhouse Gas Enhancement Ratios

Table S1. Full Flight breakdown

Flight Date (YYYYMMDD)	Location	Time airborne above location (hr)	Flight Number in Country
20240206	Philippines	8.278	1
20240207	Philippines	7.837	2
20240211	Philippines	7.702	3
20240213	Philippines	8.192	4
20240215	Taiwan	4.484	1
20240217	South Korea	7.338	1
20240226	South Korea	7.446	2
20240308	South Korea	8.428	3
20240310	South Korea	6.622	4
20240311	South Korea	8.544	5
20240313	Taiwan	2.582	2
20240316	Thailand	7.797	1
20240318	Thailand	8.168	2
20240321	Thailand	7.972	3
20240325	Thailand	7.842	4
20240327	Taiwan	3.061	3

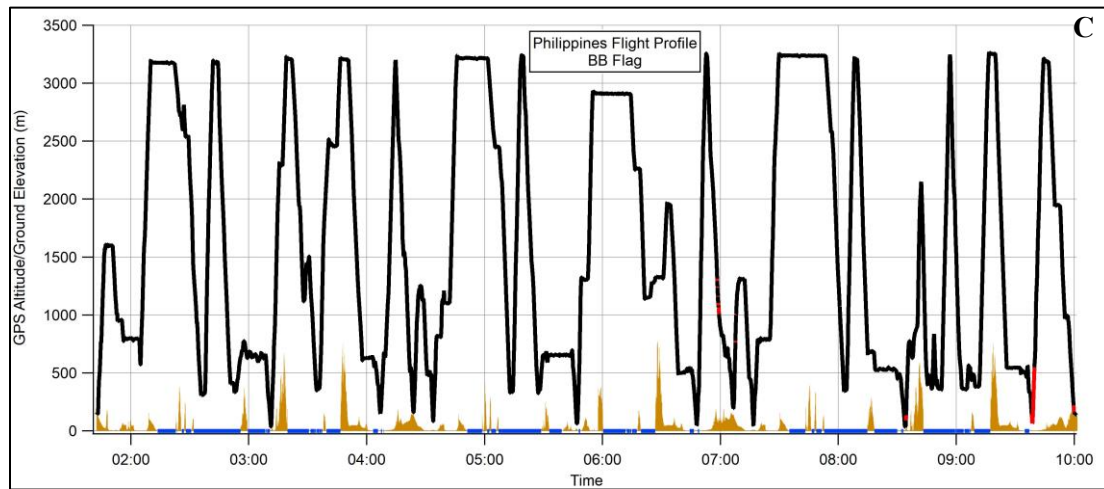
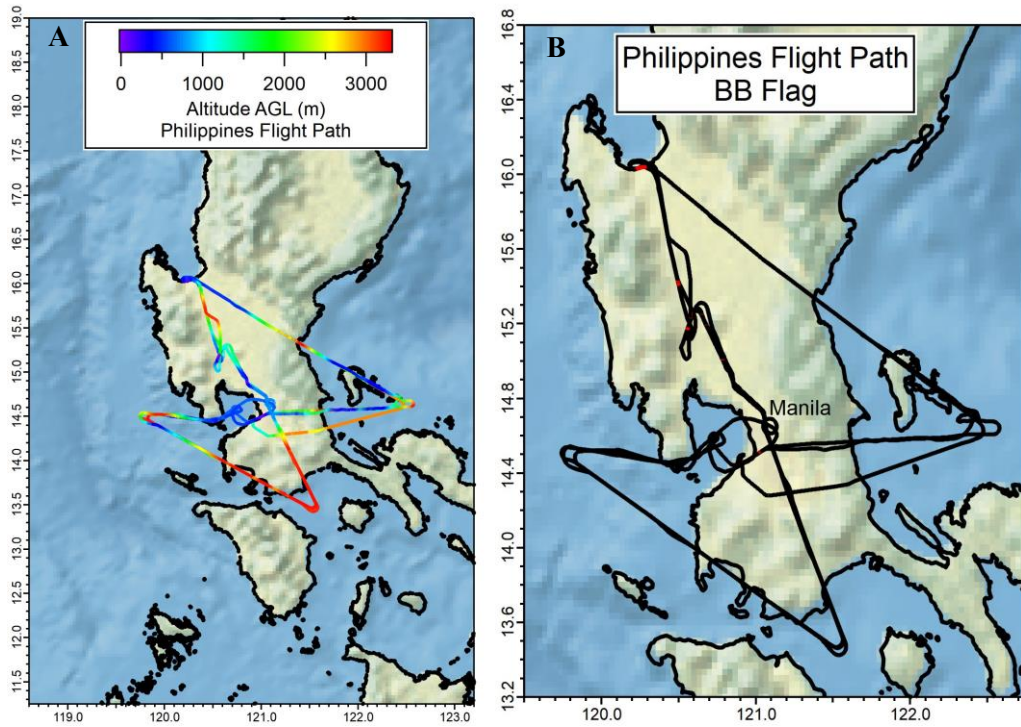
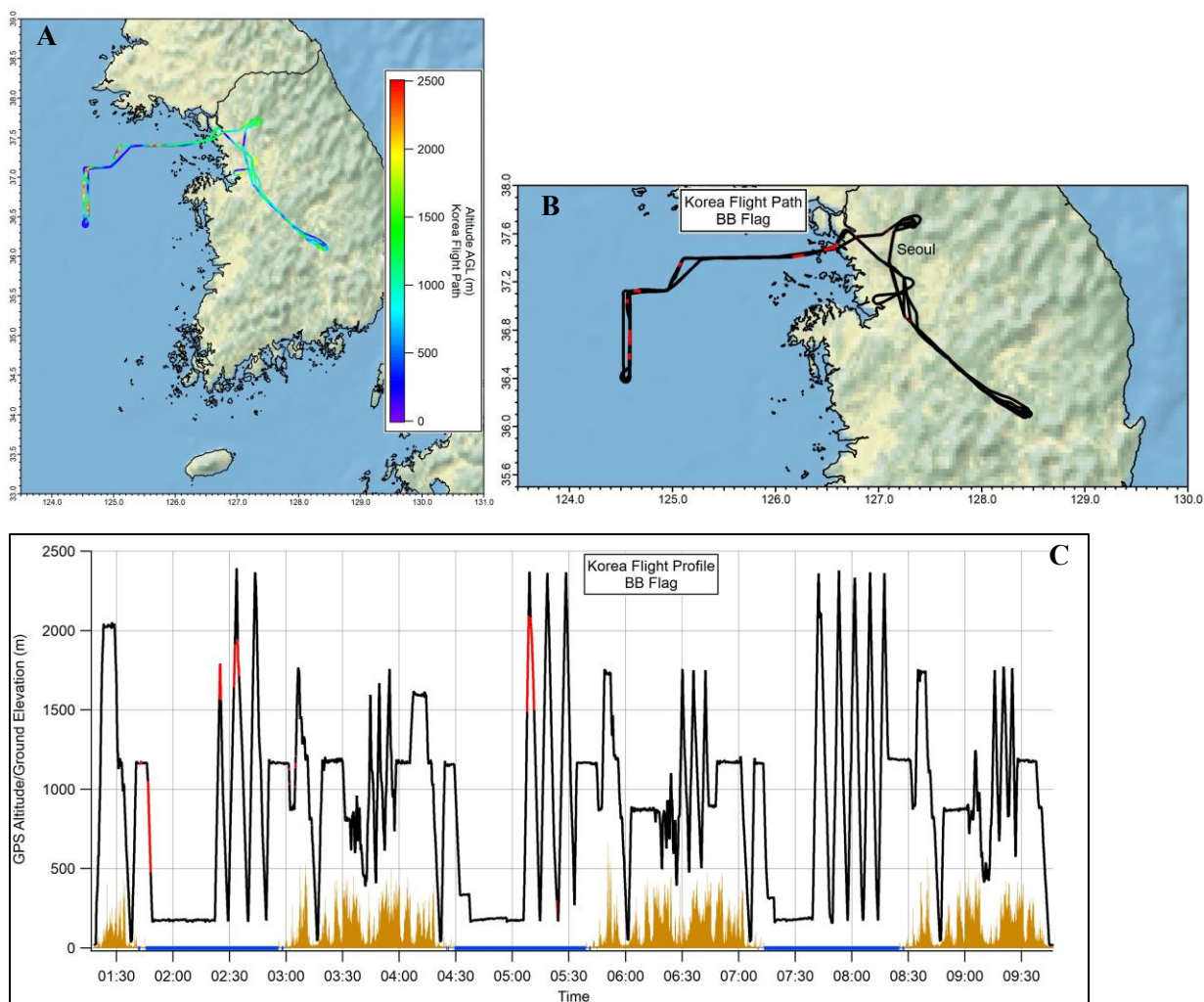


