

Interactive comment on “Mid-Late Holocene event registered in organo-siliciclastic-sediments of Lagoa Salgada carbonate system, Southeast Brazil” by Anna Paula Soares Cruz et al.

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We thank Reviewer #1 for the very constructive review of our manuscript. Below, we provide a point-by-point response to the Reviewer #1. To facilitate the review, we copied the Reviewers' comments in black and inserted our comments after that. Reviewer #1 (Specific comments): The authors interpret the fluctuations in the ^{13}C and ^{15}N composition as the main consequence of change in both vegetation structures and C3/C4 photosynthetic organisms due to climate dynamics (e.g. page 2, lines 9-12; page 4, lines 27-28; page 7, lines 5-9). This is substantially based on the assumption that terrestrial plants are dominated by two distinct vegetation groups employing different

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photosynthetic pathways (C3 and C4 plants) that determine different ^{13}C ; generally, C3 plants grow under humid conditions while C4 plants under relatively arid conditions. Furthermore, a combination of stable carbon and nitrogen and the C/N ratio of organic matter is used to discriminate the different source of organic matter. The vegetation changes discussed in the manuscript, however, are quite difficult to understand due to the lack of adequate direct proxies (e.g. pollen, plant macro-remains, phytoliths). In the transitional environments represented by coastal wetlands several factors different from climate changes, such as salinity, light level into the water, and impact of human activities, among others, can shape the communities of primary producers, influencing the stable isotopic composition of the organic matter into the sediments. Sea level fluctuations also produce major geomorphic and ecological changes in coastal areas, which have the potential to modify the sedimentological processes and affects the communities of primary producers, even without a direct influence of climate. For example, input of saltwater into a coastal wetland may determine the development of communities of halophilic plants and aquatic algae, featured by photosynthetic species that may present a wide range of ^{13}C and ^{15}N values (see Duarte et al. 2018, *Frontiers in Marine Sciences*, doi: 10.3389/fmars.2018.00298). The formation of coastal dunes may trigger the development of plant communities dominated by C4 species of Poaceae in a context not influenced by climate changes. In the hydrosphere, often occurring in coastal wetlands without a direct relationship with climate, there is the succession of different environmental stages characterized by peculiar sedimentological processes and photosynthetic organisms (C3 and C4 species), which have the potential to produce major changes in the stable isotopes composition of the organic matter. The authors do not seem to adequately consider the high variety of ecological situations that can influence the isotopic composition in coastal sites. Therefore, I would like to suggest them to comment in the text on the possible uncertainties of the applied methodology in the study of coastal sites and to discuss occurrence / exclusion of other possible factors that influence the composition of ^{13}C and ^{15}N and the C/N ratio in their study area. Authors: We agree that several factors can change the

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environmental condition of the coastal areas. Thus, we added on page 2, in the introduction, other factors that can change the environment beyond the climate. We also mention in the discussion part, page 5 (line 20-24), the problems with the nitrogen and carbon isotopes in the discrimination of the primary producers and we emphasize the importance of the pollen analysis to discuss the vegetation changes. Unfortunately, we don't have pollen analysis made in this core or in this lagoon. However, we use pollen analysis made in other lagoons of southeast Brazil to corroborate with ours proxy and emphasize the influence of the climate in this region. In page 6 (line 18-24), we reinforce the idea of the other factors, as the input of saltwater into the coastal wetland and the formation of coastal dunes, which can trigger the development of plant communities as a result of the competitive advantages of salt-tolerant species, but we also showed that in pollen data analyzed from cores collected from lagoons in southeast Brazil, without influence of the coastal dynamics, also show changes in vegetation as a result of the climate alterations through the Holocene, making the climate an important environmental modifying factor in this region. Reviewer #1: Paragraph 4.2 must be integrated by references to recent research dealing with the 4.2 ka event. I would suggest the authors to look for recent literature focused on this climate change characterized by a high regional specificity. To this purpose there is a special issue of *Climate of the Past* devoted to 4.2 ka event with contributions from various regions of the world. Authors: Agree. Done. Reviewer #1: Figures 2-6 of the pdf version of the manuscript I downloaded shows a low quality in terms of image resolution. Besides, the Figures 3 and 6 show curves too close to each other with overlapped scales that limit the readability of the data. I would suggest the authors to check this graphic material and improve its quality. Authors: Agree. Done. We have substituted for a better resolution. Reviewer #1: Technical corrections Page (P) 2, Line (L) 28: check the correct version of the Bacon program P 4, L 7: include space between '3.7' and 'ka' P 4, L 10: add 'ka' after '3.2' P 4, L 21: include space between '3' and 'm' P 6, L 1: change 'estromatolites' to 'stromatolites' P 6, L 14: write '2200_80 BP' P 6, L 16: include space between '0.05' and 'mm/year' P 6, L 14: write '2800_8 BP' P 6, L 23: include space between '4.2'

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and 'ka' P 6, L 31: change 'Monson' to 'Monsoon' P 7, L 6: include space between '4.2' and 'ka' P 7, L 24: include space between '3.7' and 'ka' Authors: All the technical corrections were done.

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