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*Supplement of*

## **Calculations of automatic chamber flux measurements of methane and carbon dioxide using short time series of concentrations**

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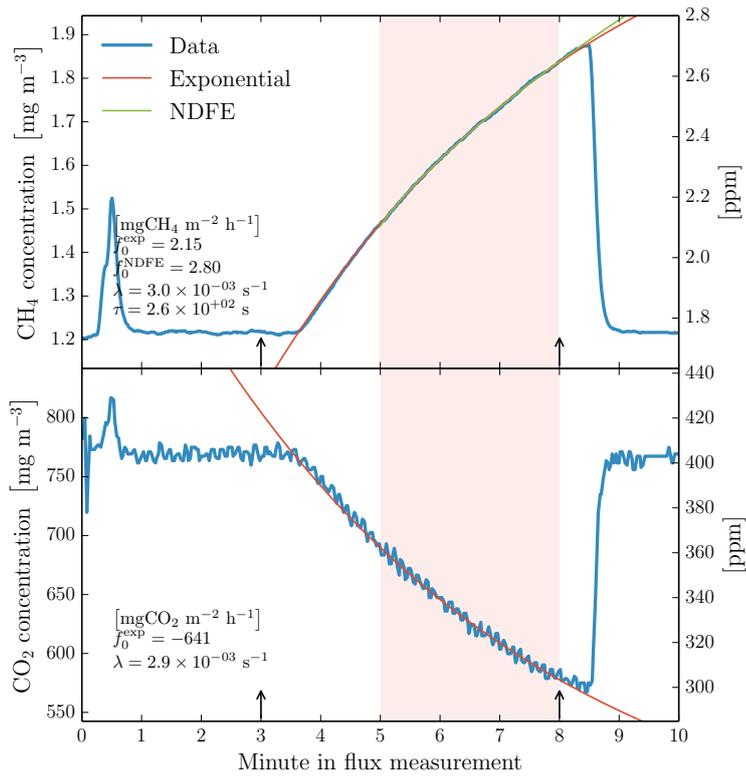


Figure S1: Flux measurement example of  $\text{CH}_4$  (top) and  $\text{CO}_2$  (bottom) from chamber 3 at Adventdalen, 30 July 2013, 14:20 LT.

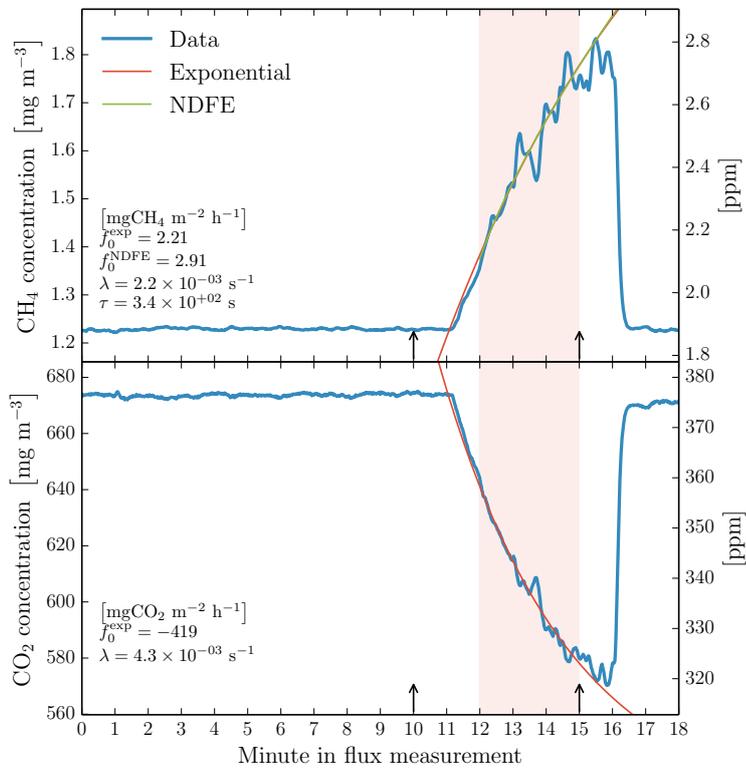


Figure S2: Flux measurement example of  $\text{CH}_4$  (top) and  $\text{CO}_2$  (bottom) from chamber 4 at Stordalen, 07 August 2012, 15:54 LT.

