

Reply to Anonymous Referee #1 (replies marked by ➤)

The manuscript entitled 'Flux and accumulation of sedimentary particles off the continental slope of Pakistan authored by Schulz and von Rad addresses questions that are well within the principle scope of 'Biogeosciences'. The comparison of sediment accumulation rates with sediment trap data helps to better understand how sediment distribution and sedimentary processes evolves in the seasonal cycle of the monsoon system. The precise determination of the age of a stratigraphic marker bed (F-turbidite) facilitates the quantitative comparison of sediments (and their grain size fractions) deposited on the sea floor with the flux through the water column.

- We acknowledge very much the insightful suggestions of the referees and his review. A rather broad inventory of different sedimentary data and precise dating may be a suitable way to continue to explore the observed variability and sedimentary impact of matter fluxes on the continental slope off Pakistan. The processes of erosion and transport and sedimentation can be monitored by a combination of biological and geochemical sediment and water column proxies.

Scientific methods and hypotheses used in the presented manuscript are of importance, however, some presented paragraphs need 'streamlining' (see below).

- Both coauthors thank the referee for his work and help and have streamlined the manuscript.

The authors give proper credit to related publications.

- Because we focus on a rather regionalized feature, which however possibly may have broader implications for our understanding of varve and sediment lamina and turbidite formation off Pakistan, we realized that in the last years sediment traps studies have gained relatively little attention, after our investigations had failed to show a "normal" trap record off Pakistan.
- We have updated our study with new and relevant literature which mostly come from the Indus area further to the south (Cowie et al., 2009 DSR Special Topic; see updated MS), more distal to the Makran Margin (Hab area), that we here wished to study.

We mentioned below some scientific 'odds' and editorial/technical comments which should be addressed to improve the manuscript:

- Referring to the referee's suggestions and to those of reviewer #2, the coauthors have rewritten the MS, included more recent literature, changed figures, and have streamlined and revised the old data sets.

The title should be shortened. What does 'water column and seafloor estimates' mean?

Suggestion: Sediment flux and -accumulation in the NE Arabian Sea p.

The title should be shortened. What does 'water column and seafloor estimates' mean?

Suggestion: Sediment flux and -accumulation in the NE Arabian Sea

- We propose the following title used in the attached MS:
Vertical and lateral flux on the continental slope off Pakistan: correlation of sediment core and trap results
- In a revised MS attached, we have taken full account to the referees suggestions:

What does 'individual bulk component' mean?

- We have omitted the term, but refer to the conventions started decades ago by P.D.Trask in order to use Recent Marine Sediments to determine the size and relative amounts of particles almost entirely composing the material. The term may be used on the major inorganic and organic sediment fractions: Organic carbon, lithic fraction, shelled materials (e.g. micro)-fossils, opal, but leave room to estimate on appropriate subfractions and more detailed analyses.

line19: Delete sentence 'However.' ➤ O.k.

line21: The transfer from recent observations of high winter flux events (HFE) to explain sedimentation patterns over the past 5000 years comes a little bit 'out of the blue'. Please remove 'for the past 5000 yr'.

- We think that large shifts during the climatically rather stable Late Holocene period are highly unlikely. From our layer-by-layer counting (several thousand varves) using radiographs, microscopy and statistics on laminae thicknesses, lamina types appear as basically invariable. We take into account exceptional event deposits (turbidites-turbid layers, suspensates, interflows etc.). We consider however that past boundary conditions (shift in sea level) may have been totally different in the pre-Holocene time

line25: Explain 'sudden shifts'. ➤ Deleted from the abstract

line26: Is there missing a sentence? Carbon preservation was not mentioned before. The second half of the abstract (beginning with line 19) needs some clearance/re-writing, because several information are stirred and not comprehensible.

