Supplement of Biogeosciences, 21, 1161–1172, 2024
https://doi.org/10.5194/bg-21-1161-2024-supplement

Biogeosciences Open Access EGU

Supplement of

Fractionation of stable carbon isotopes during formate consumption in anoxic rice paddy soils and lake sediments

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Legends of the supplemental figures

Fig. S1: Formate conversion to acetate, CH_4 and CO_2 in suspensions of paddy soil from the International Rice Research Institute (IRRI) after addition of formate without sulfate (blue squares) or formate plus sulfate (gypsum) (red triangles) without CH_3F (open symbols) or with CH_3F (closed symbols). Controls with addition of only water (blue or red X crosses) are only shown occasionally. The panels show the temporal change of (a) concentrations of formate, (b) concentrations of acetate, (c) mixing ratios of CH_4 (1 ppmv = 10^{-6} bar), (d) mixing ratios of CO_2, (e) $\delta^{13}C$ of formate, (f) $\delta^{13}C$ of acetate, (g) $\delta^{13}C$ of CH_4, and (h) $\delta^{13}C$ of CO_2. Means ± SE.

Fig. S2: Balance of produced acetate plus CH_4 (blue symbols) and of only CH_4 (red symbols) against the consumed formate in (a) the absence and (b) the presence of sulfate in paddy soil from the IRRI. The open and closed symbols denote conditions in the absence and the presence of CH_3F, respectively. The different symbols indicate three different replicates. The line indicate equimolarity (in terms of reducing equivalents between substrate and product.

Fig. S3: Formate conversion to acetate, CH_4 and CO_2 in suspensions of sediment from the SW basin of Lake Fuchskuhle after addition of formate without sulfate (blue squares) or formate plus sulfate (gypsum) (red triangles) without CH_3F (open symbols) or with CH_3F (closed symbols). Controls with addition of only water (blue or red X crosses) are only shown occasionally. The panels show the temporal change of (a) concentrations of formate, (b) concentrations of acetate, (c) mixing ratios of CH_4 (1 ppmv = 10^{-6} bar), (d) mixing ratios of CO_2, (e) $\delta^{13}C$ of formate, (f) $\delta^{13}C$ of acetate, (g) $\delta^{13}C$ of CH_4, and (h) $\delta^{13}C$ of CO_2. Means ± SE.

Fig. S4: Balance of produced acetate plus CH_4 (blue symbols) and of only CH_4 (red symbols) against the consumed formate in (a) the absence and (b) the presence of sulfate in sediment from the SW basin of Lake Fuchskuhle. The open and closed symbols denote conditions in the absence and the presence of CH_3F, respectively. The different symbols indicate three different replicates. The line indicate equimolarity (in terms of reducing equivalents between substrate and product.

Fig. S5: Mariotti plots of formate consumption in (a) paddy soil from the IRRI and (b, c) sediment from the SW basin of Lake Fuchskuhle under methanogenic (blue symbols) and sulfidogenic (red symbols) conditions both in the absence (open symbols) and in the presence (closed symbols) of CH_3F. The different symbols indicate three different replicates.

