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## ***Interactive comment on “Deep-sea scavenging amphipod assemblages from the submarine canyons of the Iberian Peninsula” by G. A. Duffy et al.***

### **Anonymous Referee #2**

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In general this is a well-written manuscript reporting new interesting data on the scavenging amphipod assemblages of the Iberian Margin. However, there are some issues that, in my opinion, must be addressed before final publication in Biogeosciences.

1. The title does not clearly reflect the contents of the paper – the Iberian Peninsula presents many submarine canyons subjected to very different environmental factors (eg. In the Mediterranean margin, the West Iberian margin, the Bay of Biscay margin). Consider changing from “. . . from the submarine canyons of the Iberian Peninsula” to “. . .from submarine canyons of the West Iberian Margin”.

2. In the abstract it is not clear that the data from the abyssal plain was retrieved from

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the literature (and not the authors own data).

3. The authors set as one of the objectives “[to] identify factors that may potentially be affecting community composition and species distributions” (P7834L2-3); in “Conclusions” they state “Depth-correlated variables appear to control scavenging amphipod distribution. . .”- if possible the authors should be less ambiguous and more convincing in their final statement.

4. Differences in sampling methodology are important and deserve more discussion. The smaller traps deployed/recovered with ROV and the traps baited with smoked fish are yielding results that in my opinion cannot be directly compared with the results from the other samples. It is interesting to see all the results but the samples affected by differences in sampling methodology should not be included in the multivariate analysis. These samples were clearly not successful in attracting the scavengers yielding abundances 1-2 orders of magnitude lower and also the lowest values for species richness. If these two samples are removed from the multivariate analysis the conversion to percentage composition could be avoided therefore enabling to account for differences in abundance between samples (the duration of the deployments for the remaining samples is within an acceptable range of variability – 21-30 hours). Also I would like to see the MDS plot resulting from the analysis.

5. In “Sample analysis” (P7834-35) the authors should define more clearly the hypotheses tested, the factors, and the samples grouped into each factor (for each hypothesis tested).

6. The authors present results and discuss the following:

A. Differences between canyons: The factor is explicit but according to Table 1 there are 5 samples from Nazaré (should be 4 if JC10/094 is excluded as suggested), 2 from Setúbal (should be one if CD179/56817 is excluded as suggested) and one from Cascais – it is not surprising that ANOSIM results are not significant as the number of replicates per canyon does not allow sufficient power to the test. Differences in the

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assemblage composition are not evident; however, abundances (for the same depth - ~4000m and comparable deployments - 24-30h) are much higher in the Nazaré canyon than in Cascais and Setúbal. This is discussed in “4.2 Relative abundance” (P7840) but can be further supported by the results in Cunha et al 2011 who also reported higher macrofaunal densities in the Nazaré canyon.

B. Differences between middle and lower canyon: The factor is explicit with 4 samples in the middle canyon (limited two 2 if JC10/094 and CD179/56817 are excluded as suggested) and 4 samples in the lower canyon – the authors report a significant difference (P7837) but nothing is said about what explains this difference (or at least in what it consists). Apparently there are more species in the lower canyon (6 to 10 species per sample) than in the middle canyon (3 to 6 species) and the catches (abundances) are also lower - This may be conflicting with the authors' statement in “Discussion 4.1 Community composition” - “canyons do not restrict the movement of motile scavenging fauna”.

C. Differences based in temperature and TOC: There is no information at all about these factors and which was the grouping of samples except for a mention to “discrete categorical bins” (P7835). The reference to Cunha et al 2011 as the source of data “from push-cores taken during dives of ROV Isis” is erroneous as all data reported by Cunha et al 2011 refers to cruises D297 and CD179 where the ROV Isis was not used.

D. Differences between canyons and abyssal plain: My major concern about this test is the comparability of the samples reported by Thurston in 1990 and the ones taken in 2005, 2006 and 2007 as temporal variability in the composition and abundance of the assemblages was not taken into account (or even discussed). For instance, when the samples taken in Nazaré in 2005 are compared with the ones taken in 2006 at comparable depths there is a consistent increase in the catch (7-11 fold) – is this important? At least it should be discussed. One of the main reported differences between canyons and abyssal plains is the higher evenness, reduced importance of *Paralicella* spp. and greater representation of *E. gryllus* in the latter. For this discussion I suggest

the reading of Klages et al (2001, Polar Biology 24: 292-295) – in their discussion these authors mention two size spectra groups of necrophagous amphipods in the deep-sea, the smaller ones representing facultative necrophagous able to feed on carcasses but also on other food-like detritus, phytodetritus and smaller macrofauna. It could be hypothesized that the abundance of a variety of food-like detritus in canyons could be more suitable for the exploitation by these smaller facultative necrophagous amphipods and explain the observed differences in the composition of the assemblages from the canyons and abyssal plains (eventually revise your conclusions in the light of this discussion). Still on the comparison between canyons and abyssal plains, the authors state “A similar trend of high abundances and low species richness in submarine canyons has also been observed in... and various macrofauna (Cunha et al., 2011; Paterson et al., 2011)” (P7838L12-14). This is incorrect in two ways: first, the authors are confounding evenness and species richness – the data presented in their manuscript shows that less species were found in the abyssal plain (1 to 6 per sample) and more in the canyons (3 to 10 per sample). Second, Cunha et al (2011) concluded that canyons may show multiple patterns of biodiversity in relation to the adjacent margins (including higher, lower or similar biodiversity) and do not always present depressed species richness nor low evenness.

#### 7. Other notes:

P7832L16-22: not all canyons incise (deeply) into the continental margin and not all canyons are active – the authors should be more cautious in their generalist statements about canyons.

P7835L21 and P7836 L2: Simpson’s Index of Diversity and Pielou’s evenness are commonly used in ecology – in my opinion equations are not necessary.

P7840L21-30: the suggestion that the deepest sites are nutrient rich and high in organic matter (more than the middle canyon) is not supported by data from Kiriakoulakis (eg in Cunha et al. 2011) which clearly indicate that not only TOC concentration in

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the lower canyon is lower than in the middle canyon but also the OM is less labile (low quality food).

P7841L3-11: In line with the above, the authors suggestion discard of fisheries bycatch provides a food source readily available for scavengers at depths of 3000 m and more in the W Iberian canyons must be further supported.

Table 3 and Figure 2: samples in the Nazaré canyon should be ordered by sampling date (D297, CD179 and JC10) for each canyon section

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**BGD**

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