

## ***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 #1**

Received and published: 11 May 2015

The paper by Perez and colleagues reconstructs river discharge and climate variation in the Rio de La Plata basin over the last 1200 yr based on XRF and diatom analysis of a sediment core. The diatom data have been published previously, but this manuscript focuses on new XRF data and uses the diatom data to strengthen conclusions derived from the geochemical data. My major concern with the manuscript is that the XRF ratios as proxies for continental versus marine input or of eolian versus fluvial input are not explained or critically evaluated and justified. For example Ti/Ca as a proxy for continental influx assumes Ca flux doesn't vary much – is this the case? Fe/K is sometimes used as a proxy for continental weathering – why is it discussed in the Introduction as an indicator of eolian versus fluvial flux? I suggest that the authors

C356

expand the Introduction to explain the potential causes of variation in the XRF data in more detail (see detailed comments below), taking care to describe the mechanisms that affect the ratios from source to sink. Also, as suggested in the comments below, some of the climate interpretations are not rigorously justified or explained. Finally, there are a few grammatical errors and awkward phrases; the manuscript would benefit from editing by a native English speaker.

Specific comments: Page 1349, lines 5-10: Some more information should be given here about the rationale for using these ratios in this particular setting. These ratios are widely used in paleoceanographic studies, none-the-less the factors that affect concentrations of the individual elements may vary geographically dependent on regional geology, regional hydrogeomorphic setting, and local biogeochemical processes. So an additional paragraph to explain the basis for the individual ratios and that justifies the choice of these ratios in this particular basin is warranted.

Page 1350, lines 0-3: It's unclear what the relevance of this sentence is. An additional sentence should be added to specify that this approach was used also in this study to evaluate freshwater influx.

Page 1350, lines 21-25: You say the core was analyzed at high resolution from AD 1483-1534 but then you talk about peaks at AD 1373, 1407, 1470, etc. – I assume the 1483 value is a mistake? And why did you chose this interval for high-resolution analyses? This should be included in the methods section. Alternatively this section could be eliminated – you don't really discuss these higher resolution data in the text.

1352, line 4: Given that the age-depth relationship is relatively straight, I don't see the evidence for “significant changes in sedimentation rate”. To me this suggests the changes are relatively small.

Page 1352, lines 13-14: You say the elemental ratios indicate a mixed terrestrial-marine signal –what is it that suggests this? The information on the next page about the sources of Fe, Ti, and Ca should be included here to introduce the causes of variation

C357

in the individual elements.

Page 1353, line 2-4: The wording here suggests that both the flux of terrestrial material decreased and the flux of marine material increased – it seems likely that it is only one or the other that is changing the ratio. Also, how do you know that diagenesis is not affecting the ratio?

Page 1353, lines 4-11: In the introduction you indicated that Fe/K and Ti/Al were indicators of fluvial versus eolian inputs, yet all 4 of the ratios show the same general trends (low values prior to 1300 and higher values afterward), which suggests they are all indicators of the same thing (continental flux in the rivers). You end up saying this on the next page – but the discussion would flow more logically if a summary of the potential influences on the elements was described in the Introduction.

Page 1354, line 19: I think it is more appropriate to say that some studies have suggested or inferred that the LIA was characterized by stronger El Nino events – it is certainly not a fact. Also, given that strengthened SASM, changes in the westerlies, and changes in ENSO dynamics affect precipitation variation in this region – it needs to be clearly stated that any one of these things may have caused the changes in your sediment record – the text (and abstract) presently seems to suggest that all of these things changed.

Page 1354, line 28: What is the basis for concluding that this variation is forced by strong El Nino conditions? This is not at all clear based on the information given.

Page 1355, line 4: Again, make clear what evidence you are using to indicate higher river discharge.

Page 1355, line 6-15: These are not the only potential explanations – perhaps the diatoms have dissolved; perhaps increased nutrient concentrations have favored algal groups other than diatoms. I'm sure there are many others. I suggest that this paragraph (and the last sentence of the Conclusions) be a bit more circumspect about the

C358

causes of the observed patterns in the post 1850 sediments.

Figure 4: This is not really discussed in the text, other than to say that one section of the core was analyzed in higher resolution and shows peaks. The extra figure needs to be justified by more discussion of the data; otherwise I suggest deleting it.

---

Interactive comment on Clim. Past Discuss., 11, 1343, 2015.

C359