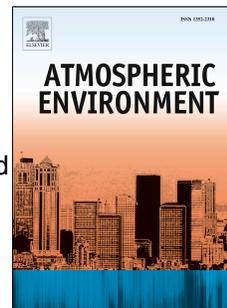


Accepted Manuscript

Seasonal fluxes of carbon monoxide from an intensively grazed grassland in Scotland

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PII: S1352-2310(18)30639-3

DOI: [10.1016/j.atmosenv.2018.09.039](https://doi.org/10.1016/j.atmosenv.2018.09.039)

Reference: AEA 16272

To appear in: *Atmospheric Environment*

Received Date: 29 May 2018

Revised Date: 17 September 2018

Accepted Date: 19 September 2018

Please cite this article as: Cowan, N., Helfter, C., Langford, B., Coyle, M., Levy, P., Moxley, J., Simmons, I., Leeson, S., Nemitz, E., Skiba, U., Seasonal fluxes of carbon monoxide from an intensively grazed grassland in Scotland, *Atmospheric Environment* (2018), doi: <https://doi.org/10.1016/j.atmosenv.2018.09.039>.

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1 Seasonal fluxes of carbon monoxide from an intensively 2 grazed grassland in Scotland

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7 2018-05-24

8 **Highlights:**

- 9 • A long term dataset of CO fluxes measured from agricultural grasslands
10 • A potentially large source of CO emissions is quantified from UK grasslands
11 • CO emissions from grassland can be modelled using meteorological measurements

12 **Keywords:**

13 Eddy Covariance, meteorology, greenhouse gas, inventory, CO

14 **Abstract**

15 Fluxes of carbon monoxide (CO) were measured using a fast-response quantum cascade
16 laser absorption spectrometer and the eddy covariance method at a long-term intensively
17 grazed grassland in southern Scotland. Measurements lasted 20 months from April 2016 to
18 November 2017, during which normal agricultural activities continued. Observed fluxes
19 followed a regular diurnal cycle, peaking at midday and returning to values near zero
20 during the night, with occasional uptake observed. CO fluxes correlated well with the
21 meteorological variables of solar radiation, soil temperature and soil moisture content.
22 Using a general additive model (GAM) we were able to gap fill CO fluxes and estimate
23 annual fluxes of 0.38 ± 0.046 and 0.35 ± 0.045 g C m⁻² y⁻¹ for 2016 and 2017,
24 respectively. If the CO fluxes reported in this study are representative of UK grasslands,
25 then national annual emissions could be expected to be in the order of 61.91 (54.3 to 69.5)
26 Gg, which equates to 3.8 % (3.4 to 4.3 %) of the current national inventory total.

27

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