



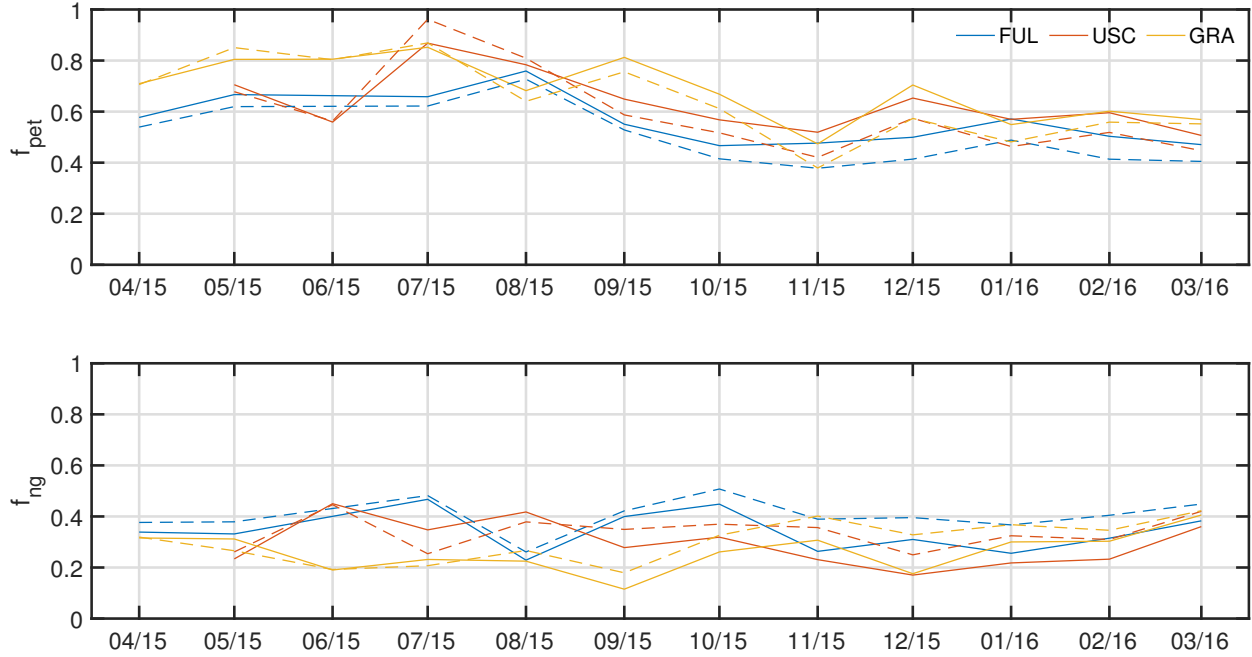
*Supplement of*

## **Quantification of fossil fuel CO<sub>2</sub> from combined CO, $\delta^{13}\text{CO}_2$ and $\Delta^{14}\text{CO}_2$ observations**

