

## ***Interactive comment on “Coral Cd/Ca and Mn/Ca records of El Niño variability in the Gulf of California” by J. D. Carriquiry and J. A. Villaescusa***

### **Anonymous Referee #2**

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This paper explores the Mn and Cd content in coral records from three coral species as possible paleoceanographic proxies, for a reef located at the southern tip of Baja California. Differently than oxygen isotopes or the Sr/Ca ratio, which are well established and utilised proxies, the coral Mn/Ca and Cd/Ca ratios have not been exploited as much. The present paper finds interesting correspondences of these ratios with ENSO variability, which are suggested to be explained by processes linking changes in upwelling and vertical mixing. I found the paper rather short and simple but, for its interesting insights on the potential use of these uncommonly studied ratios, I think it would be of use to have it published at Climate of the Past. Before publication, however, several important points should be addressed, which I detail in the following:

Sample collection:

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- Were the whole colonies collected for sampling? Which were their dimensions? Hadn't it been better to drill cores in the colonies?

- It would be informative to add representative X-ray sections of the sampled coral slabs.

- More details on the sampling resolution should be given. Is each data point presented in the figures (e.g. Fig. 3) representative of the calcification during the whole year? Or during a subsection of the year? One of the corals seems to have been sampled at higher (seasonal) resolution, but this is mentioned, for the first time, already at the Results and Discussion section (69/21). These higher resolution data are only plotted at the end of the paper, in a figure (Fig. 6) that is not called anywhere in the text.

Results and discussion:

- 71/3: The sentence 'It is unlikely that species differences observed in this work is a consequence of sample treatment, although it has been proposed that corals can bio-concentrate metals from 5 their diet (e.g., Fallon et al., 2002)' should be split in two, and further information should be given to substantiate why the sample treatment is believed to have not been an issue.

- 71/8: The authors discuss about changes in growth rates, but do not present any data on them. It would be interesting to add these data in a new plot, for better assessment of any correspondences with the elemental ratios. The discussion on this should be expanded. The paragraph now ends with some references on studies assessing possible effects of growth rates on Sr/Ca which, in the way it is written now, I am not sure clarify much about Mn and Cd ratios.

End of the paper:

The manuscript ends very abruptly. Looks like it was either finished quickly due to a lack of time, or that some important part is missing. In fact, Figures 5 and 6 are not called in the main text, while a discussion on them, particularly on Figure 6, would add

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value to the paper. Regarding this figure, which presents data on a higher resolution for the coral *Pavona gigantea*, the elemental ratios present a variability that does not match that well with the data presented at lower resolution (Fig. 3). A clear maximum in Cd/Ca between 1972 and 1973, for example, occurred during an El Niño event which, according to the hypotheses of this paper should have given a minimum in this ratio. Regarding Mn/Ca, maxima occur at times when there were no El Niño events (e.g. 1974, 1981, 1984, 1989). The authors should discuss more on the discrepancies between high and low resolution records. Also, a final comprehensive conclusion section should be prepared.

#### Tables and Figures:

- Table 2: Instead of marking with an asterisk the probability of those elemental ratios that are significantly different, all data, probability and ratios, could be printed in bold.
- Fig. 1: Bathymetry contours would be of help.
- Fig. 2: Explain the meaning of the grey bars, in this and also the other figures. Also, in the legend, it is 'Slutz' instead of 'Schultz' in the reference.
- Fig. 3: It may be better to plot each coral record on its own scale, to magnify all changes. It is difficult to see changes in *P. gigantea*, for example, which in the paper conclusions is suggested as the best paleoceanographic coral recorder.
- Fig. 4: It is not clear how these anomalies are calculated. I am not sure about the meaning of the solid line average between all species. Perhaps a line for each species would be better. Also, in the legend, add 'the' after '... the Cd/Ca ratio in'.
- Figs. 5 and 6: I am surprised that they are not called at all in the main text! See comments above.

#### Minor changes or typos:

- 64/9: 'ENSO and non-ENSO years' in the whole paper. Wouldn't it be better to talk

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about 'El Niño and La Niña years'?

- 64/11: Regarding the coral scientific names, since Pavona and Porites start with the same letter, perhaps is better not to abbreviate the genus throughout the paper?
- 65/8: Cut sentence at 'chronology' and start another afterwards. - 65/26: Comma after ENSO.
- 66/6: After 'Tarawa atoll', a suitable reference should be provided.
- 66/21: Lat, long separated by comma instead of 'and'.
- 68/17: Meaning of APDC?
- 68/27: Is there a better word for 'fortified'?
- 69/1: Regarding the 91% recovery, did the authors correct for this in the final results?
- 69/7: Lat, long separated by comma instead of 'and', correct degrees symbol after 23.
- 70/1: Remove 'in'.
- 70/10: Long and complicated sentence that should be rephrased.
- 70/29: Add comma after 'that'.
- 72/9: All 'Delgadillo' references should be 'Delgadillo-Hinojosa', search and replace.
- 73/3: 'is' instead of 'are'.
- 73/16: Add dot after the reference, and start the following sentence as 'Moreover, from the differences in ...'
- 73/20: 'On the other hand'.
- 73/24: Better 'tracers' in plural.

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