

***Interactive comment on “Neogene Caribbean elasmobranchs: Diversity, paleoecology and paleoenvironmental significance of the Cocinetas Basin assemblage (Guajira Peninsula, Colombia)” by Jorge Domingo Carrillo-Briceño et al.***

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**General comments**

Dear Anonymous Referee,

Thank you very much for your considerations about our submitted manuscript. We revised our writing and many sentences were rewritten. We hope that now the manuscript is adequate for publication in the Biogeosciences journal.

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Considerations and points raised are answered below:

### Specific comments

**Comment:** "A taxonomic revision is presented of the elasmobranch fauna collected in the Cocinetas Basin (Figs. 1–2), from the Jimol (Burdigalian), Castilletes (late Burdigalian–Langhian), Ware (Gelasian–Piacenzian) Formations, and two localities of the Patsúa Valley (Burdigalian–Langhian). " – The authors address this taxonomic revision in <10 lines per family within the results (p. 6–7) with many families containing more than one taxon. If there are revisions to the taxonomy (or even establishment of taxa or taxon), a more careful description of the specimens, previous taxonomic classification, justification for the changes, and discussion of the systematics are needed at the individual taxa level, either genus or species depending on the classification.

**Answer:** We are grateful with this important suggestion from the referee. First we want to apologize, because it has been a mistake from us, when we were not clearer in the introduction or methods sections. It generated misunderstandings for the readers. The focus of this manuscript was not a detailed taxonomic revision of the fossil assemblage. For 30 taxa we should dedicate a long description section which could result in a long monograph, far from the plan and objectives expected for this manuscript. Any specimens referred in our contribution do not represent a new species or taxon, for which a description is not required. We have linked all the references for the original descriptions of each taxon, other descriptions and their record in Tropical America for supporting our assignments. Usually paleontological and neontological manuscripts with only taxonomic list do not require a detailed description. In our case, we have presented general information for each taxon, detailed and high quality pictures with the best representative specimens for each taxon. Additionally, supplementary information (e. g., Table S2) with information about total number, tooth measurements, jaw position and provenance of all the fossil specimens are provided.

**Comment:** "The assemblage includes 30 taxa, of which 24 are new reports for Colom-

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bian Neogene deposits." Again, an assemblage description needs to be more careful and detailed with information on tooth morphology including but not limited to tooth shape, size, position, wear, etc.

**Answer:** Continuing the idea of the above answer, the assemblage from Colombia is not represented by new taxa for the scientific community. It represents new records from the country of taxa that were previously described and referred from other regions of the Caribbean, Tropical America and the Americas in general (see references section). We presented a paleodiversity compilation of the fossil assemblages. Fossil assemblages have different ways to be described, for example: a) with detailed taxonomic description (which is out the focus of our manuscript), b) just as simple taxonomic lists with or without illustrative support, and c) taxonomic lists, with general information about taxonomic comments and information supported by a detailed supplementary and illustrative information. The last one is our case.

**Comment:** There are no paleosalinity estimates given in this manuscript. There are oxygen isotope values that indicate lower salinity environments, but the authors do not give actual paleosalinity and only refer to broad and qualitative interpretations of environmental conditions. It is possible for the authors to use a paleosalinity model as established in the literature if they use estimates of temperature and freshwater oxygen isotope composition from the literature.

**Answer:** Indeed, no net paleosalinity values are given. Since we lack additional proxies for estimating the freshwater oxygen isotope composition (e. g., marine mammal bones), we have chosen to replace the term 'paleosalinity'.

**Changes:** Replaced in P. 1 L. 8; P. 2 L. 21; P. 13, L. 12; P. 15 L. 26.

**Comment:** Next, the authors present the generalized diet for modern analogues to discern feeding ecology. However, the authors do not give specific species for modern analogues; many modern families referred to for the fossil specimens have a wide variety of diet and habitat preferences that cannot be easily summarized and condensed as

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they are in the current manuscript (P. 8 L 4-20). The modern analogues are not identified and furthermore, little to no justification for how and why the fossil taxa should follow these modern ecological classifications. Further, if the modern analogues were named, I am almost certain that a careful and deeper search of the modern shark ecology research would yield more specifics on dietary preference, migration patterns, and other important aspects of ecology.

**Answer:** About “However, the authors do not give specific species for modern analogues”, one of the most complex topics and challenges in paleoecology is the inferences about paleo diets. How it is referred in the text “Extant sharks and rays exhibit a wide range of diets; however, each taxon has specific food preferences (see Cortés et al., 2008; Klimley, 2013) that could be used to infer dietary strategies of their fossil relatives”. A dietary composition and behavior of extant/relative species of the taxa recorded in the Cocinetas assemblages is compiled in the Table S3. Every fossil taxon with living representative is referred with their analogous living species. Fossil taxa without extant representative at species level are compiled according to the preferences of all extant species present in the genus. For extinct species without extant representatives (e. g., families and genera), their paleoecology and potential feeding preferences have been inferred according their fossil record (based on references), tooth morphology and adaptive dental types, diagnostic characters to infer feeding preferences in shark and rays (see Cappetta, 2012, pp. 17-23).

**Comment:** The authors have a substantial variation in the  $\delta^{18}\text{O}$  values from shark teeth. Given the range of Formations, lithology, and likely depositional environments, the results need to be better organized to reflect these differences. In addition, the paleoenvironmental reconstruction based on these oxygen isotope compositions must consider the habitat reference of the shark that is the basis of geochemical analysis. A shark’s tooth mineralizes at a fairly fast rate below the epithelium but there is a delay until this tooth reaches the first series within the jaw where it is used and lost (and hence deposited into the fossil record). Therefore, for migratory sharks the  $\delta^{18}\text{O}$  value

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of a tooth may not represent the depositional environment.

**Answer:** We have tried to summarize the information about the  $\delta^{18}\text{O}$  of shark's bioapatite formation and incorporation of low  $\delta^{18}\text{O}$  values in the beginning of the discussion about isotopes (P. 13 L. 13–22). A new sentence about the subject was also added in the P. 15 L. 2–3, when referring about *Negaprion* results from Ware Fm.

**Changes:** Sentence added in P. 15 L. 2–3.

**Comment:** Parsing out details for modern analogues and their lifestyle can help the authors classify and interpret the variation in  $\delta^{18}\text{O}$  values.

**Answer:** We have revised some sentences which we mention modern analogues in our stable isotope discussion section. Since *Carcharhinus leucas* is an extant species, only †*Negaprion eurybathrodon* and †*C. chubutensis* needed relevant examples of a modern analogues. For †*C. chubutensis*, *Carcharodon carcharias* is mentioned (P. 13 L. 27–31) and for †*Negaprion eurybathrodon*, *Negaprion brevirostris* is referred (P. 14 L. 6–8).

We hope to have answered all considerations and to have attended the requirements to publish in the Biogeosciences Journal.

Best regards,

Zoneibe Luz.

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Please also note the supplement to this comment:

<https://www.biogeosciences-discuss.net/bg-2018-271/bg-2018-271-AC2-supplement.pdf>

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