Fig S1. Philippines flight paths colored by altitude above ground level (A) and BB flag (in red) (B) for flight 1. (C) Philippines altitude profile colored by BB Flag (in red) with ground elevation (over land in brown and water in blue) for flight 1.

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21 Fig S2. Korea flight paths colored by altitude above ground level (A) and BB flag (in red) (B) for
 22 flight 3. (C) Korea altitude profile colored by BB Flag (in red) with ground elevation (over land
 23 in brown and water in blue) for flight 3.

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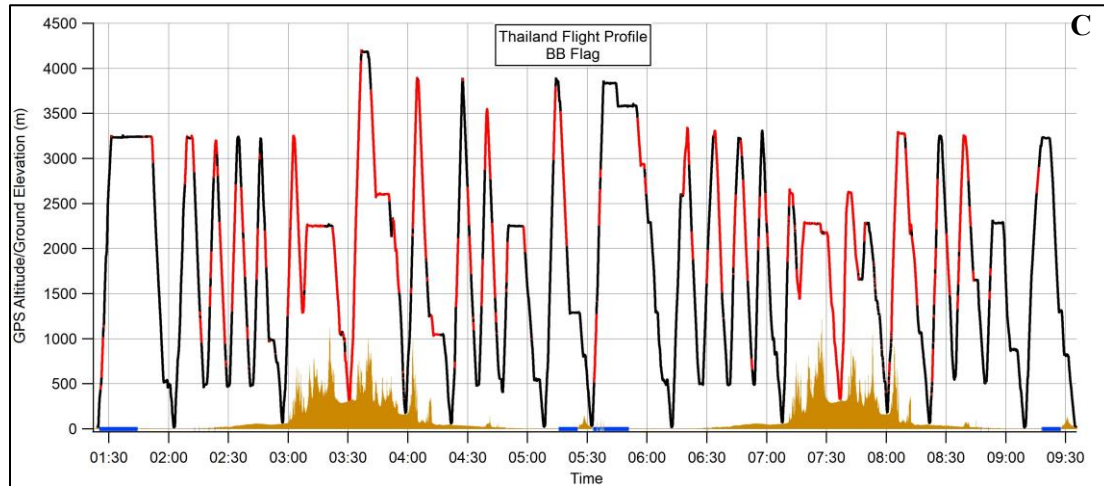
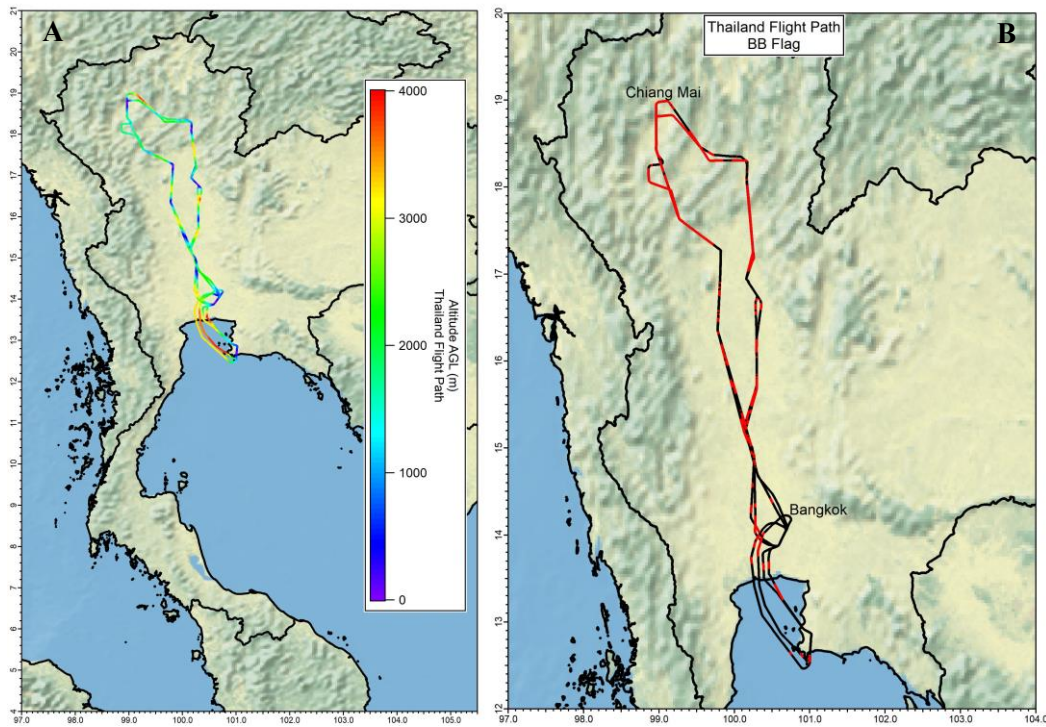