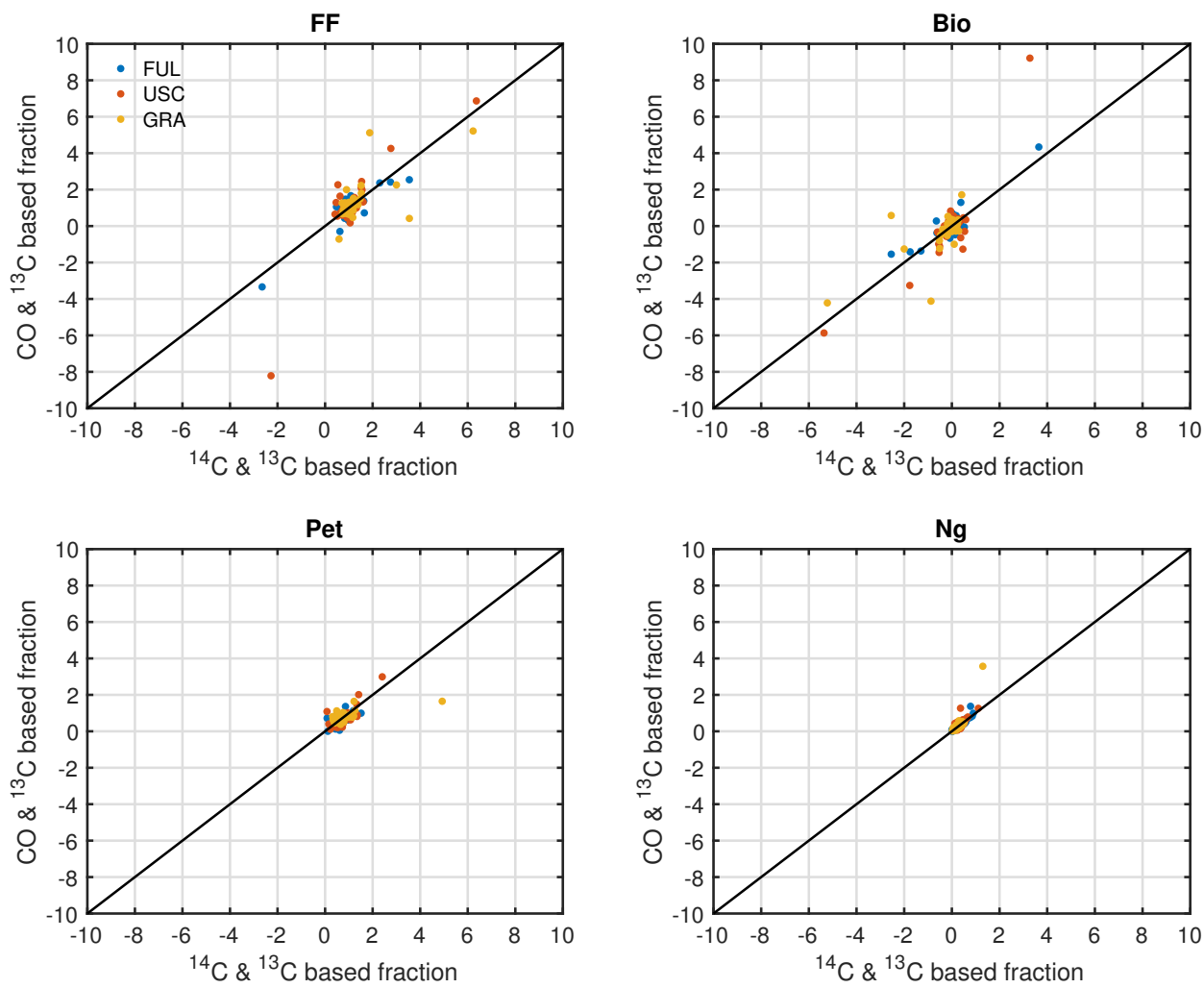
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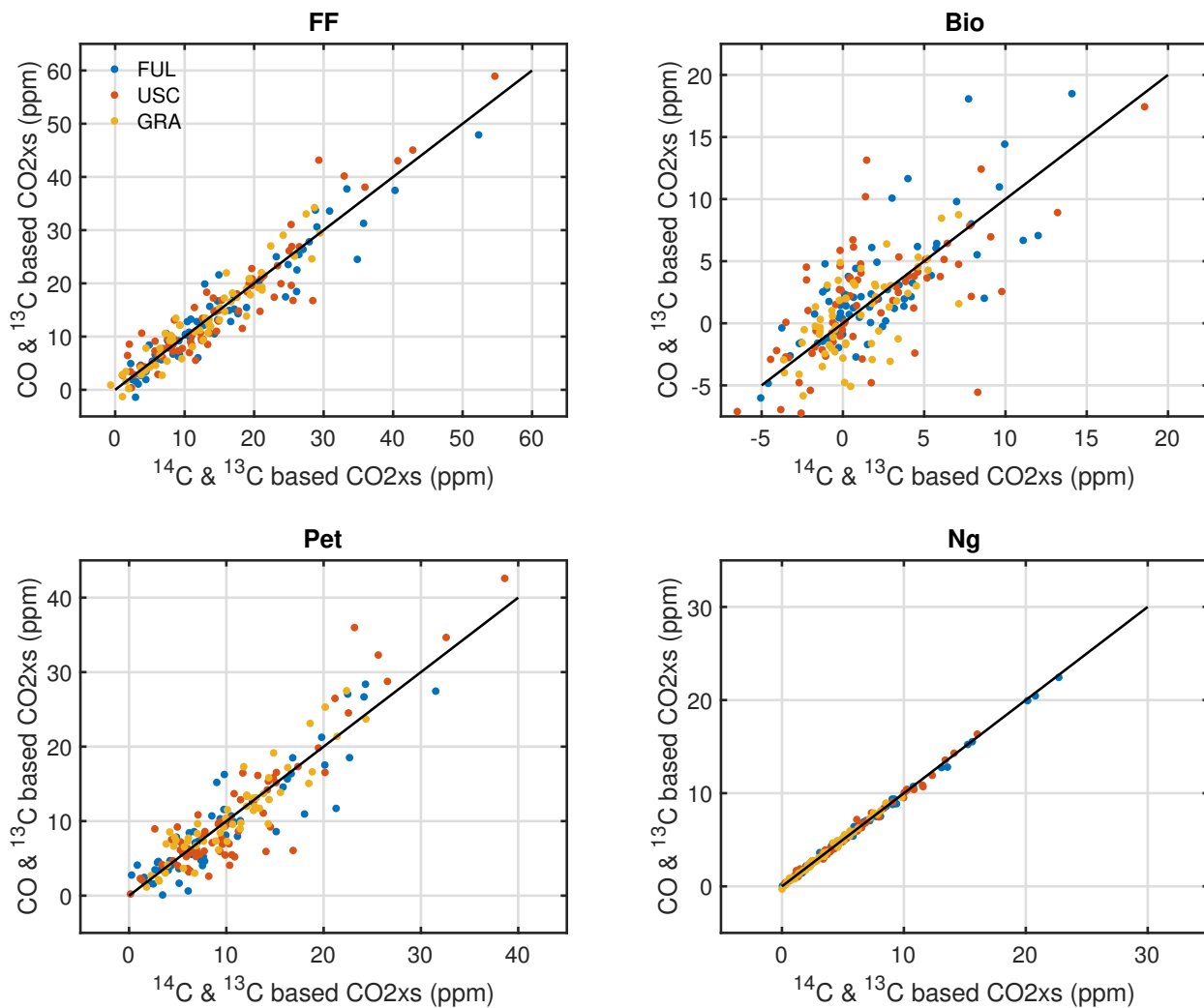
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**Figure S1.** Sensitivity of  $f_{pet}$  and  $f_{ng}$  ( $C_{pet}/C_{xs}$  and  $C_{ng}/C_{xs}$ ) to assuming  $\delta_{bio}$  value. Solid line represents  $f_{pet}$  and  $f_{ng}$  calculated using  $\delta_{bio} = -26.6$  ‰ and the dashed line represents  $\delta_{bio} = -20$  ‰.  $f_{pet}$  changes from  $0.62 \pm 0.13$  to  $0.58 \pm 0.15$  (annual mean and standard deviation of monthly mean fraction),  $f_{ng}$  changes from  $0.30 \pm 0.08$  to  $0.35 \pm 0.08$ .