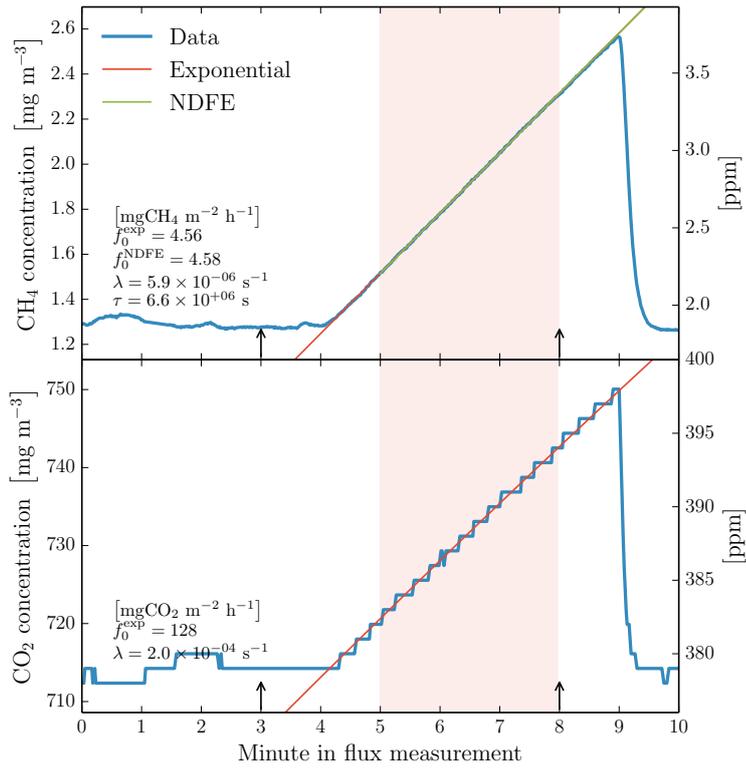


Figure S3: Flux measurement example of CH<sub>4</sub> (top) and CO<sub>2</sub> (bottom) from chamber 3 at Kobbefjord, 05 July 2012, 18:20 LT.

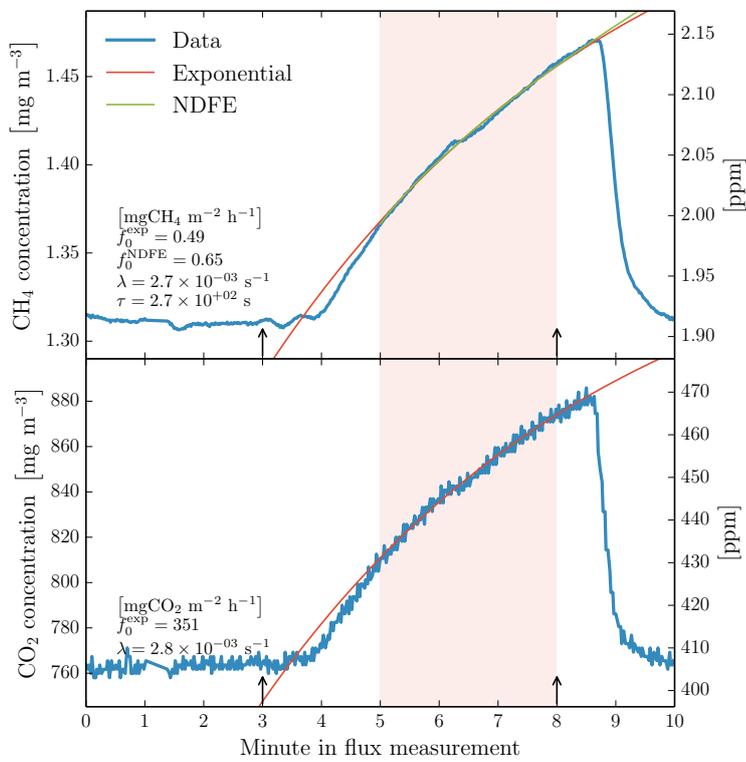


Figure S4: Flux measurement example of CH<sub>4</sub> (top) and CO<sub>2</sub> (bottom) from chamber 4 at Fäjemyr, 19 June 2008, 02:30 LT.

