

## ***Interactive comment on “Stable isotope study of a new chondrichthyan fauna (Kimmeridgian, Porrentruy, Swiss Jura): an unusual freshwater-influenced isotopic composition for the hybodont shark *Asteracanthus*” by L. Leuzinger et al.***

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The manuscript "Stable isotope study of a new chondrichthyan fauna (Kimmeridgian, Porrentruy, Swiss Jura): an unusual freshwater-influenced isotopic composition for the hybodont shark *Asteracanthus*" by Lea Leuzinger and co-authors represents a large data set of oxygen isotope values derived from predominantly hybodont sharks and pycnodontiform fishes from the coastal marine Late Jurassic of Central Europe. In

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combination with other stable isotope studies compiled from different localities it can be shown that the low  $\delta^{18}\text{O}$  values from the enameloid of the hybodont shark *Asteracanthus* not only point to adaptation to brackish and freshwater realms but also show a distinct trend through time to life habitats in a wider salinity range. The strength of the work is not only the large data base of 77 original analyses but also the further 96 incorporated values from other studies. So a large picture is created that is able to show an ecological trend from the Middle to the Late Jurassic for *Asteracanthus*. This widens our knowledge regarding durophagous hybodont sharks, especially in the marine realm of the Jurassic Seas. Moreover, it demonstrates the use of isotopic investigations of fossil tooth material for palaeoecological purposes. The quality of the illustrations looks also very good. The manuscript is without doubt worth to be published in the BGD!

In the attached pdf (R1) I marked some semantic points, comments and suggestions. Unfortunately, some of the presented information comes out of nowhere. References would substantiate these facts.

Moreover, I have some problems with part 5.1 of the manuscript. The diagenesis discussion is very short, actually it is one sentence. However, it is a most important point. Various approaches and indicators have been proposed to evaluate the preservational state of fossil bioapatite but to date there is no unequivocal method to ensure pristine preservation. Therefore, it is necessary to convincingly argue for the original isotope composition in the bioapatite. Just with a convincing exclusion of alteration of the investigated tooth material the obtained data become useful. I believe that the authors did this already but it is not presented in the text. Furthermore, it is a long known fact that dentine is less resistant to diagenetic overprint than the hypermineralized enameloid. That's why enameloid is always the preferable tissue. Nevertheless, it is not reasonable for me the *Asteracanthus* dentine bulk samples are considered to be diagenetically altered but the *Asteracanthus* enameloid samples that covering largely the same range are not. A more detailed explanation could easily clear up any misunderstandings.

Also, the discussion of juvenile tooth material is not convincing at all. Since nothing

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is displayed in any figure the reader just knows that the "proposed" juvenile teeth are smaller than the large, adult ones. In comparison with a complete heterodont dentition of *Asteracanthus* containing teeth of different size this is not the strongest argument. It appears that the juveniles were included to give the freshwater-excursion a meaning. The proof of a freshwater reproductive behaviour of *Asteracanthus* would be great but is not mandatory for the existence of this work. Currently the assignment of teeth to juveniles and subadults stands on shaky ground, based on the given information in the manuscript I have.

Nevertheless, it is a very interesting manuscript dealing with a fascinating aspect of the palaeoecology of the extinct hybodont sharks. The underlying and compiled data base is enormous and even without the juvenile story worth to be published.

I hope you will find the comments and ideas useful to improve your manuscript.

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/12/C5631/2015/bgd-12-C5631-2015-supplement.pdf>

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