

## ***Interactive comment on “Seagrass as major source of transparent exopolymer particles in the oligotrophic Mediterranean coast” by Francesca Iuculano et al.***

**Francesca Iuculano et al.**

fiuculano@imedea.uib-csic.es

Received and published: 11 August 2017

Answer to the general comment:

We thank the reviewer for the assessment that our results clearly show the response of TEP by *Posidonia oceanica* leaf litter release in the coastal area of the oligotrophic Mediterranean Sea and our field observations are confirmed by the experiment conducted in the laboratory. We also agree with the reviewer that, as also pointed out by reviewer 1, the discussion on the role of TEP release by *P. oceanica* at the scale of the Mediterranean basin needs to be improved by acknowledging uncertainties around the estimates provided.

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We will revise the discussion to read:

“These observations suggest that *P. oceanica* meadows, the dominant ecosystem in Mediterranean coastal waters, are an important source of TEP precursors in the Mediterranean Sea. Considering the average leaf production of *P. oceanica* of 876 g DW m<sup>-2</sup> y<sup>-1</sup> (Duarte and Chiscano, 1999), the estimated 37,000 Km<sup>2</sup> covered by *P. oceanica* in the Mediterranean Sea (range 31,040 to 43,550 Km<sup>2</sup>, Marbá et al. 2014), and the average TEP yield from leaf litter experimentally derived here (2344 μg C g DW<sup>-1</sup>) we calculated that *P. oceanica* releases about 76 Gg C as TEP annually to the Mediterranean Sea. However, this estimate should be considered a first-order estimate, as it involves considerable uncertainty, compounding that derived from the substantial variability in primary production of *P. oceanica* (Duarte and Chiscano, 1999), that in the area covered by *P. oceanica* meadows in the Mediterranean Sea, and variability in TEP yield across meadows and over time, as the estimate used was derived from a single meadow in the fall. Improving this estimate will require narrowing down these sources of uncertainty as well as the capacity to compare it with estimates of other sources of TEP, such as phytoplankton, which are not yet available at the basin scale. The contribution of *P. oceanica* meadows to TEP release may contribute to explain, along with other processes, the elevated TEP/Chl *a* ratios characteristic of the Mediterranean Sea (Ortega et al., 2010). The role of *P. oceanica* as a relevant source of TEP precursors is enhanced by the contrast between the high production of *P. oceanica* meadows (Duarte and Chiscano, 1999), resulting in a high production of detritus (e.g. Mateo and Romero 1997, Cebrian and Duarte 2001) releasing TEP precursors, and the oligotrophic nature of the Mediterranean Sea, leading to low production in the pelagic compartment. In fact, both *P. oceanica* (e.g. Alcoverro et al., 1997) and phytoplankton (e.g. Krom et al., 1991) are likely to be strongly nutrient-limited in the Mediterranean Sea, which has been shown to enhance the release of TEP precursors through carbon overflow during nutrient limiting conditions (Mari et al., 2001; Radic et al., 2005). Despite the limitations acknowledge above, our estimates highlight the important role of *P. oceanica* litter as source of TEP in the Mediterranean, and suggest

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that seagrass meadows may play a similarly important role in other regions supporting extensive seagrass meadows, such as the Caribbean, Australia and South East Asia.”

Answer to the minor comments:

Line 19: We agree. The revised version of the manuscript will correct “deoxyc” with “deoxy”.

Line 41: We agree. The revised version of the manuscript will correct “studying” with “study”.

Line 51: We agree. The revised version of the manuscript will clarify “for three years since 2006” with “for three years since January 2012”. (This study started in January 2012 in Cap Ses Salines and in August 2012 in Es Caragol beach. However, the time series project in Cap Ses Salines started in 2006. We agree that it is not necessary give this detail as it may confound the reader). We will also add in line 54 “for two years since August 2012”, when sampling in Es Caragol beach started.

Line 55: We agree. The revised version of the manuscript will correct “in the shore” with “on the shore”.

Line 56: We agree. The revised version of the manuscript will correct “on 2 L Nalgene bottles” with “in 2 L Nalgene bottles”.

Line 91: “12 hours” listed twice in the revised version of the manuscript will be corrected with “24 hours” as we also sampled at this time interval.

Line 140: We agree, the revised version will be corrected to read: “Despite the limitations acknowledge above, our estimates highlight the important role of *P. oceanica* litter as source of TEP in the Mediterranean, and suggest that seagrass meadows may play a similarly important role in other regions supporting extensive seagrass meadows, such as the Caribbean, Australia and South East Asia”.

Line 143: We agree. The revised version of the manuscript will correct “assess” with

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"assessed".

Line 145: We agree. The revised version of the manuscript will add “for the” particles dynamics in the ocean at the end of this sentence.

Bar Zeev et al., 2011; Duarte and Cebrian, 1996 will be cited in the revised version of the manuscript. Mykkestad, 1977 will be changed with Mykkestad, 1995 in the text line 20 and in the reference list.

Parsons et al., 1984 yes it is already cited in the text in line 63.

Please also note the supplement to this comment:

<https://www.biogeosciences-discuss.net/bg-2016-558/bg-2016-558-AC1-supplement.pdf>

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Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2016-558>, 2017.

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