Fig S3. Thailand flight paths colored by altitude above ground level (A) and BB flag (in red) (B) for flight 2. (C) Thailand altitude profile colored by BB Flag (in red) with ground elevation (over land in brown and water in blue) for flight 2.

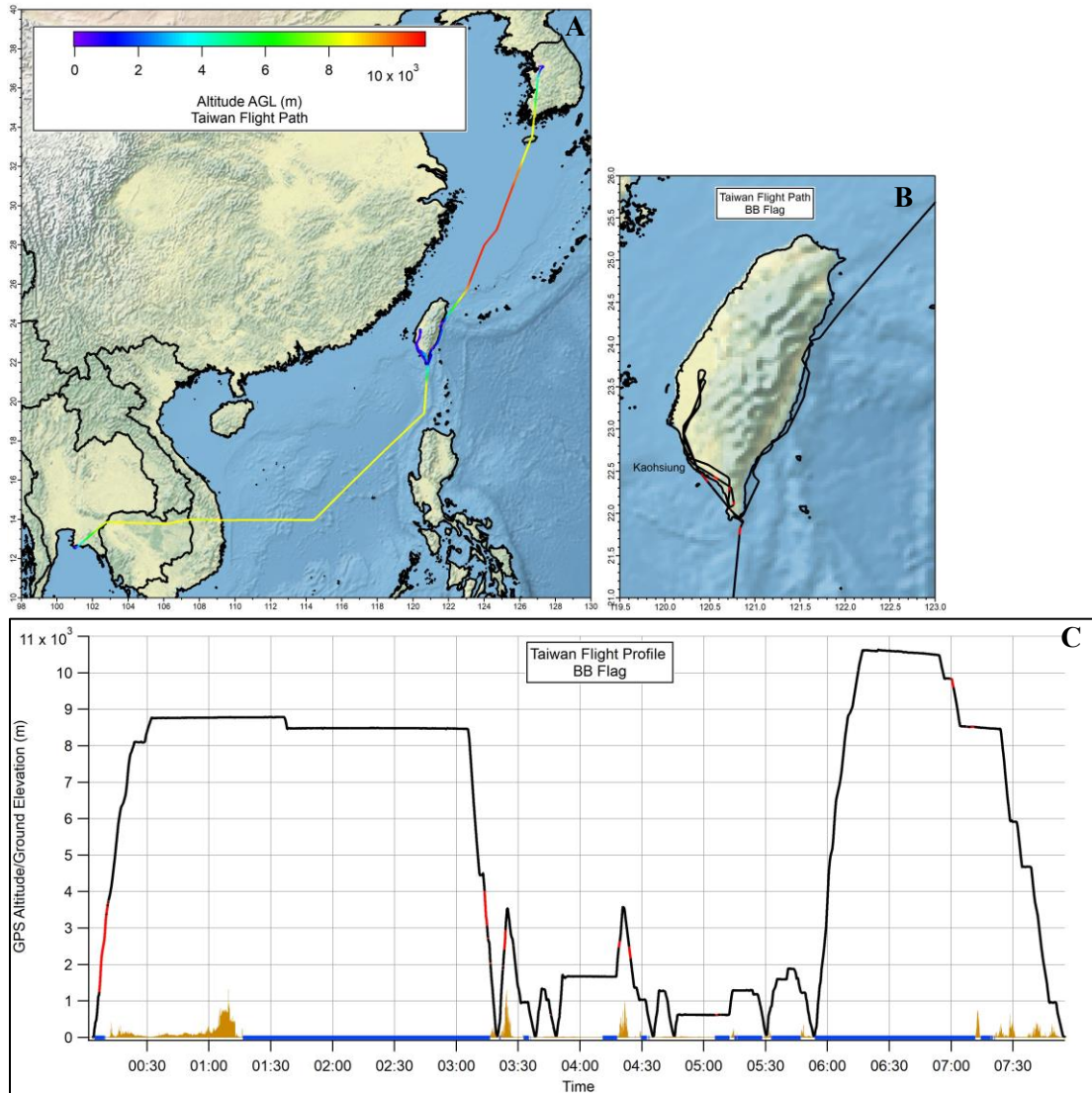


Fig S4. Taiwan flight paths colored by altitude above ground level (A) and BB flag (in red) (B) for flight 