

## ***Interactive comment on “Comparative organic geochemistry of Indian margin (Arabian Sea) sediments: estuary to continental slope” by G. Cowie et al.***

**Anonymous Referee #1**

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This is a well written paper which fits very well into this special issue. Cowie et al. follow up the earlier work of Slater and Kroopnick (1984) and Paropkari et al. who attributed increased organic carbon concentrations on the slopes of the Arabian Sea basically to better preservation of organic matter within the OMZ. Cowie et al. test this hypothesis using multiple tracers for organic matter sources and degradation intensity as well as grain sizes to study the influence of hydrodynamics on sediment composition. They find better preservation of organic matter in the OMZ (and on the shelf) possibly related to oxygen exposure time. However, grain size reflecting hydrodynamics, regional winnowing and focusing seem to be more important, determining organic matter content of slope sediments. Another important result is that the terrestrial signals in C/N and

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$d_{13}C$  disappear immediately off the river mouths which is confirmed by lignin content. My general comment is that the paper could be shortened a little at some places to become more concise and that a separate chapter comparing with the results from the authors' earlier study off the Pakistan margin could further improve its scope.

Specific suggestions:

- The abstract can be shortened a bit:
- The two sentences in line 10 to 15 can be merged. The term “of different origin” is misleading and can be deleted.
- Delete or rewrite line 20 after the comma as “loadings” could be unclear in this context
- Use a common abbreviation for organic carbon (Corg, as later in the text), sometimes it is only C and sometimes organic C. This has to be changed also at many places in the introduction, also check the rest of the ms..

Introduction Page 3389

- delete the sentence in line 12 to 13 as the next one says more or less the same.
- delete etc. in line 18

Page 3390

- line 6: although there are a large number of rivers their size and annual discharge is relatively small except for Narmada and Tapti which are far north of the working areas (as you suggest later they may have influenced the “Yokosuka stations”). Delete the first part of the sentence from line 6 to 8 and rather start with “Rivers on the western Indian coast have particularly large runoff....”

Page 3391:

- Line 6: it is quite misleading to describe the five transects as north and south of the Mandovi/Zuari as there are a large number of other estuaries between Goa and

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Ratnagiri and also some between Goa and Karwar. Rewrite this part as well as line 10 and lines 12/13, use latitudes and the names of the transects rather than "north or south of the estuaries" as this implies that sedimentation may be still influenced by these two rivers.

Change the order of Figures as Figure 3 is cited in the text before Figure 2.

Chapter 3 should be named Results and Discussion starting on page 3393 in line 9. This is more precise as parts of the subchapters are data presentations. Merge the two sentences line 10ff.

Page 3395: cannot find SPOM data in Table 1; add SPOM data.

- the Kali river may be a more probable source of terrigenous matter at Karwar. As the d13C in this river has not been analysed it may be better to delete line 17

Page 3397:

Lines 6 and 19: delete Zuari and Mandovi (see above).

Page 3398:

- shorten the paragraph on d15N: the general trend is clear with lighter values in the estuaries and values between 5 and 7.5 ‰ in the deeper samples with a few exceptions. As a thorough discussion of the large number of processes is beyond the scope of this paper just mention the processes which could influence d15N in sediments (see line 19). Two or three references for the respective processes and impacts on d15N are missing in this section. The same is also required for C/N, cite a paper for the range of C/N ratios in marine, aquatic and terrestrial OM (may be Meyers, 1994).

- Start amino acids with a new paragraph.

- Line 28: it is not possible to compare the decrease observed along Goa transect to the Yokosuka transects as there are no shallow AA data for this northern area. It is not to be expected that THAA are higher on the northern shelf than 20% though, but you

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have to formulate it differently: basically the northern transect data are more scattered in the OMZ.

There are several paragraphs comparing the Indian and Pakistan margins all through the paper. It would be better to summarize these in a new chapter, possibly, with Figures presenting the data for comparison and discussion of the differences and possible mechanisms. The respective paragraphs are on page 3394, lines 10-16, page 3395, lines 20-28, page 3398, lines 20-25, page 3399, lines 3/4, and also page 3403, lines 1-9.

I like to read this paper with all these tracers put together and discussed in detail in a comprehensive way and look forward to its publication in Biogeosciences.

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