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GHG Fluxes in semi-natural grasslands in the Pyrenees

Haifa Debouk (1,2), Nuria Altimir (1), Angela Ribas (1,3,4), Mercedes Ibañez (2), Teresa Sebastià (1,2)

(1) Laboratory of functional ecology and global change, Forest Sciences Centre of Catalonia, Carretera de St. Llorenç de Morunys km 2, 25280 Solsona, Spain (haifa.debouk@ctfc.es), (2) University of Lleida, ETSEA, HBJ dept., Avinguda Alcalde Rovira Roure 191, 25198 Lleida, Spain, (3) BABVE, Edifici C, Universitat Autònoma de Barcelona, 08193 Bellaterra, Spain, (4) CREAF, Cerdanyola del Valles 08193, Catalonia, Spain

Mountain areas are identified by the IPCC report (2013) as particularly sensitive to climate change. The need to understand mountain grasslands is crucial since these ecosystems can act as both sinks and sources of CO_2. Investigating CH4 and N2O fluxes is important because they can offset potential CO_2 sequestration. While most studies have been focusing on CO_2, the knowledge on the temporal and spatial variability of CH4 and N2O, particularly in semi-natural mountain grasslands, is scarce. This study describes the magnitude and range of variability of the fluxes of CO_2, N2O, and CH4 from four semi-natural pastures in the Pyrenees across an altitudinal gradient (1026 to 2436 m a.s.l.) during the growth period in 2012 and 2013. We measured GHG fluxes of the grassland during both light and dark conditions in the study sites using a photoacoustic field gas-monitor (INNOVA 1412, LumaSense Technologies). After completing the GHG measurements, we collected vegetation samples for the estimation of above-ground and below-ground biomass and separated them into functional groups and species. We present here the analysis of the relationship between GHG fluxes and above-ground biomass including the contribution of the relative abundance of plant functional types. Our preliminary results showed a clear seasonal pattern of GHG fluxes. We observed a negative impact of the summer period on the GHG fluxes, which was mostly pronounced in the CO_2. We will further elaborate in-depth the effect of the temporal and spatial variability on the fluxes of CO_2, N2O and CH4. Also, we will present the relationship between the GHG fluxes and the contribution of the vegetation in terms of the relative abundance of different plant functional types.