3. (C) Taiwan altitude profile colored by BB Flag (in red) with ground elevation (over land in brown and water in blue) for flight 3.

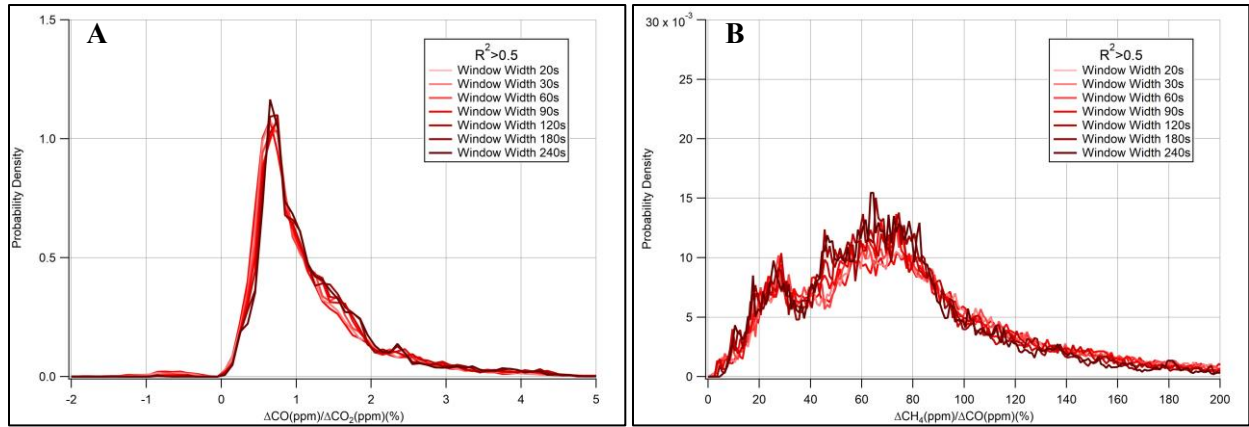


Fig S5. Sensitivity of $\Delta\text{CO}/\Delta\text{CO}_2$ (A) and $\Delta\text{CH}_4/\Delta\text{CO}$ (B) rolling slope methods to changing window width. Results shown here were calculated using all five Korea flights.

