

Interactive comment on “Variability in terrigenous sediment supply offshore of the Rio de la Plata (Uruguay) recording the continental climatic history over the past 1200 years” by L. Perez et al.

Anonymous Referee #3

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The article entitled “Variability in terrigenous sediment supply off shore of the Rio de la Plata (Uruguay) recording the continental climatic history over the past 1200 years”, deals with the application of two approaches to reconstruct the paleo-hydrological history of la Plata River Uruguay. For this purpose the authors focus on the combined use of sedimentological (major element analyzed at High Resolution using XRF) and micropaleontological (diatoms) proxies. The study, supported by 6 AMS ages, points to identify the sources and amount of terrigenous material and to interpret them as markers of hydrological changes in response climate changes during the last 1200 years.

I find this a very important and enlightening paper dealing with the reconstructions of
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paleohydrological changes. It is of fundamental international concern to understand how changes in South America large scale circulation affected this region, principally the South American Monsoon system (SAMS) and the South Atlantic Convergence zone (SACZ). But, the paper fails in analyzing and reconstructs the sedimentary processes involved. The clarity of the reasoning is therefore not straightforward.

The abstract is generally well written and well documented but I suggest that some modifications should be done. It is true that the ITCZ was displaced northward and southward during the MCA and LIA, respectively, but from a meteorological point of view, the ITCZ influence is limited to the coastal region. Actually, I think that the South American Monsoon and SACZ have a major influence.

As mentioned by the referee 2, it is difficult to support the authors' interpretation of El Niño impacts during the Little Ice Age. Various papers (Newton et al., 2006, Gutierrez et al., 2009, Salvattecchi et al., 2014) underlined that centennial-scale changes in precipitations are associated with changes in the ITCZ meridional displacements and with South American Monsoon System activities in the South-American continent, and not so with changes driven by zonal shifts of precipitation (ENSO events).

Concerning the divergence between the diatoms and the major elements records during the CWP and the anthropogenic interpretations proposed by the authors, I think that this claim is exaggerated. Various points have to be clarified. Increase in Ti/Ca, Fe/ca ratios can also be due to a decrease in Ca content as a consequence of weaker productivity, and not only to an increase in sediment discharge or an increase of diatom frustules dissolution. Another point is that both markers (diatoms and major elements content) do not show the same variations. Despite the trend diatom assemblages mark also high variability than major element content (Ti, Fe, ca, etc. . .) during the CWP. For that reason I don't think that they are above the same environmental and climate pressure during this period (CWP). Finally, why the authors do not explore the natural intensification of the South American Monsoon System during the last century

The authors explained the climate mechanisms that govern hydrological changes in this region but avoid to discuss the anthropogenic impact on fluvial and/or aeolian transport. They also describe superficially the environmental significance of the ratios used in this study. I suggest to the authors to justify the use of the each major element ratio because they can vary independently in relation to of regional geological and geomorphologic setting and also in local hydrodynamic regimes.

The authors make a simplified lithological description of the core. Slumps, turbidity and discontinuity in sedimentation are not discussed in the manuscript.

For the age model, the following points need to be clarified: 1. Why do they use bivalves for dating instead of organic matter? How can they assume that they are in life positions and which confidence do they have in their dating 2. The authors should discuss the ^{14}C reservoir effect, which is important for the calibration of ^{14}C ages. 3. For the CWP period, ^{210}Pb analyses of the top of the marine core are really needed if they pretend to infer changes during this recent period. 4. Which confidence do the authors have in the XRF analysis? Various paleoceanographic studies based on high resolution XRF analysis have made comparison between major elements obtained by XRF and chemical analysis to normalize those proxies. 5. It will be necessary that the authors add a figure of bulk results of the Ti, Ca, Fe independently. This will help to follow the variation of each element and will consolidate their interpretation based on the ratios as marker of increase in sediment discharge, or of the dissolution of calcium carbonate, etc. 6. The authors should estimate the total fluxes of inorganic sediment discharge by comparing the modern sediment discharge and the intensity of the hydrological processes and the SASM activities.

The authors have an interesting high resolution record, why do they not try to explore for each period studied (MCA,LIA and CWP) variabilities (Interannual, decadal, multi-decadal and centennial) triggering changes in hydrological changes using statistical methods (spectral analysis, wavelet) such as shown by by Novello et al., 2014, Apaestegui et al., 2014

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I think the authors have to improve their manuscript more carefully concerning their arguments and their evidence.

In conclusion, I encourage the publication of this paper with major revision.

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