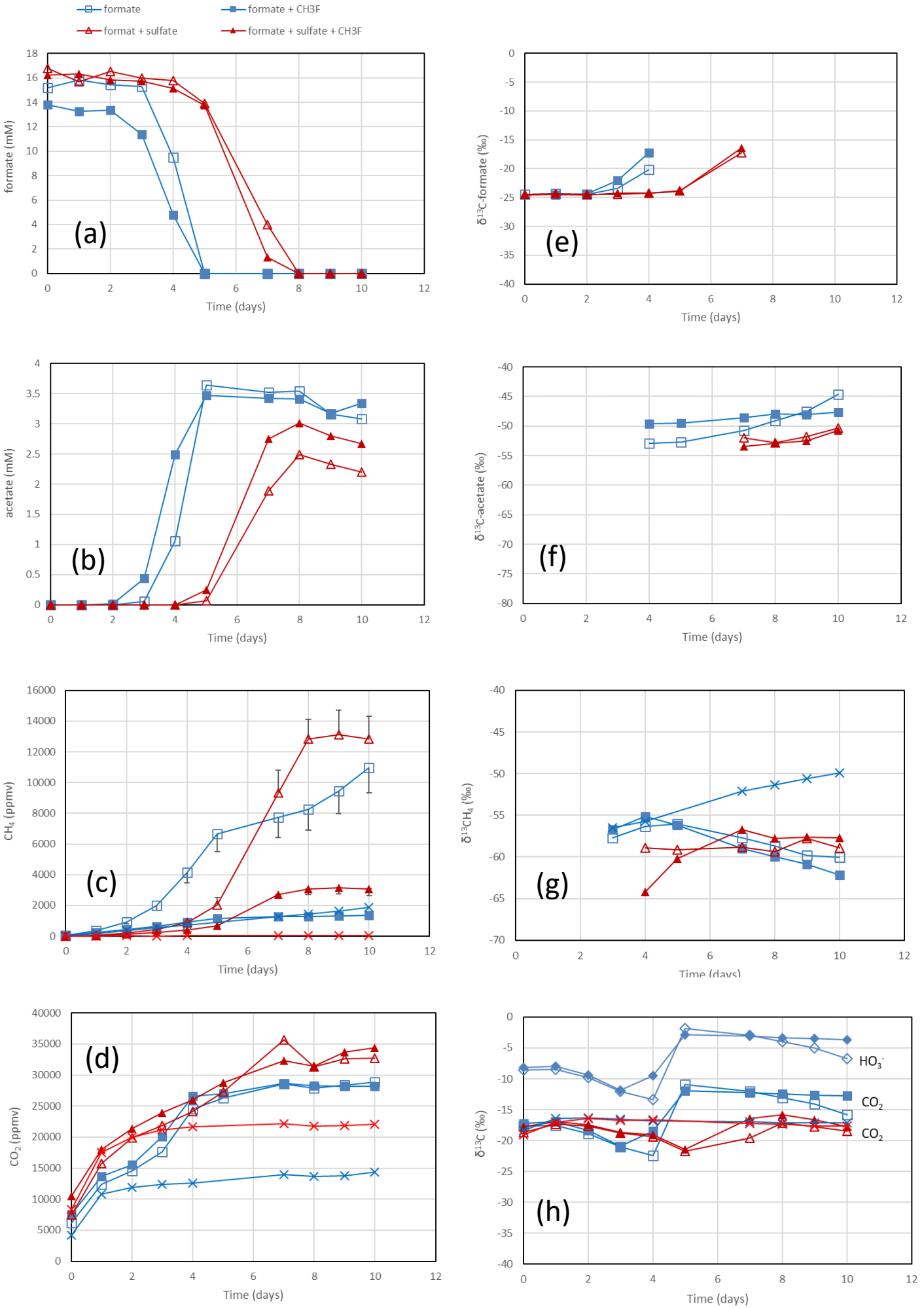
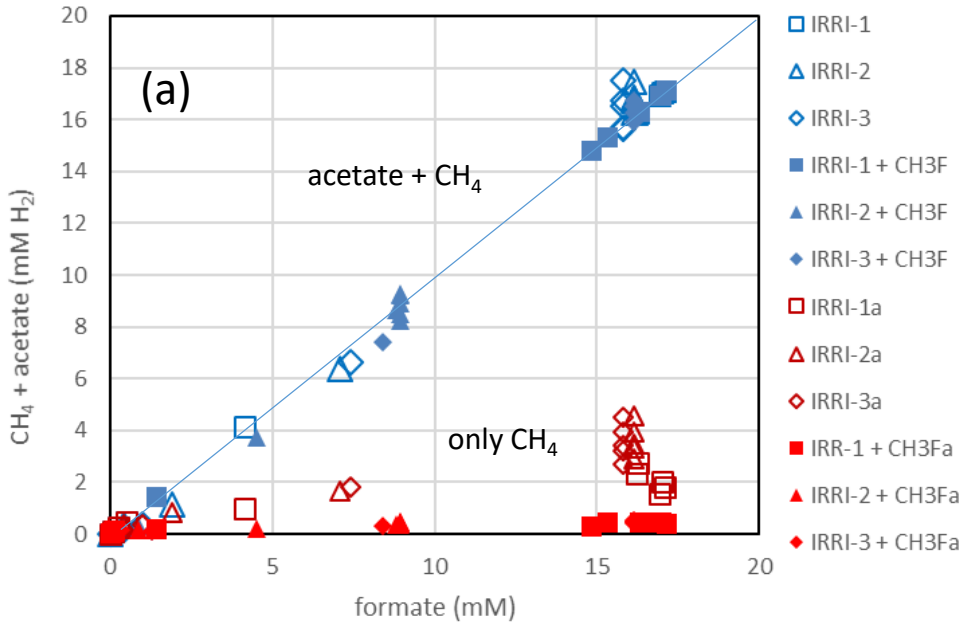