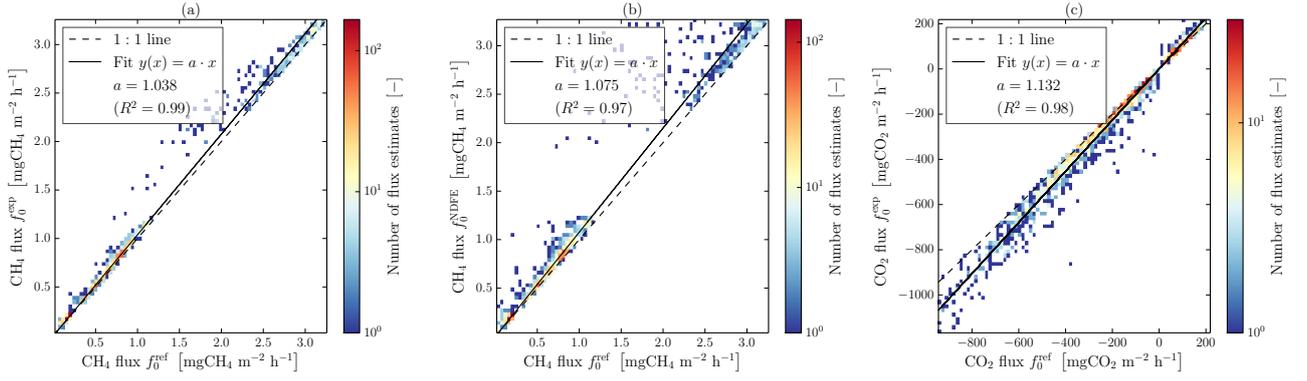


Figure S5: Histograms of flux estimates against reference flux for all chambers of Adventdalen. (a) CH<sub>4</sub>, exponential. (b) CH<sub>4</sub>, NDFE. (c) CO<sub>2</sub>, exponential.

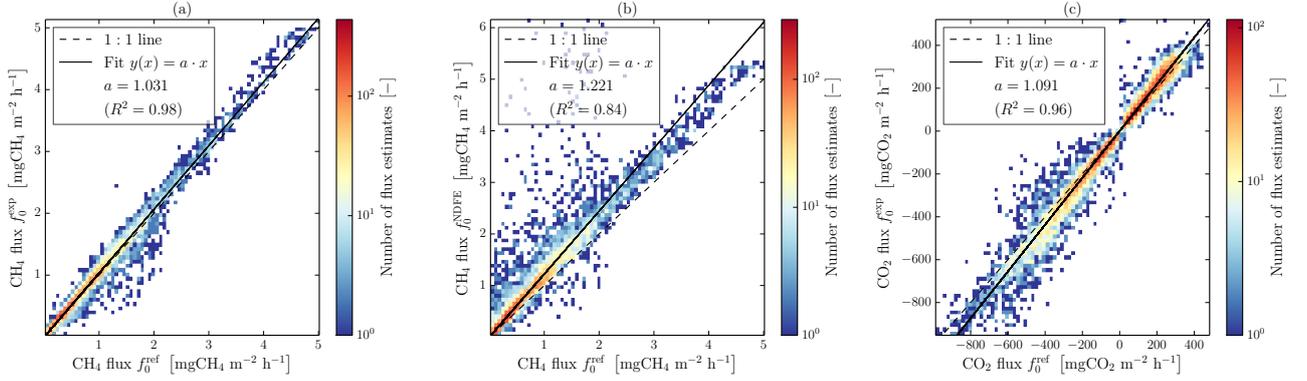


Figure S6: Histograms of flux estimates against reference flux for all chambers of Zackenberg. (a) CH<sub>4</sub>, exponential. (b) CH<sub>4</sub>, NDFE. (c) CO<sub>2</sub>, exponential.