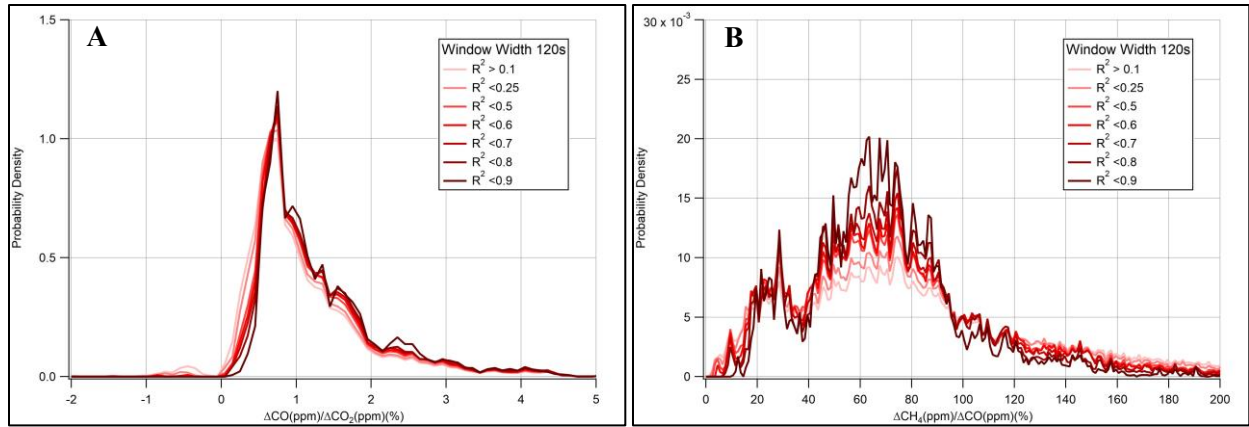


Fig S6. Sensitivity of $\Delta\text{CO}/\Delta\text{CO}_2$ (A) and $\Delta\text{CH}_4/\Delta\text{CO}$ (B) rolling slope methods to changing R^2 cutoff. Results shown here were calculated using all five Korea flights.