formate
formate + CH3F
format + sulfate
formate + sulfate + CH3F
(a)
formate (mM)
Time (days)
(b)
acetate (mM)
Time (days)
(c)
CH4 (ppmv)
Time (days)
(d)
CO2 (ppmv)
Time (days)
(e)
δ13C-formate (‰)
Time (days)
(f)
δ13C-acetate (‰)
Time (days)
(g)
δ13CH4 (‰)
Time (days)
(h)
δ13C (‰)
HO3-
CO2
CO2
Time (days)

Fig. S1



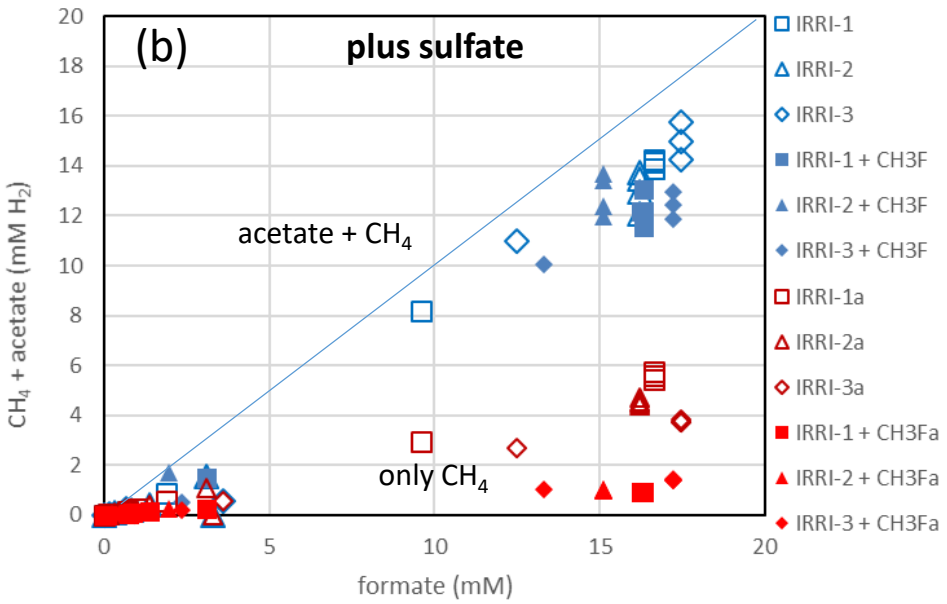


Fig. S2

IRRI-II

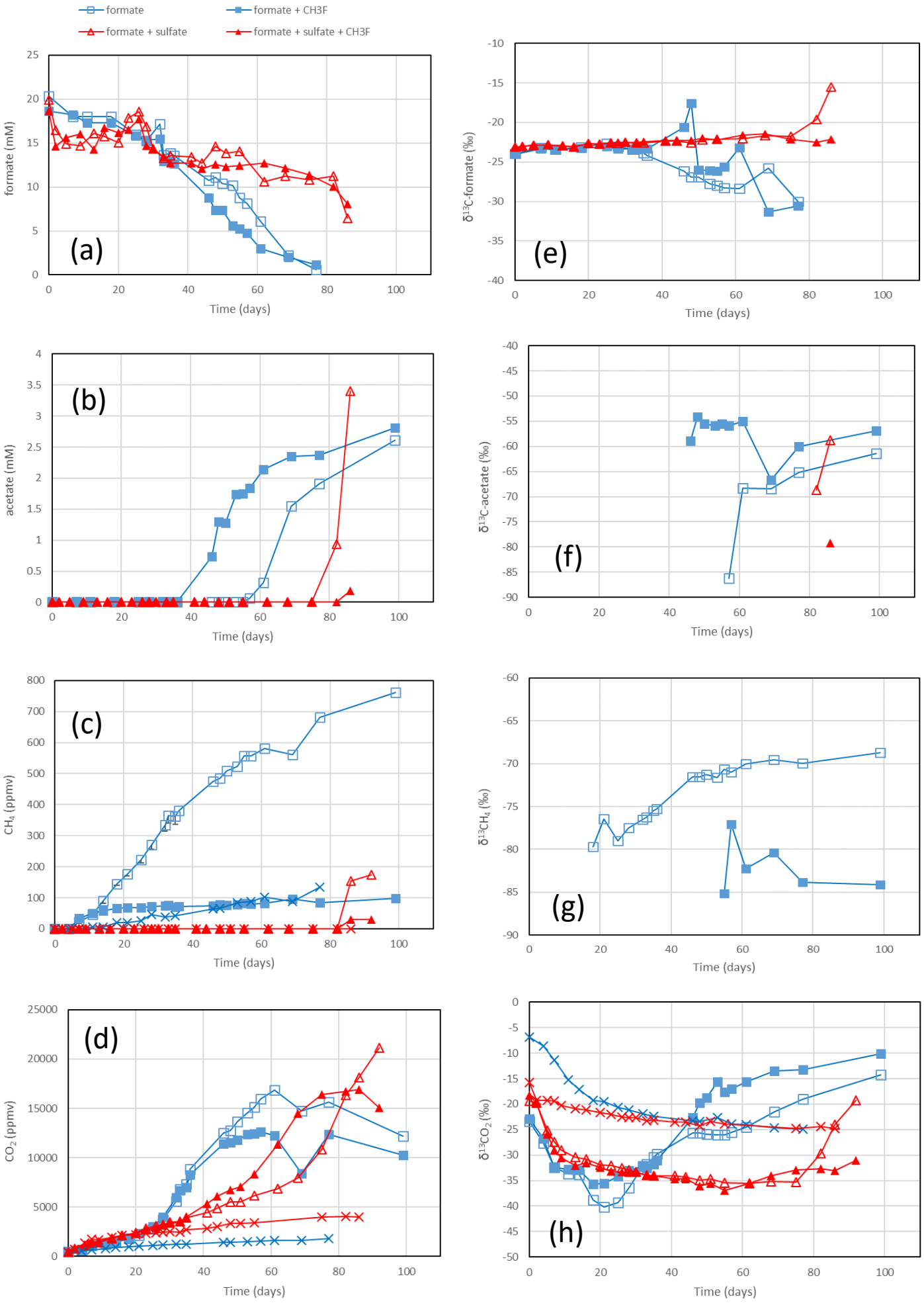
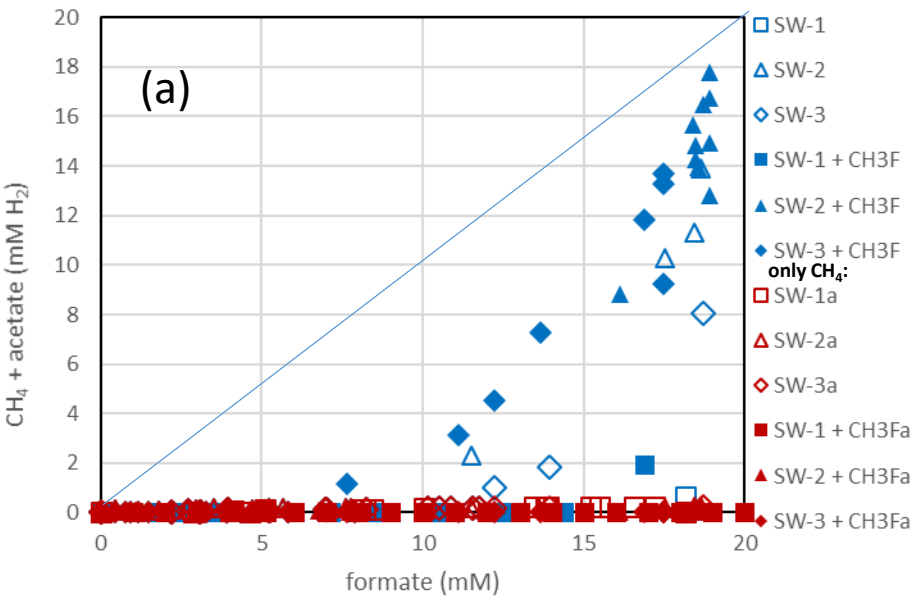