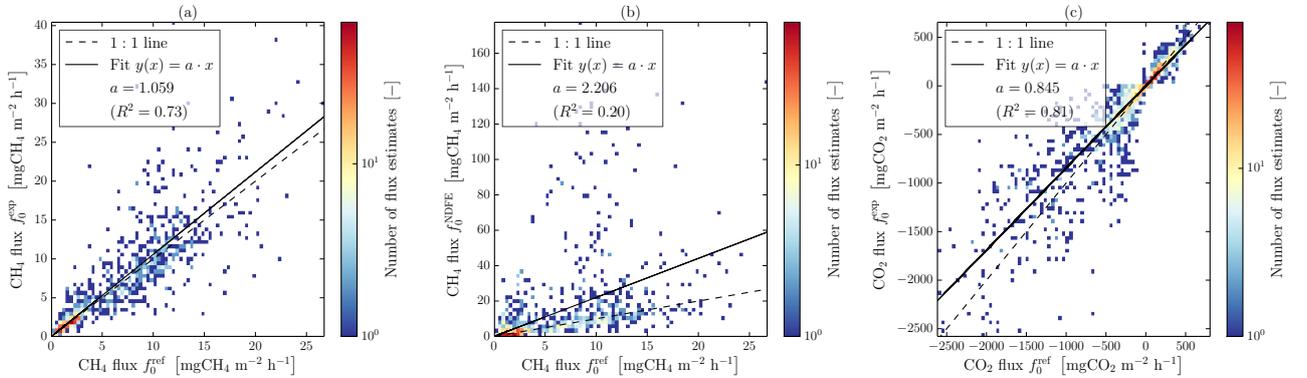


Figure S7: Histograms of flux estimates against reference flux for all chambers of Stordalen. (a) CH<sub>4</sub>, exponential. (b) CH<sub>4</sub>, NDFE. (c) CO<sub>2</sub>, exponential.

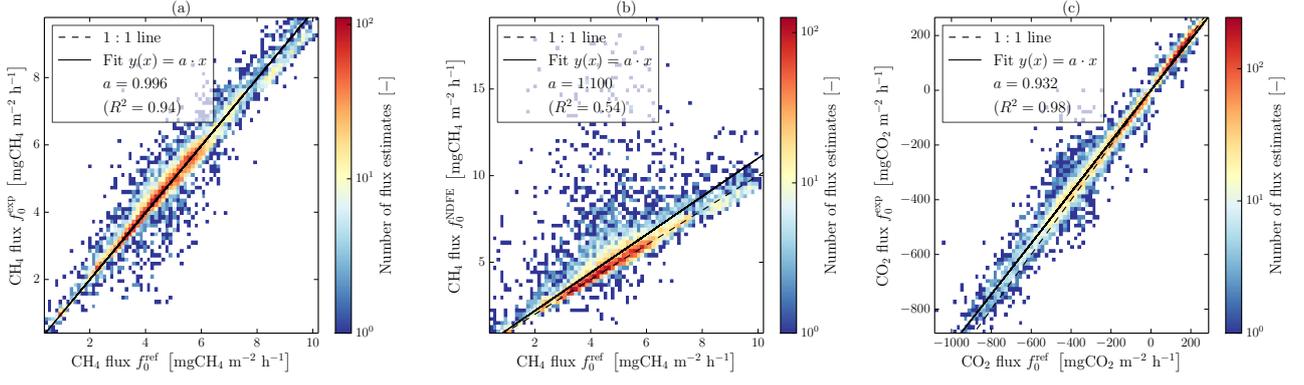


Figure S8: Histograms of flux estimates against reference flux for all chambers of Kobbefjord. (a) CH<sub>4</sub>, exponential. (b) CH<sub>4</sub>, NDFE. (c) CO<sub>2</sub>, exponential.

