

Interactive comment on “Combined North Atlantic and anthropogenic forcing of changes in the marine environments in the Gulf of Taranto (Italy) during the last millennium” by Valerie Menke et al.

Anonymous Referee #2

Received and published: 25 January 2018

The paper submitted by Menke et alii is an attempt to demonstrate the influence of sediment released by the Italian rivers to the Sea and accumulated in the Gulf of Taranto (>1000km away from the Po River mouth). The authors examine decadal to centennial variability of benthic ecosystems, depositional environments and bio-processes and relate them to natural (NAO, AMO) and anthropogenic forcing. Despite I enjoyed the data showed in figure 9, I cannot support the publication of the paper in its current state on Climate of the Past. Still, I cannot recommend the paper for publication for several reasons of which the most important are:

The Authors attempt to define the provenience of fine-sediment by looking at the rela-

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tionship between illite and smectite. This methodology is based on earlier Tomadin's works which rely on old studies of sediment transport in the Adriatic basin. For instance, the Authors do not report new data on the source area of the Padane sector (i.e. the Padane sector is constituted by different catchments that are characterized by distinct sediment composition (see various papers by Eduardo Garzanti and Alessandro Amorosi in the Padane sector from '90s to now). In addition, the composition of the clay minerals does not reflect only the provenience of the sediment, especially in sediment that travelled such a long path. Finally, the key role of the interaction among different oceanic water masses has not been taken into account by Authors; this is true also for the different sediment facies that should reflect the depositional processes and may be examined in the available sediment cores. Moreover, recent documentation demonstrated that diagenesis play a crucial role even in modern sediment (e.g. see JHS Macquaker works on muddy deposits). Thus, the drivers of sediment transport and accumulation are different in nature and Authors seem to underestimating the role of each driver. Authors should study the sediment provenance by integrating different methods and by showing additional data.

As the Western Adriatic Current (WAC) has been defined in different ways from different authors (e.g. Artegiani et al., 1999 vs Poulain, 2001), Authors should state the evidence that the WAC is bringing sediment from the Adriatic Sea to the Gulf of Taranto. Perhaps, Authors should consider that: - from Artegiani et al. 1999, the WAC corresponds to the coastal amplification of the southeastward current on the mini-shelf and flows at water depth <20 m (the sediment cores showed in this work are at a water depth > 100 m). - Lipizer et al., 2014 suggest a sinking of the WAC along the slope of the western Adriatic margin and in the Otranto Strait (see their section 3.2.2) and they do not mention the Gulf of Taranto.

The Authors should provide references to works that document the path of the WAC in their study area. This is a fundamental point to address. How the sediment of the Po river reached the Gulf of Taranto? Authors should argue this concept with robust

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references. What's the current that brings the sediment at the sites of the sediment cores sampled in the Gulf of Taranto? Indeed, as Authors reported in different sections the WAC flows along the Adriatic shelf. This is well documented from different works available from the bibliography. What remains unclear to the reader is the path of the WAC outside the Otranto Strait, based on previous works.

The concept that bands of sediment with Padane provenience and Apennine provenience travel in the Adriatic Sea on two "parallel highways" is an old concept based on earlier Tomadin's works. More recent works suggest a more complex oceanographic-sediment dispersion pattern (under the influence of water gyres and cascading see Trincardi et al., 2014). Moreover, based on his dataset, Tomadin doesn't take into account the distribution of the modern sediments and sampled deposits older than 5ky BP.

Readers would appreciate if Authors could add photos of the sediment cores (maybe in supplemental material?): any deformations of the cores due to gravity core sampling? If yes, how deformation has been taken into account? What is the recovery (%) of sediment cores?

The Authors should remind that they did not sample the depocenter, because the figures provided for sediment accumulation rates are telling the opposite (e.g. 28.3 cm/kyr that means a sediment accumulation rate of ca. 0.028 cm/yr... see Cattaneo et al., 2007 for maps of the modern depocenters and for the sediment accumulation rates (>1,5 cm/yr).

