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Climate of the Past Discussions

Interactive comment on "Terrigeneous material supply to the Peruvian central continental shelf (Pisco 14 S) during the last 1100 yr: paleoclimatic implications" *by* F. Brice no Zuluaga et al.

Anonymous Referee #1

Received and published: 10 August 2015

GENERAL COMMENTS

This paper presents grain-size analyses from a composite profile made of two cores located offshore Peru. From these data authors intend to reconstruct temporal variations in the relative amount of wind-blown sand grains (interpreted as dry climate) and river input (interpreted as wet climate). Despite the fact that the paper falls within the scope of Climate of the Past, I'm not convinced the paper provides a substantial contribution to scientific progress; it rather refines the understanding of the climate of this area by contributing with additional pieces of information. The conclusions are in accordance with everything published so far. Authors failed to convince they used valid methods to measure grain-size, and their interpretation of the grain-size data might be not as

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simple as presented. Indeed, the paper misses to present important information about the site, and lacks to present all potential explanation for the variation they measured.

SPECIFIC COMMENTS

The authors give proper credit to related work and clearly indicate their own new/original contribution. The title clearly reflects the contents of the paper, and the overall presentation is well structured and clear. The language is fluent and precise, and mathematical formulae, symbols, abbreviations, and units are correctly defined and used. References are appropriate (except one that seems missing, see below). Figures are good and are relevant, as well as the supplementary material. The paper is not self-sustaining for several reasons. The paper does not present any description of the sedimentary record (no sedimentary log), no description of physical setting of both cores (depth, bathymetry, seismic profile, physical parameters of the water column,. . .), no chronological information and no information about how the composite profile as been established. The paper only refers to other papers, but the information is spread over several paper and difficult to synthesize in order to follow the authors rationale. The paper should also explain what are the phenomenons behind the formation of laminations. Moreover, it is impossible to find a description of core G-10 in the Salvatteci et al 2014 (Clim Past) from the reference list. However, I found another paper by Salvatteci et al. 2014 in Marine Geology, describing the stratigraphy of core B-6, but there is no mention of G-10 in this paper. This latter paper shows that the link between two cores in this setting is difficult to do because of slumps induced by earthquakes. It is therefore critical to explain how the composite section has been built for this paper, and have a comprehensive description of the sedimentary sequence and the geological setting. It raises some concerns about the reproducibility and the traceability of results. Another problem is that authors are mentioning a southward redistribution of river sediments because of currents, a feature that is indeed credible. However, authors should at least discuss the possibility of countourite that could occur in this kind of settings, i.e. continental slope. This is critical, because countourites

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are capable of moving/depositing sediment such as coarse silts and fine sands. Sedimentological analyses demonstrate that slope-parallel currents lead to winnowing of fine particles and (re)deposition of allochtonous material, which alters the grain-size populations, (see for instance Mulder et al., 2013) and the paleoclimatic reconstruction that are performed using these kind of sediments (for instance Keigwin, L. D., and M. A. Schlegel (2002)). The grain size distributions presented here also are quite similar to the grain-size distributions smaller than 200μm found in other countourites. This is a serious problem because the technique used here does not include the fraction > 200 μm. Therefore, it should be essential to provide the reader with quantities of sediment that were removed from the grain-size analysis because of this filtering. Authors should also justify why they used the Flow Particle Image Analyzer technology rather than regular techniques that are capable of analyzing the full size range of sediments, and demonstrate this is not important for the interpretation of the results.

Finally, in many instances, references to other papers are not relevant or wrongly used (see examples on the technical corrections section). This needs to be addressed as well

TECHNICAL COMMENTS (lines numbers are referring to the word document uploaded by authors)

L61: GSD is not mixed since laminations are preserved, and I therefore suggest the following wording: "Grain size distribution in laminated marine sediments may indicate different sources and/or deposition processes, expressed as polymodal distributions.

L65: I suggest the following: "(. . .) identifying the different sedimentary processes and the past environmental conditions behind them (. . .)"

L96-97: I'm sorry, but there is little about the sedimentary processes sensu stricto in the paper. For instance, authors are not really explaining what type of current/process leads to deposition of riverine material.

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L101-111: The information presented here is not sufficient to have a self-sustaining paper. A lot more information about the cores and the site should be included in the paper.

L112-121: I understand what you are aiming for, but the practical explanations remains unclear. Please rephrase this section.

L123-127: The sample thickness is missing. It is important because it would provide an idea of the number of laminations included in each analysis. It should be also a good idea to provide the variation of the number of laminations through time.

L127-129: It is essential to provide the reader with quantities of sediment that were removed from the grain-size analysis because of this filtering. The interpretation of the data highly depends on that.

L185-186: Sun et al. (2002) indeed write that, but in the frame of loess sediments. The exact citation is: “In loess deposits, the wide size range of the fine component and the low degree of sorting suggest that they are slowly and continuously deposited throughout the year Âż. This is not applicable here.

L189: What are these favorable erosional soil properties? Are they consistent with the situation here?

L192: The sample that is the most influenced by wind in Stuut et al. 2007 (core GeoB7108) has a mode that is 400μm, something that the authors in this study would have missed because of the technique used. Moreover, the grain-size analyses interpreted by Stuut et al (2007) were only described for the samples from water depths>1000 m. Since cores are taken at much shallower depths in this study is the Stuut et al (2007) interpretation still valid? Again, this is critical to address this issue to support your interpretation.

L193: Flores-Aqueveque et al., 2015; these authors are mentioning particle >100μm and actually in their figure 7, they measured grains up to 400μm, which would not have

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been measured by the grain-size technique used in this study.

L197-198: Is this last sentence really useful?

L199-201: Contourite and hyperpycnal flows can transport these coarse grains. Moreover, some of the co-authors of this paper reported the presence of slumps in this area in another paper; slumps can transport coarse grains. Authors should carefully and comprehensively argue that these phenomena do not affect sedimentation here, otherwise their interpretation falls apart.

L219-220: McCave writes in the abstract: “We cannot use size distributions to distinguish the nature of the currents Âż

L230-231: Again, the composite record should be described in this paper.

References cited.

Keigwin, L. D., and M. A. Schlegel (2002), Ocean ventilation and sedimentation since the glacial maximum at 3 km in the western North Atlantic, Geochem. Geophys. Geosyst., 3(6), doi:10.1029/2001GC00028

Mulder, T., R. Hassan, E. Ducassou, S. Zaragosi, E. Gonthier, V. Hanquiez, E. Marchès, and S. Toucanne (2013), Contourites in the Gulf of Cádiz: A cautionary note on potentially ambiguous indicators of bottom current velocity, Geo.Mar. Lett., 33(5), 357–367, doi:10.1007/s00367-013-0332-4.

Interactive comment on Clim. Past Discuss., 11, 3211, 2015.