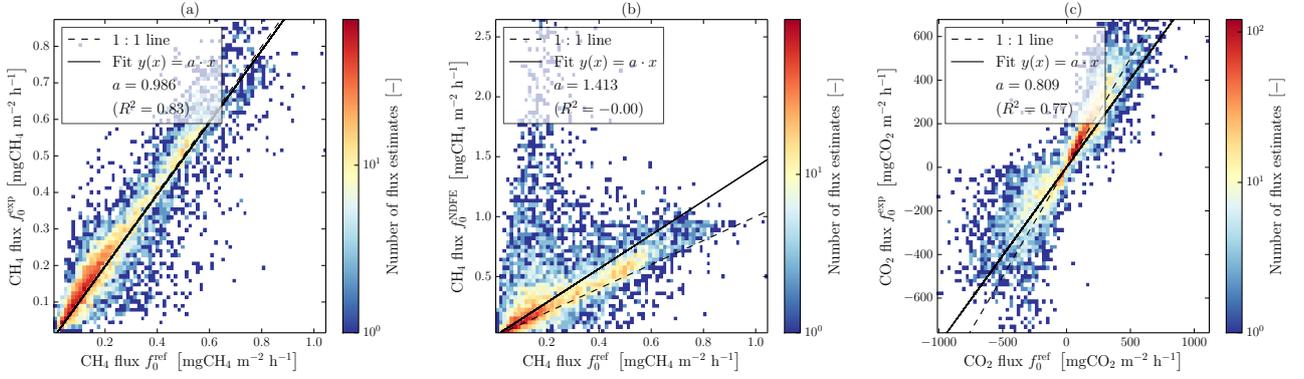


Figure S9: Histograms of flux estimates against reference flux for all chambers of Fäjemyr. (a) CH<sub>4</sub>, exponential. (b) CH<sub>4</sub>, NDFE. (c) CO<sub>2</sub>, exponential.

