

Interactive comment on “Trophic state of sediments from two deep continental margins off Iberia: a biomimetic approach” by A. Dell’Anno et al.

Anonymous Referee #1

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I have had some difficulty in reviewing this manuscript. It describes sedimentary organic matter and its “bioavailability” in two rather different canyons and adjacent slopes at the Iberian Margin. As far as they go, the approach adopted and methodologies seem to be sound (for the most part, see specific points below) as are the results presented. However, I do not find the MS to be acceptable for publication in its present form for three main reasons of decreasing importance.

1. Some of the statements made in the discussion are not borne out by the data presented. Specifically, on p. 17633 the authors suggest that their results indicate circulation pathways and episodic events at the Catalan Margin fuel benthic systems with

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bioavailable N-rich compounds. My question is how? Hydrolysable protein concentrations to bioavailable C (Fig 4C) seem to me to be very similar in slope and canyon sediments. If this is a measure of bioavailable N-compounds, then how does it relate to episodic events? Of course we know that such events occur in the Gulf of Lions, but the data presented here really cannot be linked to any of them. As far as the Nazare canyon is concerned, the evidence for transport of bioavailable OM to deep in the canyon is stronger, but the discussion is obscured by the grand statement that “this may have profound implications on the quantity and distribution of bioavailable C pools on the sea floor”. How? Why? Finally, fluxes are never mentioned, yet ultimately, fluxes of bioavailable OM must be the key in understanding the benthic environments described, not concentrations. While it may well be true that there is a relationship between OM flux and macrofaunal abundance (biomass must be a better measure!), the environment at 940 m is very different to that at 3200 m in the Nazare canyon, in other words, other factors are also likely to play a role in controlling macrofaunal abundance.

2. A number of key references on the Nazare canyon are ignored, for example those dealing with meiofauna, physical setting, carbon burial and organic geochemistry. The authors should refer to Deep-Sea Research II.

3. The level of self-citation throughout is unusually high and frankly detracts from the quality of the manuscript.

I have a number of specific points that the authors should also consider.

1. The title of the paper is ambiguous. What does trophic status mean? I think nutritional is a better term, because “trophic” is usually associated with the biology, rather than the sediments themselves.

2. Page 17620, line 21. “relatively high amounts of bioavailable organic matter” Relative to what? Other deep-sea sediments. The final sentence is not justified by the data presented, which cannot on their own be used to describe processes.

3. Page 17622, line 29. “Benthic trophodynamics” is a pretty opaque term. Who eats what and how quickly? I would argue that on its own, the data presented here cannot be used to unravel these questions. Indeed, most of the final sentence is not directed to the core question that the authors can answer, which

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is how much bioavailable OM is present in the sediments. 4. Page 17623, line 8. Does freezing of the sediments influence the measurement of enzymatically hydrolysable OM? In other words does it lead to cell lysis of sedimentary bacteria? Perhaps more significantly particularly for the Nazare canyon sediments where sedimentary meio- and macrofaunal abundance and biomass can be quite high, do they contribute to the bioavailable pool of OM? These are not necessarily easy questions to answer, but I think that they are important. 5. Page 17625, line 21. "Muffled" is not a verb. Use "...heated in a muffle furnace". 6. Page 17627, line 26. Add in a source reference for the statistics. In general the term "significance" is not used consistently through the manuscript, in that sometimes it is justified with a P value, or relevant test, but often is not.

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