Peer Community In Ecology

A functional ecology reference database on the populations of two species of Zoostera along french coasts

gudrun bornette *based on peer reviews by* ***Antoine Vernay***, ***Sara PUIJALON*** *and 1 anonymous reviewer*

Élise Lacoste, Vincent Ouisse, Nicolas Desroy, Lionel Allano, Isabelle Auby, Touria Bajjouk, Constance Bourdier, Xavier Caisey, Marie-Noelle de Casamajor, Nicolas Cimiterra, Céline Cordier, Amélia Curd, Lauriane Derrien, Gabin Droual, Stanislas F. Dubois, Élodie Foucault, Aurélie Foveau, Jean-Dominique Gaffet, Florian Ganthy, Camille Gianaroli, Rachel Ignacio-Cifré, Pierre-Olivier Liabot, Gregory Messiaen, Claire Meteigner, Benjamin Monnier, Robin Van Paemelen, Marine Pasquier, Loic Rigouin, Claire Rollet, Aurélien Royer, Laura Soissons, Aurélien Tancray, Aline Blanchet-Aurigny (2024) A dataset of *Zostera marina* and *Zostera noltei* structure and functioning in four sites along the French coast over a period of 18 months. Zenodo, ver. 3, peer-reviewed and recommended by Peer Community in Ecology. https://doi.org/10.5281/zenodo.10425140

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bornette, G. (2024) A functional ecology reference database on the populations of two species of Zoostera along french coasts. *Peer Community in Ecology*, 100636. 10.24072/pci.ecology.100636

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Seagrass beds are in a poor state of conservation and the ecological function of these plant communities is poorly assessed.

Four zones of eelgrass beds (*Zostera marina* and *Zostera noltei*) were described in terms of the morphology of the plant populations and the associated fauna. At the same time, parameters related to the functioning of these ecosystems were quantified (benthic fluxes of oxygen, carbon and nutrients) over a two-year cycle.

The article provides the databases collected and provides the main characteristics of these habitats for the measured parameters.

The work provides a reference database on the *Zoostera* beds of french coastal areas, outlining the ecological contrasts between both ecosystems. This database can on the one hand contribute to help management and restoration of these habitats, and on the other hand provide a reference state of their ecology, with a view to

long-term monitoring.

References:

Élise Lacoste, Vincent Ouisse, Nicolas Desroy, Lionel Allano, Isabelle Auby, Touria Bajjouk, Constance Bourdier, Xavier Caisey, Marie-Noelle de Casamajor, Nicolas Cimiterra, Céline Cordier, Amélia Curd, Lauriane Derrien, Gabin Droual, Stanislas F. Dubois, Élodie Foucault, Aurélie Foveau, Jean-Dominique Gaffet, Florian Ganthy, Camille Gianaroli, Rachel Ignacio-Cifré, Pierre-Olivier Liabot, Gregory Messiaen, Claire Meteigner, Benjamin Monnier, Robin Van Paemelen, Marine Pasquier, Loic Rigouin, Claire Rollet, Aurélien Royer, Laura Soissons, Aurélien Tancray, Aline Blanchet-Aurigny (2023) A dataset of *Zostera marina* and *Zostera noltei* structure and functioning in four sites along the French coast over a period of 18 months.. Zenodo, ver.3 peer-reviewed and recommended by PCI Ecology https://doi.org/10.5281/zenodo.10425140

Reviews

Evaluation round #2

DOI or URL of the preprint: https://doi.org/10.5281/zenodo.13255066
Version of the preprint: 2

Authors' reply, 06 November 2024

Download author's reply
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Decision by gudrun bornette, posted 16 October 2024, validated 16 October 2024

the reviewers emphasise the quality and the clear improvement of the manuscript, for the one who had already evaluated it, but both still recommend small improvements with which I agree. I therefore recommend that the authors take these easily integrated remarks into consideration and quickly resubmit the article.

Reviewed by anonymous reviewer 1, 16 October 2024

The authors have addressed the questions and corrected the deficiencies indicated in the previous review. However, I have a few more comments. These new comments are easy to address, and from my side, another review is not necessary—just clarifying the questions related to the comments would suffice.

Minnor comments:

- L96-97. The authors state that the data loggers measured light intensity (lumens m□²), temperature (°C), and tidal water level fluctuations (cm). However, the datasets do not include the tidal water level fluctuations. If this information is available, please include it, as it could be highly relevant for comparisons with other seagrass meadows.
- L157. "... the Gross Community Production as follows: GCP = |NCP| - |CR|." Is this equation correct? I would expect it to be GCP = |NCP| + |CR|, otherwise, GCP would be lower than NCP, which doesn't seem logical.

