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CO_2 and CH4 exchange by Phragmites australis under different climates

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The key role of wetlands regarding global warming is the resulting balance between net CO_2 assimilation, via photosynthesis, and CO_2 and CH4 emissions, given the potential to release stored carbon, because of the high temperature sensitivity of heterotrophic soil respiration and anoxic conditions. However, it is still unknown whether wetlands will convert from long-term carbon sinks to sources as a result of climate change and other anthropogenic effects such as land use changes. Phragmites australis is one of the most common species found in wetlands and is considered the most globally widespread and productive plant species in this type of ecosystem. In this context, the main objective of this study is to analyse the GHG exchange (CO_2 and CH4) of two wetlands with Phragmites australis as the dominant species under different climates using the eddy covariance (EC) technique. The first site, Padul, is located in southern Spain, with a sub-humid warm climate, characterised by a mean annual temperature of 16ºC and annual precipitation of ca. 470 mm, with a very dry summer. The second site, Rzecin is located in Poland with a mean annual temperature of 8ºC, and annual precipitation around 600mm with no dry season. The Padul EC station is equipped with two infrared gas analysers to measure CO_2 and CH4 fluxes (LI-7200 and LI-7700 respectively) while the Rzecin EC station has the same CH4 sensor as Padul, but also a sensor measuring both GHG fluxes (DLT-100 Fast Methane Analyser, Los Gatos). In this study, we present: i) the results of a CH4 analyser inter-comparison campaign (LI-7700 vs. Los Gatos), ii) a comparative analysis of the functional behaviour of respiration and photosynthesis in both sites testing relationships between CO_2 fluxes measured with the EC technique and meteorological variables such as temperature and direct or diffuse radiation and iii) the CH4 dynamicsat both sites by identifying, when possible, annual, seasonal and diurnal patterns.