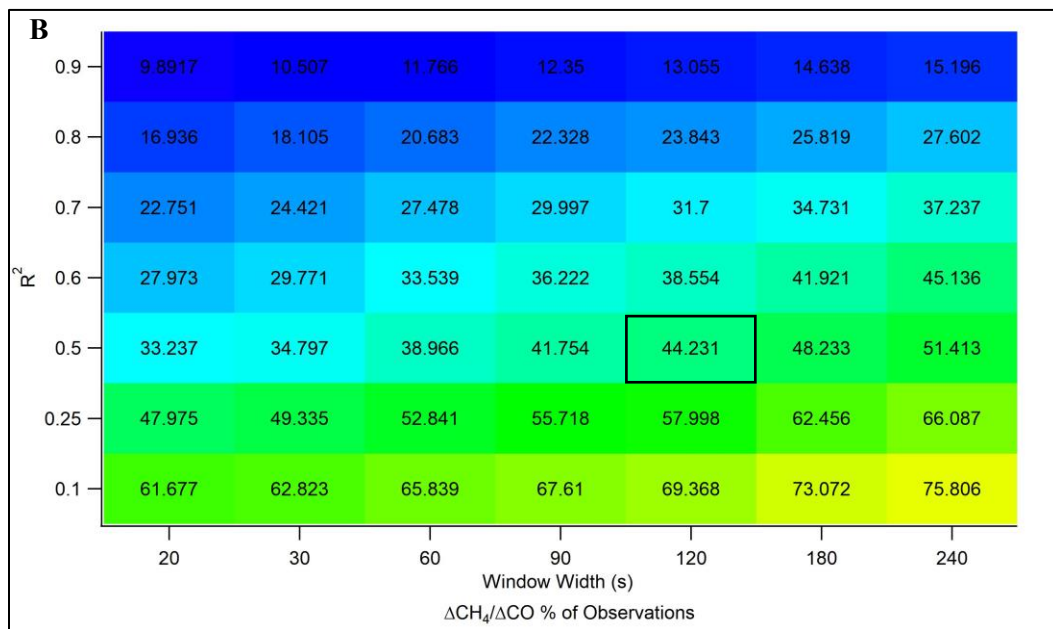
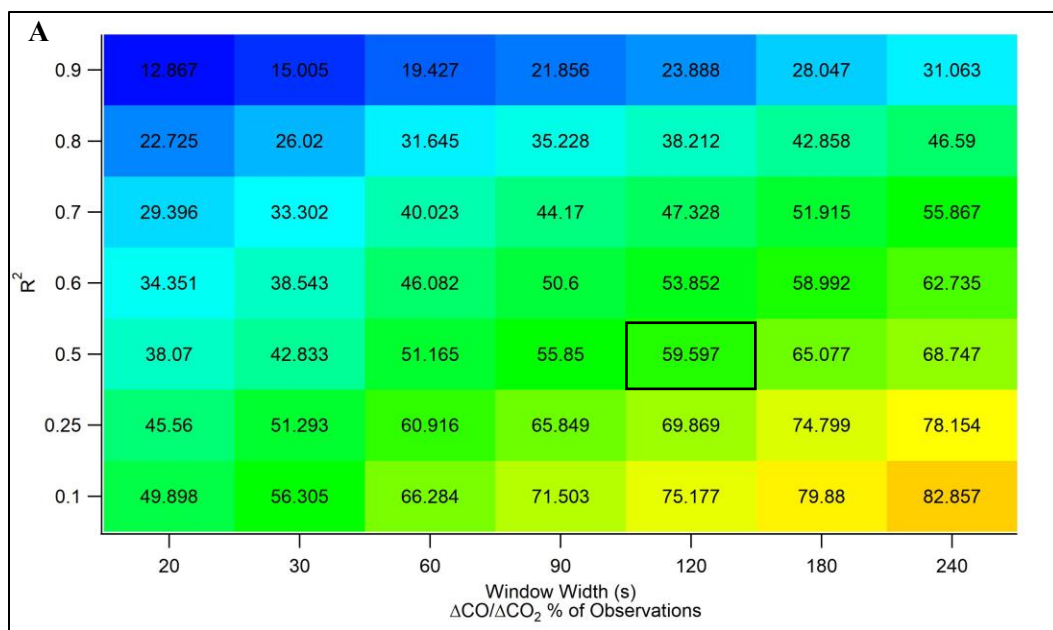


Fig S7. Sensitivity of $\Delta\text{CO}/\Delta\text{CO}_2$ (A) and $\Delta\text{CH}_4/\Delta\text{CO}$ (B) rolling slope methods to changing R^2 cutoffs and window width. Results shown here were calculated using all five Korea flights.

Table S2. Percent of calculated $\Delta\text{CO}/\Delta\text{CO}_2$ and $\Delta\text{CH}_4/\Delta\text{CO}$ slopes that were correlated ($R^2>0.5$) for each flight.

Flight	$\Delta\text{CH}_4/\Delta\text{CO}$ (%)	$\Delta\text{CO}/\Delta\text{CO}_2$ (%)
20240206	46.73	40.05
20240207	44.35	36.41
20240211	47.45	36.22
20240213	60.99	50.33
20240217	53.62	63.53
20240226	48.20	65.74
20240308	36.69	59.50
20240310	48.50	70.05
20240311	62.20	73.11
20240316	65.38	51.49
20240318	60.84	52.36
20240321	47.69	31.99
20240325	73.35	68.87
20240215	47.31	42.29
20240313	53.62	49.58
20240327	50.71	46.28