- Environment and benthic fluxes data sets. You present underwater light in two different units (lumens m^2 and µmol quanta m^{-2} d^{-1}). It would be helpful to provide the conversion relationship between these two units to facilitate comparison and interpretation of the data.

Reviewed by Sara PUIJALON, 04 October 2024

Thanks to the authors for the submission of this revised version of the manuscript. I had reviewed the submitted version of this manuscript. The review of this revised version was not very easy because of the form of the responses to the reviewers' comments: the line numbers of the new version of the manuscript are generally not indicated, the responses to the comments are very short (or even absent) and often too succinct to appreciate precisely the changes done. Some of my comments are linked to the lack of precision in the responses to the reviewers' previous comments.

The corrections made by the authors have improved significantly certain important points that had been raised by the reviewers on the initial version of the manuscript, particularly the difficulty to follow the analyses and plots that were presented. The manuscript is in its revised form much clearer and easier to follow. However, some points still need to be discussed or addressed. (The line numbers indicated in the comments refer to the tracked change version of the manuscript).

1) There is still an issue with the units used for area, biomass and density:

For variables linked to density and biomass, the changes in figure 6 have not been made :

Figure 6: in the title of the panels and legend, replace "shoot biomass" by "shoot biomass per m2" and "shoot density per m2" should be either "shoot density" or "number of shoots per m2"

L147-148: the leaf area is indicated as being in m-2: it is either in m2 or dimensionless if expressed relatively to the core area.

In the table description, the variable "mean area of leaves per surface unit" is indicated in m2 : if it is an area per surface unit, it is dimensionless.

Please check the consistency of variables and surface units in the manuscript, tables, figures and table description and correct where necessary.

2) Regarding the comment in the initial review on the measurement of the benthic fluxes :

"L141-143: The figure 5 shows that the cover (by algae, the 2 species of Zostera, or bare sediment) may be very diverse between sites, modalities and season. How were the benthic chambers positioned relatively to these different elements in sites with heterogeneous covers?

This heterogeneity was deliberately taken into account in our sampling by randomly setting up the benthic chambers in each area. The seagrass habitat is considered in all its complexity, with its associated flora and fauna."

Thank you for your reply. This information should appear in the text, as it is an important point for understanding how the measurements were taken and for the re-use of the data.

3) The changes made to the figures improve their legibility and clarity (particularly, the standardized format makes them easier to read and understand). I still think that separating the bars into groups of 3 bars in Figure 5 would improve the readability of the figure.

4) Figure 7 : the legends of the panels of the plots seem to be wrong (should be AFDM and density) ?

5) It seems that the changes in the table description (“in the description of variables, put the 2 in superscript in m2 and in subscript in O2”) have not been made.

6) regarding the previous comment on the measurement of the PAR and PPFD:
“L145: « PAR », do you mean active instead of « available »? If so, I think PPFD (according to the unit you present) may be more relevant”.
The term “available” has not been corrected in the Table description
And as raised by the reviewer, this is the PPFD that is measured, not the PAR.

7) L164: correct flux instead of fluxes

8) L165 : 2 new references are missing in the reference list

9) L181 : the new reference is missing in the reference list

Evaluation round #1

DOI or URL of the preprint: https://doi.org/10.5281/zenodo.10425141
Version of the preprint: 1

Authors’ reply, 07 August 2024

Download author’s reply
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Decision by gudrun bornette, posted 16 May 2024, validated 16 May 2024

A insteresting study that needs some revision

three referees have read the manuscript, and suggest a number of improvements which are fairly consistent, and which will, I think, significantly improve the document.
I therefore suggest that the authors give serious consideration to these comments, which will undoubtedly improve the document.

Reviewed by anonymous reviewer 1, 08 February 2024

The publication of scientific data in open access is always an important contribution to the knowledge of the community. I’m just adding some minor comments for the authors consideration. I recommend this MS for publication.

Comments (MS line and comment)

43	Missing reference
50	I do not understand this sentence, please rephrase
65 – 76	I recommend adding the tidal range for all the sites, not only for AC.

Please unify units, you used ha and km2

Fig.1	Indicate lat/lon in the detailed maps and North direction
88	is bare modality a bared spot in the moment of the sample or are historically bared spots?

131-143 Can you indicate a reference with details of this method? How is the chamber? Is it rigid or flexible? It would be interesting for other scientist to use similar a similar protocol.

147-148 I think you described the sensors in opposite order than the measured variables.

163 Please add a table caption and cite the table in the text.

Fig.3 Do you have a picture of dark incubation? It would be interesting too.

Section 4 It will be nice if you add an initial sentence indicating in which tables is the information presented on each subsection.

214 Modality A is abscence of seagrass. I do not understand what do you mean with near Z. marina and Z. noltei?

Section 4.4 Is it almost always positive the net production of the community even in A modality? I think it is interesting to comment about this.