formate
formate + CH3F
formate + sulfate
formate + sulfate + CH3F
(a)
formate (mM)
Time (days)
(b)
acetate (mM)
Time (days)
(c)
CH4 (ppmv)
Time (days)
(d)
CO2 (ppmv)
Time (days)
(e)
δ13C-formate (‰)
Time (days)
(f)
δ13C-acetate (‰)
Time (days)
(g)
δ13CH4 (‰)
Time (days)
(h)
δ13CO2 (‰)
Time (days)

Fig. S3



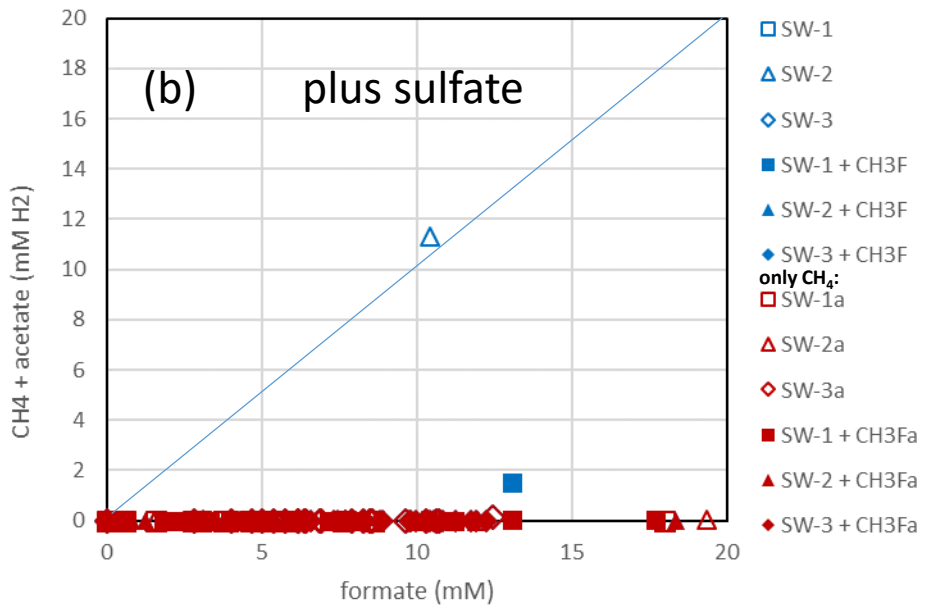
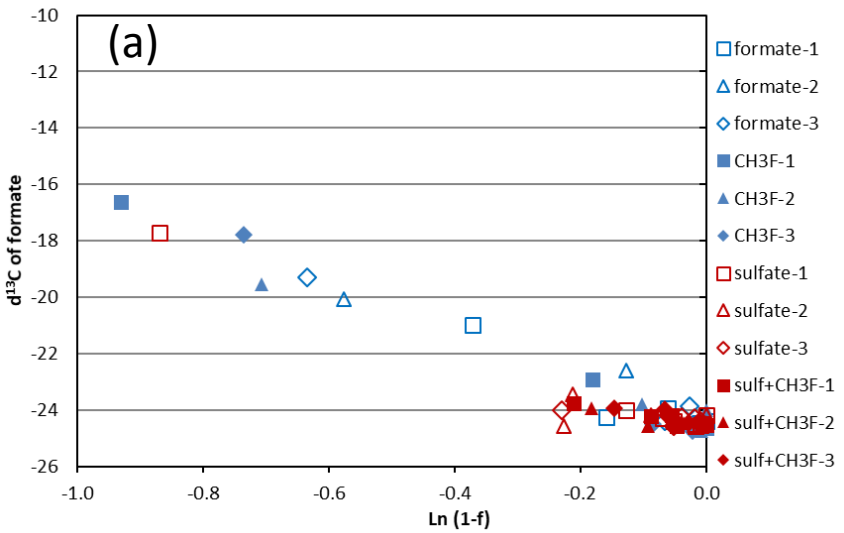