- We have omitted the aspect of carbon preservation from the abstract and also from the text, now focusing entirely on the unique sedimentary regime; including low-oxygen conditions and elevated sedimentary carbon off Pakistan. We realize, that much of confusion in the early version of the MS arose from stirring these three topics.

p. 12419 line3: Insert after 'bottom' water. ➤ O.k. p. 12419 line11: In the abstract a depth of 120 m for the upper OMZ boundary (instead of 200 m here) was given. ➤ O.k. p. 12419 line11: Delete 'subsequent' ➤ O.k. p. 12419 line12: Delete 'very'. ➤ O.k. p. 12419 line17: Delete 'offshore'. O.k. p. 12420 line8: Delete 'off west Pakistan'. This sentence is very long. Split it into two sentences. The following sentence is too long too. ➤ O.k. p. 12420 line11: 'sedimentary processes'. ➤ O.k. p. 12419 line14: The sentence beginning in line 14 is meaningless and should be deleted O.k.

p. 12421 line3: Explain 'lateral advection'. Do you mean turbidites?

- The question points to the key result of the present study: The process behind the high accumulation of laminated sediment, which we quantified in our transect. The study speculates that winter-time suspensions from the water column dominate over bottom-near transport processes, such as turbidites (although we used one thick turbidite marker bed, outstanding from "normal" lamination, for precise correlation.

p. 12421 line6: Replace 'oxic' by aerobic. ➤ O.k. p. 12421 line3 - 21: This paragraph is very extended and presents many details which are not necessarily needed for the discussion and interpretation of this here presented manuscript. ➤ Changed p. 12421 line22: 'Quantitative estimates' of what? 'are needed to better. ➤ We refer to estimates of flux p. 12421 line23: 'In the present study, we will focus on the calculation of sediment accumulation rates along. ➤ We refer to estimates of flux : p. 12421 line27: Insert after 'productivity' in more distal parts of the oceans. ➤ O.k. p. 12422 line1: The lateral fluxes may be high. ➤ O.k. p. 12422 line15: Here, four distinct tectono-sedimentologic settings are mentioned. But in the following only three settings are described. ➤ Corrected. p. 12423 line3: This is a little bit confusing. Are the two different 12 cm thick layers (either red or white) the result of the same mobilizing/deposition event or does the red layer always follow up the white layer as stated in line 11 on this page? ➤ We consider the first case as the most plausible (see line 162). p. 12423 line22: 'difference' instead of 'significance' ➤ O.k. p. 12421 line23: Delete 'from'? and write reddish. ➤ O.k. 'Alternatively' by 'Additionally'. ➤ O.k. p. 12425 line28: Delete 'homogenous'. ➤ O.k. p. 12426 line2: from a depth of: ➤ O.k. p. 12426 line8: Lückge et al. (2002) concluded that the light layers are regularly occurring winter events due to extreme rainfall events intercalated in the dark layers. ➤ O.k. p. 12426 line19: were determined at the Leibniz: ➤ O.k. p. 12427 line21: Insert after number 'of'. ➤ O.k. p. 12428 line5: Again, different depth information for the upper OMZ boundary. ➤ Corrected p. 12428 line5: What does

'eventually' mean? ➤O.k. p. 12428 line9: Re-write this sentence. Suggestion 'Due to higher bottom water-O₂ concentrations allowing more intense bioturbation the boundary between the F-turbidite and the hemipelagic sediments is less sharp: ➤O.k. p. 12428 line26: Do not understand the second half of the sentence. Why '100-250 years'? Does it mean that the varve counting is wrong? ➤O.k. Omitted. p. 12429 line1: 'and in general' lower at greater water depths: ➤O.k. p. 12429 line25: Insert after 'restricted' to. ➤O.k. p. 12429 line26: Insert after 'down' to. ➤O.k. p. 12431 line9: Does 'foraminiferal fragmentation' mean P.F. debris? ➤Yes. Please see line 649 p. 12431 line9: Delete 'that' p. ➤O.k. p.12434 line2: Replace 'reconstruction' by calculation. ➤O.k. p. 12434 line4: What are 'se floor and water columns estimates'? ➤Changed p. 12435 line22: Two times 'have received'. The sentence is too long. ➤Corrected and split.