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Discussions

Interactive comment on "Species variability and connectivity in the deep sea: evaluating effects of spatial heterogeneity and hydrodynamics" *by* Lidia Lins et al.

Lidia Lins et al.

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Dear Anonymous Referee #1,

Thank you very much for your valuable comments. We have revised the manuscript and included most of your suggestions.

We have addressed each of your comment below:

1)'P3, L12: The authors state that "nematodes may be passively transported via water currents following resuspension from disturbance events". Is there any information available on how rapidly they are likely to re-settle? The potential for dispersal will be very different depending on whether they sink passively, actively swim back to the

seabed or actively swim into the water column (e.g. Palmer (1984) Invertebrate drift: Behavioral experiments with intertidal meiobenthos , Marine Behaviour and Physiology, 10:3, 235-253, DOI: 10.1080/10236248409378620).'

There is no information about the exact speed which nematodes re-settle (Ullberg and Olaffson, 2003: Marine Ecology-Progress Series 260, 141-149) but we have estimated it based on the nematode density compared to the average density of marine sediments (Tenzer, R., Gladkikh, V., 2014. Assessment of Density Variations of Marine Sediments with Ocean and Sediment Depths. Scientific World Journal). In this sense, we have included a paragraph about this subject in the manuscript: 'In addition, based on the model proposed by Condie and Sherwood (2006) for resuspension rates, settling speeds, and average alongshore sediment transport, settling speeds of nematodes could be inferred. Since average nematode density (1.17 g cm-^{3}) is much lower than average marine sediments at the studied depths ($\sim$1.7 g cm-^{3}), settling speeds of nematodes would be in average 0.002 cm s-1 (Condie and Sherwood, 2006; Tenzer and Gladkikh, 2014). However, whether nematodes can actively choose a spot for settling is still not clear (Choe et al., 2012; Lins et al., 2013; Ullberg and Olafsson, 2003). Nematodes can definitely move towards a chemically attractive source (Choe et al., 2012; Hockelmann et al., 2004), but their poor swimming capabilities whenever resuspended in the water column suggests that they are actually not able to swim towards an attractive spot. Nevertheless, studies involving dispersal capabilities of nematodes observed that they were able to colonise suspended aluminium structures after resuspension events and that the 'suspended-community' considerably differed from the one found at the bottom sediments (da Fonseca-Genevois et al., 2006). '

2)'There is relevant theory on cross-slope transport in upwelling systems that would pro- vide further insight into the potential for transport of nematodes between the transects. For example, Condie and Sherwood 2006 (Sediment distribution and transport across the continental shelf and slope under idealized wind forcing. Progress In Oceanog- raphy 70(2):255-270) derive length scales for cross-slope transport (in terms of winds and settling rate) that would suggest how many resuspension events would be required to move nematodes between the two transects.'

Thank you for this suggestion. We were not aware of the paper from Condie and Sherwood, 2006 and it was very useful. Based on the average resuspension rate of sediments, settling speeds, and alongshore average transport velocity, we were able to estimate that nematodes would need only 34 h to move from one transect to the other. This result was really interesting. We have added a paragraph in the manuscript according to the suggestion of the reviewer: 'Based on the comparison with settling velocities of silt-clay sediments (Condie and Sherwood, 2006), nematodes from this study would need approximately 34 h (0.01 g m-^{2} s-1 resuspension rate) days to move from the shallower transect to the deeper transect if alongshore current velocity is maintained at 0.2 m s-1(Quaresma et al., 2007).'

3) 'The authors can fairly easily explore physical exchanges between their two transects in the context of hydrodynamic model particle transport using the online tool www.csiro.au/connie/, which covers the WIM region'

The Connie3 tool seem a very useful tool for the WIM areas (even if only data until 2007 can be used). Nevertheless, it appears the the website is not functioning normally, since we have tried many times to extract data unsuccessfully. We have also written to the support email available at the website but no response was provided. In this sense, the use of this tool was not viable for this study.

4)'The language used in relation to the hydrodynamics is unusual and sometimes difficult to interpret. For example: Abstract: Presumably "higher hydrodynamics" refers to stronger or more variable bottom currents or bottom stress. P4, L7: "great hydrodynamics" has no meaning. Perhaps "energetic currents". P11, L15: "4.2. (H2) Disturbance (high hydrodynamics) increases habitat heterogeneity"; again "high hydrodynamics" has no obvious meaning. P11, L30: "Our study demonstrated ..... together with a higher hydrodynamic stability"; again higher is not the right word, and this aspect is not

actually demonstrated, but only inferred from the sediment characteristics.'

We agree with the suggestions of the reviewer. Changes were performed accordingly throughout the whole manuscript. some examples:

abstract: '...Our study also demonstrated that higher bottom stress at the shallower habitats near the shelf break,...' page 4: '...The high particle transport observed at the WIM occurs mainly due to the great bottom dynamics in the area...'

Yours sincerely,

Lidia Lins, on behalf of all authors

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