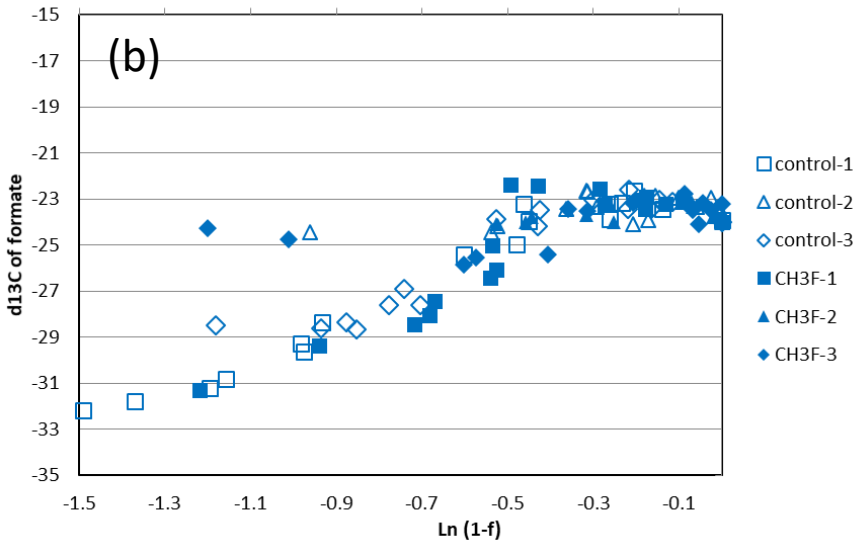
Fig. S4

Fuchskuhle-SW

IRRI



Fuchskuhle-SW



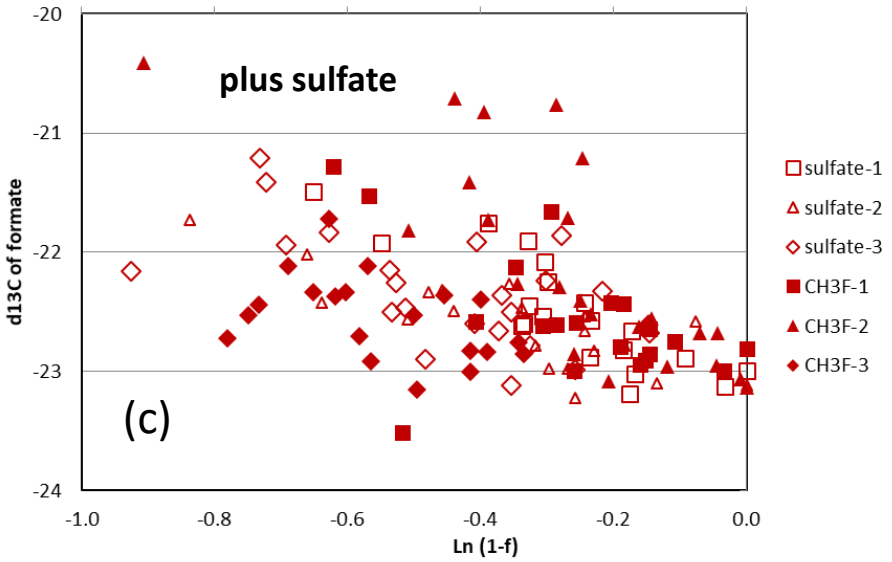


Fig. S5