**Figure S2.** Comparison of  $f$  and  $f'$  values for each source. Black lines represent 1:1 relationships and different colors indicate different sites.



**Figure S3.** Comparison of  $C$  and  $C'$  values for each source. Black lines represent 1:1 relationships and different colors indicate different sites.

**Table S1.** Monthly mean fractional contributions (f) of biosphere (green), petroleum (red), and natural gas (yellow) to CO<sub>2</sub>xs at each site, as determined from  $\Delta^{14}\text{C}$  and  $\delta^{13}\text{C}$  observations (Section 2.2). The sum of the fractions is one in each month.

Month	FUL			USC			GRA		
	Bio	Pet	NG	Bio	Pet	NG	Bio	Pet	NG
Apr 15	0.08	0.58	0.34				-0.03	0.71	0.32
May15	0.00	0.67	0.33	0.06	0.71	0.23	-0.11	0.80	0.31
Jun15				-0.01	0.56	0.45	0.00	0.81	0.19
Jul15	-0.13	0.66	0.47	-0.22	0.87	0.35	-0.08	0.85	0.23
Aug15	0.01	0.76	0.23	-0.20	0.78	0.42	0.09	0.68	0.23
Sep15	0.05	0.55	0.40	0.07	0.65	0.28	0.07	0.81	0.12
Oct15	0.08	0.47	0.45	0.11	0.57	0.32	0.07	0.67	0.26
Nov15	0.26	0.48	0.26	0.25	0.52	0.23	0.22	0.47	0.31
Dec15	0.19	0.50	0.31	0.18	0.65	0.17	0.12	0.70	0.18
Jan16	0.17	0.57	0.26	0.21	0.57	0.22	0.15	0.55	0.30
Feb16	0.18	0.50	0.32	0.17	0.60	0.23	0.10	0.60	0.30
Mar16	0.15	0.47	0.38	0.13	0.51	0.36	0.03	0.57	0.40