

Interactive comment on “Understanding Mn-nodule distribution and related deep-sea mining impacts using AUV-based hydroacoustic sensing and optical observations” by Anne Peukert et al.

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Reviewer 1: Page 1 - Title: Suggest making it sharper. Delete 'understanding' and 'sensing' from 'Understanding Mn-nodule distribution and related deep-sea mining impacts using AUV-based hydroacoustic sensing and optical observations'. Authors Comment: Title has been changed. Document Changes: Understanding Mn-nodule distribution and evaluation of related deep-sea mining impacts using AUV-based hydroacoustic and optical data.

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R1: Page 4 - Study area (line 28-29): Introduce a map showing general location of the study area with latitude, longitude and depth contours to give a general perspective to the reader (these details are not required for the subsequent figures given in the manuscript). AC: We added the coordinates for the center of the working area in Figure caption Figure 2. DC: Black squares mark the study area (center 117°1 W 11°51N) shown in Figure 3.

R1: Page 8 - AUV based bathymetry . . . abundance (line 7) : The word 'abundance' signifies 'quantity of resource per unit area (Kg/sqm)' whereas here the nodule occurrence is expressed in 'percentage'. So 'abundance' should be replaced with 'coverage'. AC: Has been corrected throughout the document.

R1: Page 8 - Large-scale variability (line 24) : The term 'large-scale variability' is misleading and suggest that it can be replaced with 'Macrotopographic variability'. AC: It has been replaced (DC) to make this clearer. DC: Broad scale variability (less detailed, correlation with ship-based bathymetric data, resolution 100-1000m).

R1: Page 10 - Fig. 5D : Mean size of nodule is given as 6.7 cm², 15cm², 17.4 cm². 'Mean size' should be replaced with 'Mean area' as size cannot be expressed as square. AC: To our understanding cm² can be used as an expression for size and we consider it as more suitable here than the expression "Mean-area"; of course, we are aware of buried areas of the nodules.

R1: Page 11 - Small-scale variability (line 21) : The term 'small-scale variability' is misleading and suggest that it can be replaced with 'Microtopographic variability'. AC: Has been corrected (DC). DC: Local scale variability (more detailed, correlation with AUV-based bathymetric data, resolution 1-100m).

R1: Page 17 - Broad-scale correlation. . . (line 18) : Use of the term 'Broad scale . . .' is confusing and may be replaced with 'Regional scale. . .' as it covers large area. AC: Has been replaced as suggested.

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R1: Page 17 - lines 25-28: Comment - Regional differences in nodule exposure (burial) could also be reason for this as nodules in Central Indian Ocean appear smaller due to more sediment cover as compared to those in the Pacific which could be due to differences in current velocities that influence settling of sediments. AC: This should indeed be mentioned here and has been added to the text p.24, edited manuscript. DC: Varying considerations of scale and regional differences in nodule exposure between different oceans across different studies have thus led to partly contradicting statements of the relationship between the Mn-nodule coverage/size and bathymetric settings.

R1: Page 19 - Broad vs small scale : In cartography 'large (broad) scale' means representing small distances (area) and 'small scale' means covering larger distances (areas) for a given unit. To avoid any confusion for the reader, suggest that authors clarify the meaning of 'large scale' and 'small scale' or make necessary corrections (for example use the terms such as 'regional' and 'local'). AC: This remark has been taken into account. We changed the passages throughout the text to avoid any confusion.

R1: Page 19-22 - Sediment plume resettling : This section is too long and without any breaks, so difficult to follow. Suggest that it could be divided into sub-sections with individual heading if possible and/or with paragraphs. AC: Paragraphs and sub-sections have been added in the section (see manuscript, section 4.3).

R1: Page 22 - Conclusions - line 17: Start new para from 'With respect to. . .'. AC: Has been changed as suggested.

Technical / editorial comments: R1: At a few places where it is not clear, a question (?) mark is inserted in the text where the authors can make necessary corrections / additions as required. AC: Thank you for the remarks. We made a number of additions/corrections at those places (see manuscript, changes are tracked). DC: p.5, line 4-5: In these lines only the Experiments and year of conduction are named, not any references. MMAJ: BIE conducted in 1997 within the area of the Marcus-Wake

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Seamounts in the North Pacific Ocean. Reference: Yamada and Yamazaki, 1998;

R1: A few general editorial corrections required are as follows: i. Apply superscript for '2 (square)' wherever required AC: Has been corrected.

R1: ii. All references should be in bracket / parenthesis including author and year eg. (Page 2 - line 7 : Purser et al. 2016; Vanreusel et al. 2016). AC: The citing format is one accepted format of the journal. But since it was commented from all other reviewers as well it has been changed to the suggested format.

R1: iii. Shipbased and AUV based may be replaced with ship-borne and AUV-borne AC: We would like to stick with AUV-based and ship-based as this is a typical way to indicate with which platform the data have been acquired.

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