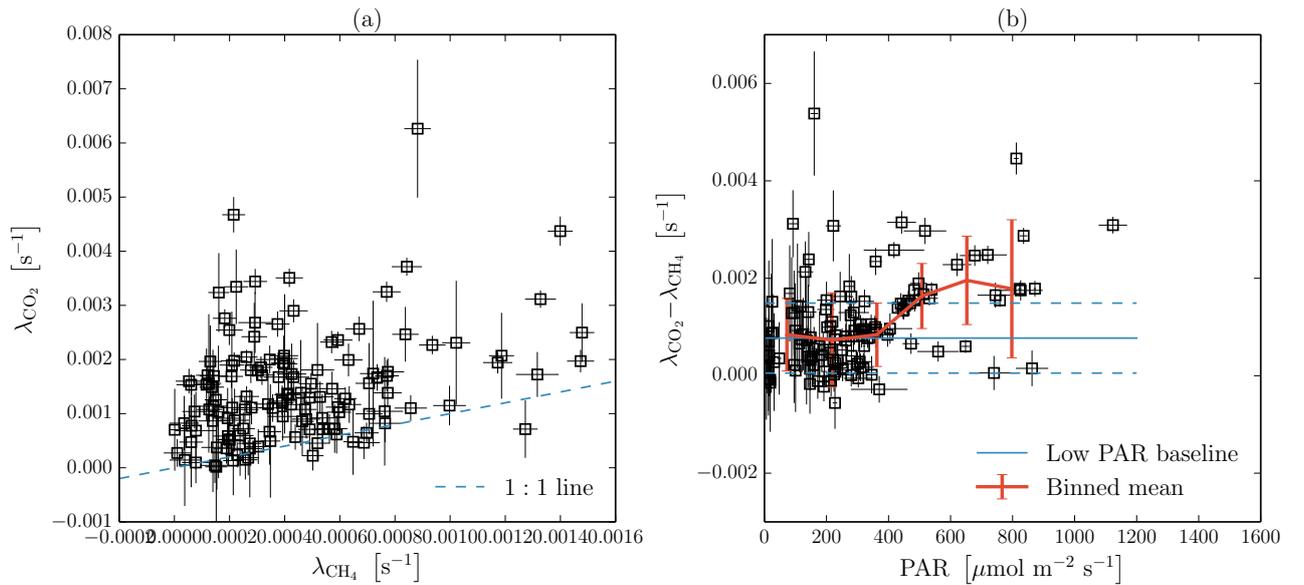


Figure S10: Curvature correlation (a), and curvature difference against PAR (b) of data from chamber 2 at Adventdalen. Error bars indicate standard errors as calculated by the least-squares fit.

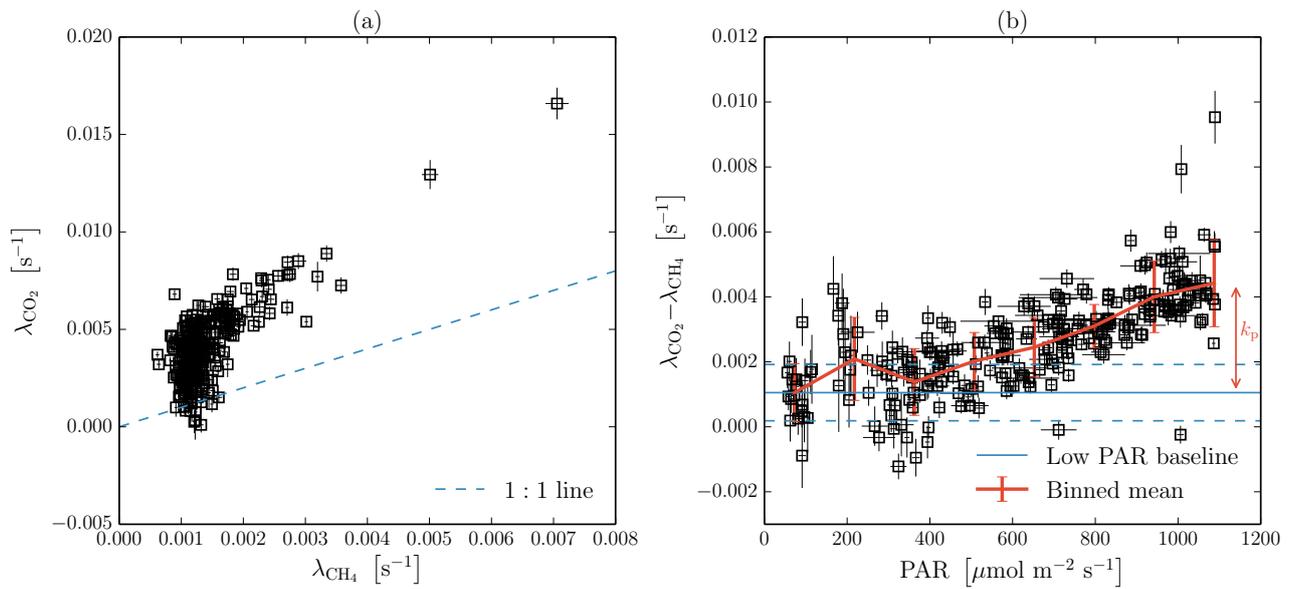


Figure S11: Curvature correlation (a), and curvature difference against PAR (b) of data from chamber 1 at Zackenberg. Error bars indicate standard errors as calculated by the least-squares fit.