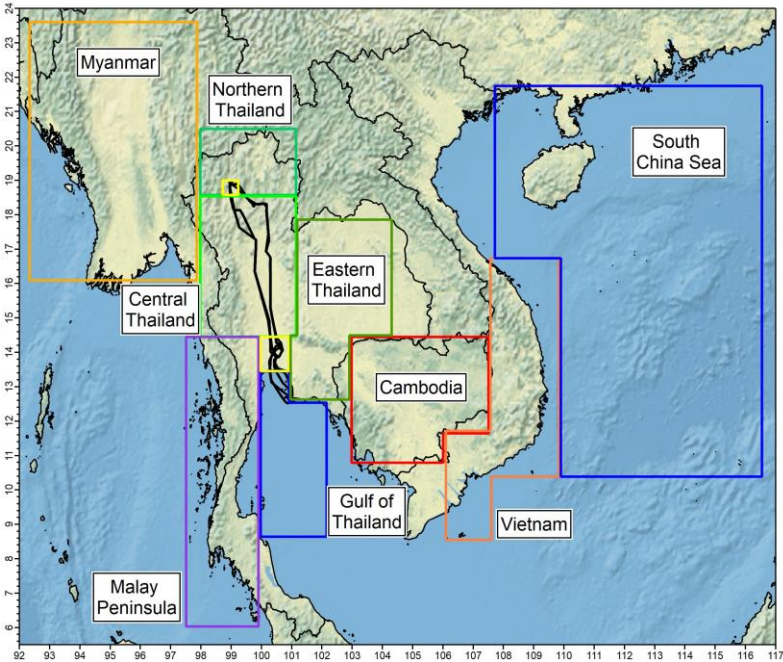
Table S3. Variable Thresholds on a Flight-by-Flight basis.

Flight	$0 < x < \Delta\text{CH}_4/\Delta\text{CO}$ (%)	$>\Delta\text{CO}/\Delta\text{CO}_2$ (%)	$>\text{CO}$ (ppm)	$>\text{HCN}$ (ppt)	$>\text{CH}_3\text{CN}$ (ppb)	$>\text{Total Scattering @ 550 nm (Mm}^{-1}\text{)}$
20240206	55.5	4	0.32	900	0.30	60
20240207	45.5	4	0.35	1000	0.50	100
20240211	45.5	4	0.40	750	0.38	80
20240213	45.5	4	0.36	925	0.32	80
20240217	40.5	4	0.40	500	0.25	130
20240226	40.5	4	0.52	880	0.21	160
20240308	36.5	4	0.27	575	0.19	57
20240310	37.5	4	0.37	600	0.20	105
20240311	48.5	4	0.44	600	0.26	110
20240316	44.5	4	0.32	2750	1.50	160
20240318	47.5	4	0.35	2800	1.10	150
20240321	53.5	4	0.43	1650	0.68	220
20240325	40.5	4	0.40	2400	0.97	220
20240215	44.5	4	0.38	450	0.25	120
20240313	37.5	4	0.41	750	0.26	110
20240327	43.5	4	0.72	700	0.55	200

64 Table S4. Locations coordinates used in Hysplit back trajectory quantification.

Location	Latitude Minimum	Latitude maximum	Longitude Minimum	Longitude maximum
Bangkok	13.46	14.447	99.973	100.91
Gulf of Thailand	8.64	12.54	99.973	102.153
	12.633	13.4469	99.973	100.91
Eastern Thailand	14.50	17.864	101.177	104.298
	12.633	14.447	100.96	102.90
Chiang Mai	18.581	19.00	98.715	99.23
Myanmar	16.098	23.605	92.331	97.86
Cambodia	10.796	14.447	102.9749	106.00
	11.65	14.447	106.10	107.5
Vietnam	8.55	11.72	106.10	107.5681
	10.387	16.74	107.60	109.835
Central Thailand	14.46	18.54	97.98	101.14
South China Sea	16.79	21.749	107.71	116.54
	10.387	16.74	109.89	116.54
Malay Peninsula	6.036	14.447	97.505	99.90
Northern Thailand	18.581	20.50	97.98	101.14

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67 Fig S8. Map of locations used in Hysplit back trajectory quantification.