**Biogeosciences
Discussions**

Interactive comment on "Ecosystem metabolism in a temporary Mediterranean marsh (Doñana National Park, SW Spain)" *by* O. Geertz-Hansen et al.

Anonymous Referee #1

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This paper presents results of some data collected quite some years ago (1990-91) from the Donana marshes. The study provides some interesting results on the carbon flow between the different compartments in the marsh, showing a large excess carbon production in the productive macrophyte beds, whereas the pelagic compartment is net heterotrophic. The dataset provide some indications of the drivers of carbon cycling, but the relationships are not strong and the authors argue with the large variability in temperature and irradiance at the sampling stations. The study is therefore as such a first step in measuring productivity in marshes with macrophyte cover and contributes with important results on the importance of macrophytes in global carbon cycling.

The marsh is influenced by a wide range of abiotic factors, including draught leading to extinction of the macrophytes. Light is also argued as an important factor, but the thresholds are quite low (down to 45 uEm-2s-1), and the question is how often light is a limiting factor? Are data available on light conditions in the marsh, which could be extrapolated to indicate the extent of light limitation? Resuspension events possibly contribute to impoverished light conditions. Is there any data available such events over a growth period? The discussion of the results could benefit for an assessment of the influence of the abiotic factors over the growth period.

The paragraph (first pg 6505) on turnover rates for macrophytes is not so clear, as the text is mixing up high and low turnover rates. Macrophyte rates are low compared the pelagic compartment, which is a key issue for this paper, but they are high compared to other studies of macrophytes, which is also an important conclusion of the paper.

I do not fully understand how to read the relationship between NCP and irradiance in fig. 7. Where is it possible to see the morning and afternoon values (arrow??)? It is not clear how the numbers in Table 3 have been achieved from this figure?

It could be interesting with a note on the status of the marshes today 20 years after this study. Did the authorities manage the marsh according to the suggestions, and was this management successful in the conservation of the marshes and the water fowl?

The paper is generally well written, with some clarifying needs provided below in the detailed comments. The generality of the paper can be expanded by including a table on more recent measurements of productivity in marshes and macrophyte beds (several authored by CM Duarte) and comparing the results from Donana with these.

Minor comments:

6495 – missing 5 in front of "now at" Abstract: l 8: suggest to change to: between 42 to 255 "below which. . ." is redundant. Is already mentioned in sentence Strongly used 3 times in the same sentence! 6498, l8: not clear what you mean by temporary at

this stage of the paper 6499,l23: this sentence is not so clear. Does depth represent hydrological regime and macrophyte abundance? The depth range is rather small (18-60 cm) 6499,l26: give salinity range of the brackish water. The salinity is used in one of the equations. 6500,l9: is conductivity used as a proxy for salinity? 6501,l26: it is not possible to get information on the temperature amplitude during day and night in Table 1, and I will suggest to either provide the information here in the text or in the table. This information is important for the argumentation on the temperature effect on respiration. 6503,l16: is it possible to give some estimates on how much of the variance between sites can be attributed to variability in temperature and light? This is important to be able to interpret the established relationships (or lack of) in the figures. 6503,l21: in the abstract the percentage is given as 43% 6504,l12: change accepting with "applying" 6504,l24: was the correlation significant? 6504,l26: what do you mean by sizeable? The same size or similar to higher biomasses

Table 2 – which column is NCP? Why are there no results from Pelagic Station 7. What is Station 0? Fig. 4-6 – add station numbers as in Fig. 3. This info will be useful to evaluate the variability in the results.

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