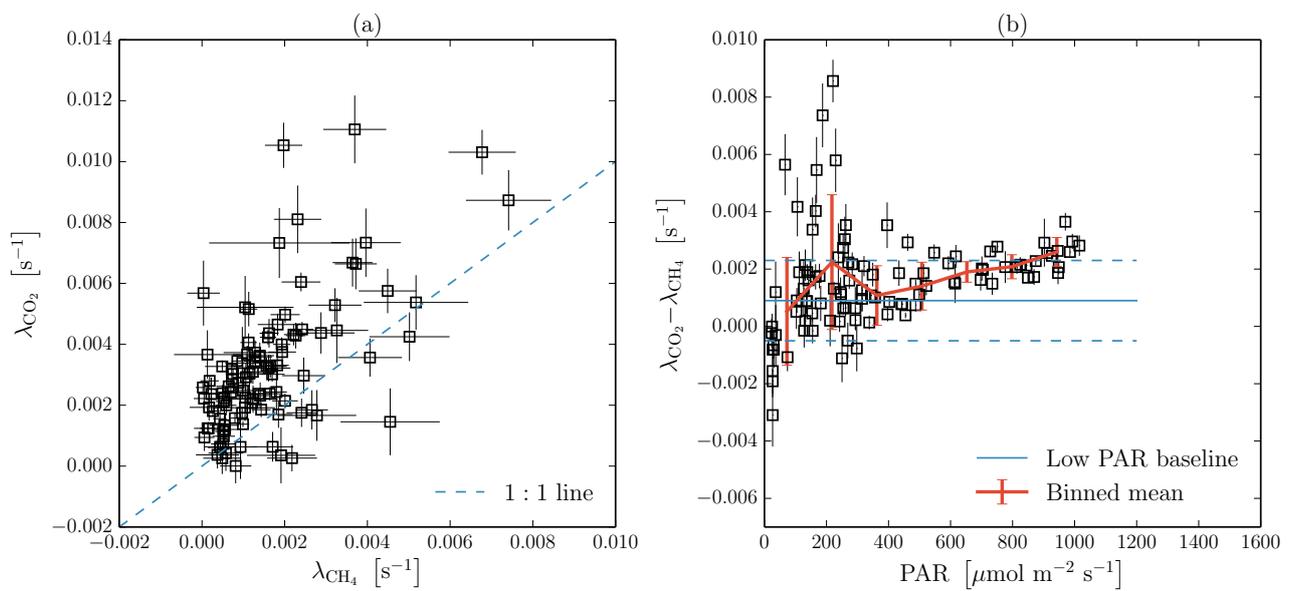


Figure S12: Curvature correlation (a), and curvature difference against PAR (b) of data from chamber 6 at Sordalen. Error bars indicate standard errors as calculated by the least-squares fit.

