

Interactive comment on “Spatial linkages between coral proxies of terrestrial runoff across a large embayment in Madagascar” by C. A. Grove et al.

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Reply to Reviewer S. Lewis

Abstract: Changed to ‘data were compared to’

P. 3101, L. 12: changed to ‘are likely to be linked’

P. 3103, L. 8: changed to ‘Barium (Ba) is both dissolved in the rivers and adsorbed to suspended sediments (clay minerals), which are then transported to coastal waters via rivers.’

P. 3105, L. 4: deleted ‘three’

P. 3105, L. 12: changed all to ‘modelled’

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P. 3106, L. 4-5: The information regarding reef slope and reef flat is already reported in the methods section (as well as the discussion).

MAS1 was located on the edge of the reef slope and MAS3 on the flat; therefore depths were not significantly different. The distance between the two was 40 m. All of this is now documented in the revised version of the manuscript.

P. 3107, L. 1: Reworded to ‘River discharge decreases but continues all year round, reaching lows in October and November (Fig. 2).’ Indeed, river discharge is continuous all year round for all catchments. NE Madagascar is a particularly wet region.

P. 3108, L. 18-28: We have added a new paragraph at the start of this section. This reads as follows: ‘Two measurement techniques, solution ICP-MS and LA-ICP-MS, were applied to compare Ba/Ca data generated for two coral cores, MAS1 and MAS3 (LA-ICP-MS only), from the same catchment. Both time series begin in January 1991 and end in December 2005, spanning a total of 15 years. Solution ICP-MS was also applied to generate both Ba/Ca and Sr/Ca data for the cores MAS1, ANDRA and IFAHO for the same 15 year period, at an approximate monthly resolution. Subsamples were taken every 1 mm equating to ca. 1 month resolution. This is in contrast to the approximate sub-weekly resolution of the LA-ICP-MS technique. Stable isotope data were generated for the same three corals measured using solution ICP-MS (MAS1, ANDRA and IFAHO), at the same ca. monthly resolution (subsample resolution).’

It is beyond the scope of this study to examine the Sr/Ca relationship between the two measuring techniques. However, it is something we are planning to publish at a later date.

The RSD of the LA-ICP-MS Ba/Ca is now reported as 4.3%

Section 2.4: We have included this information in the new paragraph added at the start of section 2.4. Please refer to point P. 3108, L. 18-28.

Section 2.5: A full description of the model and a temporal comparison of the model

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with runoff proxies has recently been accepted for publication in the journal Marine Pollution Bulletin (see Maina et al., Title: Linking coral river runoff proxies with climate variability, hydrology and land-use in Madagascar catchments, Ms. Ref. No.: MPB-D-12-00251R1). Maina et al. (2012) compare the time series of model and coral Ba/Ca and G/B for cores MAS1 and MAS3 from the largest watershed for >50 years. The model performs well in terms of the long-term trends, yet less well in terms of year to year variability which makes it difficult to confirm the magnitude of the 2000 flood. For this study (Biogeosciences) we were mostly interested in mean differences in absolute discharge and sediment yield over a 15 year period between the large and the two small watersheds. Due to the low spatial resolution of the model, yearly variations in the two small watersheds cannot be modelled with high confidence. We therefore concentrate on modeling the differences in the absolute values to get an idea of discharge volume and sediment yield and how it relates to mean proxy differences. We also state this in the discussion in section 4.2 at the end of the 2nd paragraph.

P. 3110, L. 10: changed to ‘phosphorus’

Section 2.6: Sr/Ca was not used as inconsistencies were observed between the timing of Sr/Ca in relation to G/B. We believe this to be linked to the impact of rivers potentially cooling down the waters during the wet/warm season. We will publish a comparison of Sr/Ca records between regions as well as measuring techniques (see response to point P. 3108, L. 18-28b) at a later date.

P. 3113, L. 4: Changed to ‘Geochemical data were’

Sections 3.3.1 and 3.3.2: See response to Section 5.

P. 3117, L. 8: Inserted ‘(MAS1 and MAS3)’

P. 3118, L. 13: Changed to ‘show a considerable relationship’

P. 3118, L. 17: See response to Section 5.

P. 3123, L. 5: changed to ‘river systems’

P. 3123, L. 16: changed to 'combining'

Conclusions P. 3123, L. 26 and 27: Size and discharge of rivers are important, however, not in this context.

Table 4: Changed data values to 2 significant figures

Figure 2: Changed figure caption to include caption'd'

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