

***Interactive comment on* “Stable isotopes track the ecological and biogeochemical legacy of mass mangrove forest dieback in the Gulf of Carpentaria, Australia” by Yota Harada et al.**

Anonymous Referee #1

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General comment This study assessed the impact of mangrove dieback and recovery through assessing the changes in vegetation population and biogeochemical variables in the Gulf of Carpentaria. Findings from this study are important to understand the impact of mangrove disturbance on the biogeochemical processes, specifically their interaction between plant and sediment. This study will contribute to the current blue carbon literature while such coastal ecosystems are expected to undergo extreme disturbance in future. The manuscript is well structured and nicely written but can still be improved for some minor correction. Also, I would suggest providing further raw dataset obtained from this study in the supplementary information or via digital data repository platforms such as Mendeley Data and Figshare. Such of these data will provide a bet-

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ter understanding for the readers and also be useful for future meta-analysis based study on this topic. The publication of the ms can be recommended after revisions.

Below are my minor comments: Line 15: I would suggest defining the acronym for C, N, S when they first appeared. Sometimes acronyms can make confusion for non-specialist readers. Line 19: Were these samples or applicable for vegetation and sediments only? Line 25: It would be great if data on vegetation population increase are presented in the abstract. Lines 51-55: Most of the cases provided here highlight the impact of mangrove loss. If possible, authors can provide example or reference how mangrove recovery may restore biogeochemical processes. It is important when one of the study aims is to document the ecosystem recovery profile following dieback. Line 100: 'Three field campaigns were carried out in August 2016, 2017 and 2018'. This sentence is redundant with lines 90-91. Line 115: Does this mean that leaves from the impacted site were obtained from seedling rather than survived mature trees? Line 116: I would suggest describing further steps on wood sampling approach, whether samples were done for sapwood only or with heartwood as well? Line 117: It is quite hard to see which stable isotope is applied for each sample. It would be great if the raw data are provided in Supplementary Information or online database. Line 120: In this section, maybe the readers want to know the reason for having a surface (<0.5 cm) and subsurface (0.5-20 cm) sediment samplings. Line 121: 'each forest' do you mean each zone? How many soil core per zone? Line 133: Was number of the sample here denotes the number of photographs or number of quadrats? How many quadrats per forest zone at each transect? Line 191: Was the variation similar to the impacted site? re: 34S depleted from higher to the lower tidal zone Line 259: Double increased? Here may worth to discuss why both unimpacted and impacted sites show similar mangrove seedling increase, despite they have with different number and rates. Line 271: In related to Kelleway et al 2018, was 13C between leaf and wood different significantly from this dieback study? Line 324: 'lower mangrove C inputs' change mangrove with autochthonous? Line 326: 'The surface sediment (0 - 0.5 cm) differed relatively more than the deeper (0.5 to 20 cm) fraction' Sorry, it is quite hard to follow this sentence.

Line 328: How about C/N ratio? It would be great to explore further roles of C/N ratio to support the findings in addition to elemental and isotope variation.

Table 1: Thanks. This table is really helpful to understand the scattered sampling time and what was sampled. Table 2: it is quite unusual to have a comma between mean and SD. I would suggest replacing the comma with \pm here and elsewhere. Figure 2: In the graph, I would suggest providing seedling per hectare instead of per quadrat. Figure 3: Were the authors collect the wood sample as well for SIA? Is there a possibility of presenting ^{13}C and ^{15}N in the same way with ^{34}S , from landward to seaward? Figure 7: It is a nice conceptual figure. Please clarify if isotopes denote for both plant and sediment.

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