Reviewed by Sara PUIJALON, 05 April 2024

The manuscript presents a dataset consisting of measurements collected on Zostera marina and Zostera noltei seagrass meadows at 4 sites along the French coasts (English Channel, Atlantic Ocean and Mediterranean Sea) and during 5 seasons. Within each site, 3 areas (called modalities) are defined according to the dynamics of the 2 seagrass species: areas where the seagrass meadows are stable over time (S), areas where the meadows fluctuate over time (D) and areas not colonised by the 2 seagrass species (A). In each modality, sampling and measurements were carried out at 3 replicated stations. The dataset consists in environmental data (e.g. temperature, light, chlorophyll a, nutrient concentrations in water, sediment organic matter, sediment grain size...), general properties of seagrass beds (e.g. canopy height, shoot density, relative cover of bare areas, algae and the 2 seagrass species...), seagrass properties and traits (e.g. number of leaves per shoot, below-ground and aboveground dry mass...), density and biomass of epifauna in seagrass meadows and underwater benthic metabolism (e.g. primary production and respiration). The dataset covers complementary aspects of structure and functioning of seagrass beds. Sampling was conducted at four study sites over the course of more than one year, enabling investigation of the spatial and temporal variations of seagrass bed structure and functioning.

Specific comments

Title: It would be interesting to include a term like seagrass meadows (or beds) in the title because the dataset goes beyond the 2 species and also but characterizes part of the functioning of the meadows.

Context and general description:

At the end of this part, it may be relevant to introduce briefly the rapid data representation (§4. Quick data description) that is presented in the manuscript.

L43: Indeed, add a reference instead of “ref” !

Experimental design and sampling procedure

Throughout the text, figures and tables and data files, I recommend using always the same terms for the different types of data collected (environmental data, measurements on seagrasses, epifauna, benthic fluxes...). For instance, the data collected on seagrasses appear under the titles “Habitat characterization” in the methods section, “Seagrass bed structure and plant biometry” in the results section, “Visual estimation” and “biometry cores” in Tables 1 and 2 and “Quadrat table” and “Core Table” in the data set or the data on benthic fluxes appear under the titles “Benthic fluxes and associated macrofauna” in the methods, “Benthic metabolism” in the results section, “Incubation” in Tables 1 and 2 and “Benthic fluxes” in the data files. The same problem is observed for environmental data and epifauna data.

Study site description:

L82-85: I suggest moving this paragraph after the following one (L86-92) to end up with the spatial dimension of the sampling design before presenting the temporal dimension.

L87-90: according to Tables 1 and 2, there is no D modality for the site AC. This information should be included in the text.

L86-90: can give you a rough timeframe for estimating the stability of the beds (10y? 50y?)?

L84: there are also many missing values for winter 2021

Fig. 1: Can an additional small map be produced for each site to show on the same map the relative positions of the areas colonised by Z. noltei and Z. marina? Currently, they are presented in different panels with different scales, making it difficult to determine their relative positions in the field.

Environmental data

L99-103: water analyses should be added to tables 1 and 2.

L107-108: Looking at Table 1, it looks as though grain size analysis was done in winter 2021 (not 2020) for Z. marina. Moreover, there are many missing data (GM modality A in winter, AC modality A in winter, TH in winter for Z.marina, GM modality D in winter, TH in winter for Z. noltei). The sentence could be reworded to take better account of this.

Habitat characterization

The title “Habitat characterization” is a bit reductive and does not reflect what the measures can achieve. A title that includes the notion of seagrass bed structure (as in the results section) would probably be more relevant.

L121: how were measured length and width of leaves (manually? By image analyses?) ?

The figure 6 and the data table show that leaf areas were measured (per shoot or per surface unit): how were these areas measured? The method should be added.

L123 (and throughout the text in tables and figure): biomass should be replaced by dry mass t o make it clear that the mass data are dry masses.

Epifauna

L127: “in winter and autumn 2020…”: Looking at Table 1, it looks as though it was done analysis was done in winter 2019 for the site TH.

Benthic fluxes

L141-143: The figure 5 shows that the cover (by algae, the 2 species of Zostera, or bare sediment) may be very diverse between sites, modalities and season. How were the benthic chambers positioned relatively to these different elements in sites with heterogeneous covers?

The data tables indicate that fluxes of ammonium, nitrate, nitrite and phosphate were measured, please indicate how.

Quick data description

The presentation of the data may make sense in this data paper, but it is sometimes a little confusing. The sampling design is complex, with several factors, and the way the variations in the parameters and variables measured are described differs greatly from one parameter to another (for some variables, the authors place more emphasis on seasonal variations, for others, on the difference between sites, or even between modalities). It is sometimes a little difficult to follow the flow of these data.