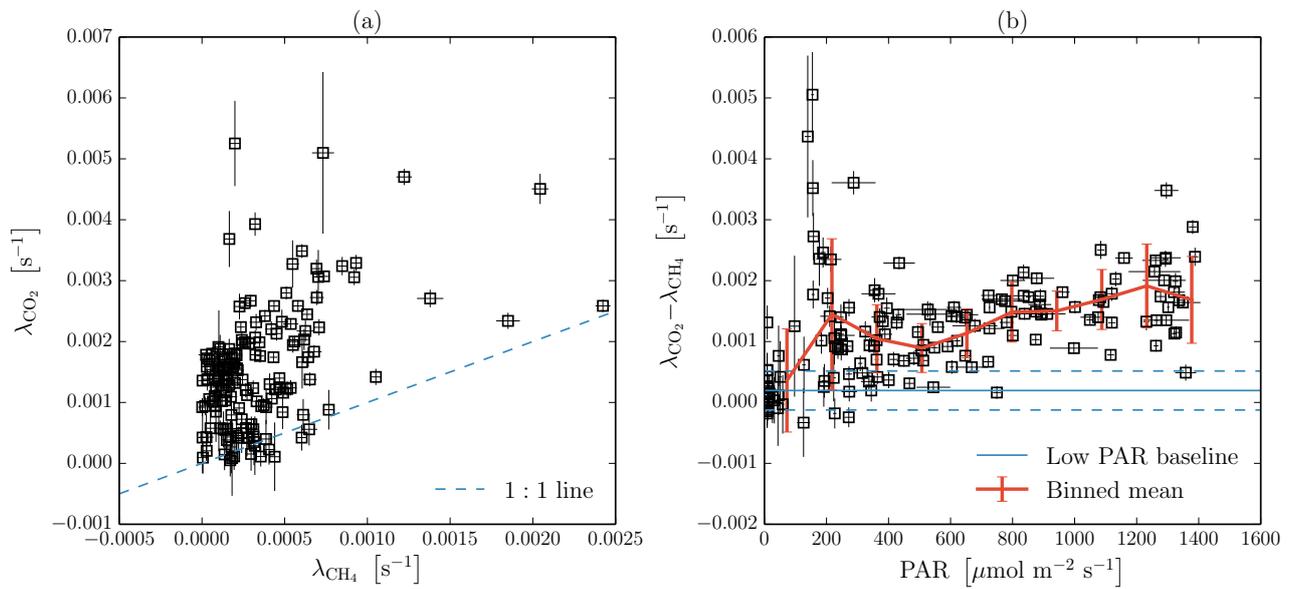


Figure S13: Curvature correlation (a), and curvature difference against PAR (b) of data from chamber 2 at Kobbefjord. Error bars indicate standard errors as calculated by the least-squares fit.

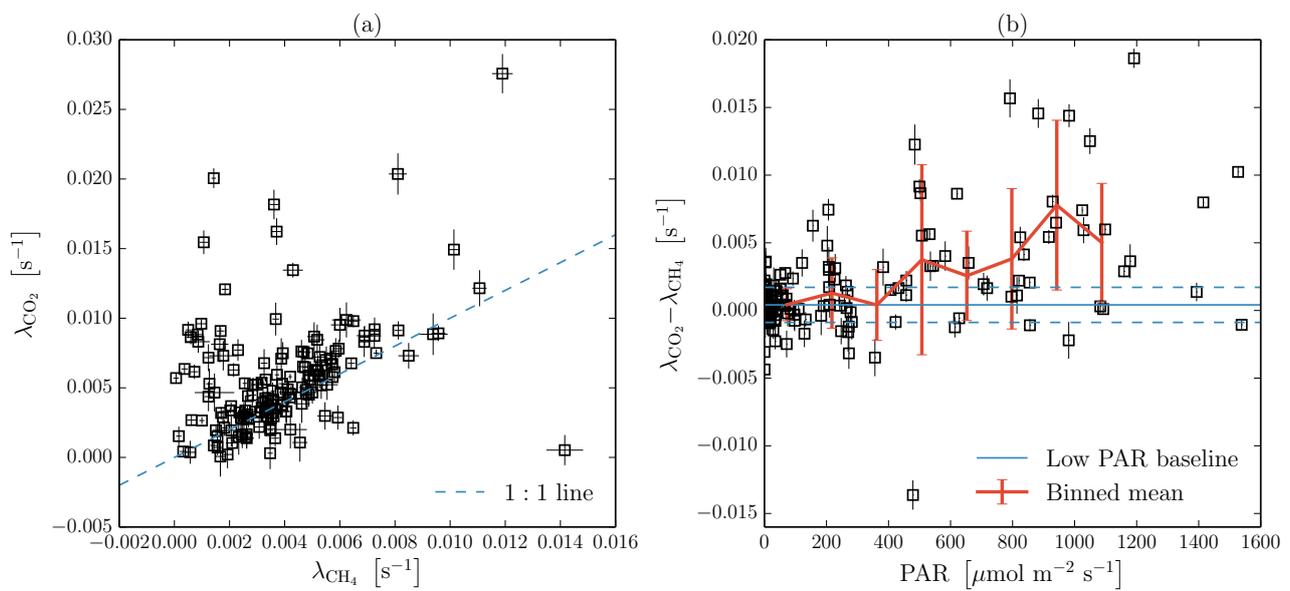


Figure S14: Curvature correlation (a), and curvature difference against PAR (b) of data from chamber 4 at Fåjemyr. Error bars indicate standard errors as calculated by the least-squares fit.