Part of the result section should be moved to methods (see highlighted sentences in the pdf).

Authors should discuss the Apennines sediment contribution on the light of Milliman and Syvitski, 1992, and Syvitski and Kettner, 2007.

Authors should avoid non-scientific language in many parts of the text (see comments

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in the pdf).

Some references are missing from the reference list.

Fig. 1. I strongly suggest to avoid this very old concept of sediment transport, a lot of work has been done by different authors on the oceanographic regime and related sediment transport in the last decades. Authors should think about merging the two imagines in one maintaining the continental part from 1A and the marine part from 1B. Authors should provide references for the oceanographic regime in the Gulf of Taranto. Figs. 3 and 4. The resolution is good. Fig. 6. Authors should add isobaths values and a dotted line along the shelf-edge and should explicit that the endmembers of the color bars change from A to B to C. Figs. 9 and 10. I really like these figures! Maybe Authors can add lines to help the readers for correlation.

Here I am suggesting works on the Adriatic Sea dealing with the complexity of oceanographic mass water pathways and the sediment dispersal system: Oceanography:

-Benetazzo A, Bergamasco A, Bonaldo D, Falcieri FM, Sclavo M, Langone L, Carniel S (2014) Response of the Adriatic Sea to an intense cold air outbreak: dense water dynamics and wave-induced transport. *Progr Oceanogr* 128:115 – 138 -Bonaldo D, Benetazzo A, Bergamasco A, Campiani E, Foglini F, Sclavo M, Trincardi F, Carniel S (2015) Interactions among Adriatic continental margin morphology, deep circulation and bedform patterns. *Mar Geol* (in press). doi:10.1016/j.margeo.2015.09.012 -Artegiani A, Paschini E, Russo A, Bregant D, Raicich F, Pinardi N (1997) The Adriatic Sea general circulation. Part I: air – sea interactions and water mass structure. *J Phys Oceanogr* 27:1492 – 1514 -Artegiani A, Paschini E, Russo A, Bregant D, Raicich F, Pinardi N (1997) The Adriatic Sea general circulation. Part II: Baroclinic circulation structure. *J Phys Oceanogr* 27:1515 – 1532 Sediment dispersion and accumulation:

South Adriatic Sea, a work that shows also the interaction of current on the south Adriatic shelf.... -Pellegrini, C., Maselli, V., & Trincardi, F. (2016). Pliocene–Quaternary contourite depositional system along the south-western Adriatic margin: changes in

sedimentary stacking pattern and associated bottom currents. *Geo-Marine Letters*, 36(1), 67-79.

North and Central Adriatic Sea - Pellegrini, C., Maselli, V., Cattaneo, A., Piva, A., Ceregato, A., & Trincardi, F. (2015). Anatomy of a compound delta from the post-glacial transgressive record in the Adriatic Sea. *Marine Geology*, 362, 43-59.

-Cattaneo, A., Trincardi, F., Asioli, A., Correggiari, A., 2007. The western Adriatic shelf clinoform: energy-limited bottomset. *Cont. Shelf Res.* 27, 506–525. Please follow the comments on the attached pdf (with tracking function). If the Authors cannot find support in the bibliography on the oceanographic regime and sediment dispersion they are suggesting as reference knowledge, they should consider switching the focus of the paper to a pure reconstruction of the past ca 1500 years. In this latter case, the Authors should make it clear the relevance of this new contribution in respect to the previous papers of the same working group. In case the Authors want to keep the same focus of their paper, I recommend Editors to send the manuscript to experts on the provenance of fine-grained sediments in marine environments. I am sorry about the negative conclusion, but hope that the comments can contribute to the improvement of the paper for a later submission. Anonymous January 25th, 2017

Please also note the supplement to this comment:

<https://www.clim-past-discuss.net/cp-2017-139/cp-2017-139-RC2-supplement.pdf>

Interactive comment on *Clim. Past Discuss.*, <https://doi.org/10.5194/cp-2017-139>, 2017.

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