The clarity of the figures 4 to 8 may be improved. First, for all these figures, sub-panels (a, b, c…) may be added which would make it easier to read the legend and quote the figure in the text. The figures are also rarely cited in the text: it would help citing them (figure and sub-panels) more often to make the text easier to read.

Secondly, for figures 5 to 7, it would make the figure easier to read if the bars were separated into groups corresponding to the x-axis legend, for instance, as in figure 8, where the bars are grouped by site, with a space between the sites.

In figure 5, the legend of the X-axis may be repeated on the panel corresponding to Zostera noltei (as in figures 6 and 8).

Figure 4. In the legend, what does the “near each habitat” refer to?

Figure 6: in the title of the panels, replace “shoot biomass” by “shoot biomass per m2”
And “shoot density per m2” should be either “shoot density” or “number of shoots per m2”

Figures 7 and 8 : why are some bars of the plot wider than the other ones? If data are missing, there should be an empty space as in the other plots.

Figure 8: in the figure, put the 2 in subscript in O2

L209-210: the Z. marina cover “could decrease to 0% in winter in AC”: unclear where this result comes from
L223: to which plot does “mean leaf size” correspond to ?

Table 1. why are the missing data of epifauna in white and not in red?
What does the value +1 without brackets correspond to?

Table description: in the description of variables, put the 2 in superscript in m2 and in subscript in O2

Reviewed by Antoine Vernay, 29 March 2024

Dear recommander and authors,

I carefully read the manuscript entitled « A dataset of Zostera marina and Zostera noltei structure and functioning in four sites along the French coast over a period of 18 months. » by Lacoste et al.

I have found the manuscript very interesting, providing a source of information for two species, associated with a large ecosystem data.

It will certainly help, in a long-term perspective, to build a community dynamic, for instance.

I have some comments that may help to improve the clarity of the manuscript

Globally, the authors have proposed some preliminary data analysis, comparing some sites, modalities, and species without defining a clear question to answer. In my opinion, it is not the main goal of a data paper, therefore I got something lost in my reading, trying to understand why some data were analyzed and some others not. Maybe a more descriptive table gathering the data (mean, sd, max, min,…) would be sufficient if the authors think it is useful.

Moreover, the authors used a lot of terms such as « most », « mostly », « mainly », « some », and « high » without giving numbers or range so I was not sure how to interpret the sentence. I suggest removing or adding some details to give more sense to those descriptions.

I would be happy to discuss with you if you disagree with my opinion. Again, I find this data paper very interesting, I just think that it goes sometimes a bit beyond its initial goal. Feel free to comments my review to further enhance your paper.

L43: can you explain what you mean by « poor conservation status » ? Do you miss one ref in « (ref) »?

L 69: can you explain more precisely « high hydrodynamics »?

L82: it is not clear what you mean here and elsewhere in the text with « parameter »

L83: « With some hiatuses », I propose to refer to your tables 1 and 2 to make a more accurate statement.

L99: « once during each seasonal campaign », is it enough once measurement per season?

L113-116: I was not sure to understand if you quantified cover and/or abundance.

L116: are the six quadrats the same as before (0.16m²)?

L117: why do you use this special method for TH?

L118: Can you give a volume of your PVC core? Is there any reason why the area is different for the two species

L131: If I read well your file, it seems that you have at least the genus of the species, do you? I think it's worth adding it in the text instead of writing « lowest taxonomic level ».

L145: « PAR », do you mean active instead of « available »? If so, I think PPFD (according to the unit you present) may be more relevant.

L153: even if you cite the paper where the whole method is described, a few sentences summarizing it would help the reader to understand what is behind it.

L157: I would rephrase the sentence starting to say « fluxes » of what.

L191: add the unit « 31 PSU

L203: Fig 4 you present « Light intensity in water and you write in the caption that « For Z. noltei [...] during immersion periods », was it not the case for Z. marina?

L207-224: The comment here may fit also other paragraph. I'm not sure you have to start analyzing the data. You describe some variables in some sites but not all, you compare some seasons in some sites but without explaining why. I was a bit lost because I did not know to which question we tried to answer with this comparison. I guess it would maybe fit better in your other article submission in PCI. I expected something more operational to allow any users to make their own analysis as they want.

L231: Maybe Fig 5 and 6 might be built in the same way. It is personal but I prefer when the name of the y-axis and the unit are vertical near the axis rather than in the « title » of each facet.

L248-249: for me, this sentence summarizes what I tried to explain in paragraph 4.2, you have two species, 4 sites with 3 modalities and different seasons so it seems tricky to draw large tendencies without going into deeper analysis. I'm sure to know what to do with the information you give here.

L255: « induced variability » Do you have any order of magnitude?

Fig 8: y-axis of the first graph as an issue with « 05 ». Put « 2 » of « O2 » in subscript