

Review for 2024-1320

Abstract

Line 14: Clarify that *H. portulacoides* and *E. atherica* are part of the same habitat (similar to line 85)

Introduction

Consider also methylotrophic methanogens which persist in saline environments.

Line 68- How extensive are non-tidal marshes in the Mediterranean? Elsewhere?

Line 85-90: Which plant species are C3 vs C4?

Line 93: Specify the temperature and salinity ranges typical of this region. Are there any salinity differences in the marsh soils between habitats or seasons?

Section 2.2

How does severing the plant stems and leaves affect the CO₂ fluxes? How long were they stored in the refrigerator?

(Were any measurements done on live, intact plants in the field?)

Line 110-111: How was stomatal conductance measured?

Line 126-130: Specify make/model of the gas chromatograph- was it using flame ionization detector?

Two methods for soil respiration rates are reported: The soda lime method was used when soils were not flooded. A gas chromatography based method was used when soils were flooded. How was "flooded" defined? How many measurements were made with each method? (This information will help readers to understand whether flooding frequent or infrequent).

I am not familiar with the soda lime method. Authors should better support their statement that gas chromatography underestimates CO₂ fluxes relative to the soda lime method. With only an initial and final time point, over 24 hours, the fluxes are not very precise. They may be affected by artifacts such as accumulation of pressure or altered temperatures, both of which could influence the gas fluxes measured.

Results

Figures: Colors or symbols are needed to distinguish the species represented by each line.

Figure 4a: Since these are different methods used to measure CO₂ fluxes from flooded vs unflooded soils, the study should not make claims about differences in soil respiration between flooded and exposed conditions. Likewise, authors should omit the flooded data points from Figure 4a to avoid direct comparison with the non-flooded data.

Discussion

Could the higher photosynthetic rates be related to C4 metabolism in *E. atherica* (in addition to structural difference in stomata?) Which species are C3 vs C4?

Line 327: Listing the species in consistent order of water use efficiency would be clearer for the reader

Line 397-399: Avoid direct comparison of flooded and unflooded CO₂ fluxes (as mentioned above) due to differences in methods. Authors might rather consider that flooding waters are a known physical barrier to gas exchange.

Table 1: Which methods were used in the studies on this table? Are they comparable to those in this study?

Discussion of methane lines 401-414: Most of the methane fluxes were positive, and so authors should not mislead the reader by first discussing negative fluxes (indicating consumption). Similarly, the methane emissions did not differ statistically between habitats. Discussion in this section should therefore focus on what might have been similar between habitats and/or how the general magnitude of fluxes falls within the range reported in other marshes.

Line 425-435: This paragraph about salinity relationships to methane emissions is useful for readers to place this study site and its findings in context. This information about the site salinity should be incorporated into the methods/ site description.

Conclusions: Authors should discuss the possible relationship of the high CO₂ uptake of woody tissues with the high carbon sequestration potential (as reflected by low mineralization quotients) for the salt meadow and halophytic scrub. Can this help to reconcile the finding of lower soil mineralization quotients despite the high respiration and methane emissions observed?

CO₂ emissions may be higher in this study than in other previous studies due to the long period of chamber closure (24h) and associated artifacts discussed above.