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Initiation of methane turbulent flux measurements over a grazed grassland in Belgium

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Methane fluxes emitted by a grazed meadow were measured continuously during the 2012 grazing season at the Dorinne Terrestrial Observatory (50° 18' 44" N; 4° 58' 07" E; 248 m asl.) in Belgium. Measurements were made with the eddy covariance technique, using a fast CH_4 analyzer (Picarro G2311-f). Carbon dioxide fluxes (LI-7000) and various micro-meteorological and soil variables, biomass growth and stocking rate evolution were also measured at the site. The site is an intensively pastured meadow of 4.2 ha managed according to the regional usual practices where up to 30 cows are grazing simultaneously. N_2O emissions are currently measured through dynamic closed chambers (Beekkerk van Ruth *et al.*, Geophysical Research Abstracts. Vol. 15, EGU2013-3211, 2013) and the carbon budget of the site has already been investigated (Jerome *et al. Geophysical Research Abstracts, Vol. 15, EGU2013-6989, 2013*). As no CH_4 measurements were available, CH_4 fluxes were estimated on the basis of dry matter intake by the cows and a conversion factor obtained from a literature review. We want to improve this estimation by measuring CH_4 fluxes, identifying their main environmental drivers and understanding diurnal and annual exchange patterns.

Methane emissions were found strongly related with cattle stocking rate with a slope of 7.34 ± 0.78 mol CH_4 day^{-1} LSU^{-1}. Up to now, no methane absorption has been observed, the meadow behaving as a methane emitter, even in the absence of cows. In the absence of cows, no significant relation can be established up to now between methane emissions and environmental parameters. No clear diurnal evolution is observed, neither during grazing periods nor during cow free periods. During cow presence periods, fluxes are highly variable, probably due to cow movements in and out the measurement footprint and cow digestion rhythm. Further developments are ongoing in order to improve cattle geo-localization through individual home-made GPS devices and infra-red cameras. The two systems will be compared in terms of cost, efficiency and ease of use.

Key words: grassland, methane fluxes, eddy covariance, cattle emissions