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Interactive comment on "Medium-term dynamics of a Middle Adriatic barred beach" *by* Matteo Postacchini et al.

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We thank Reviewer $\#3$ for their precious suggestions, which will be implemented to improve the quality of our manuscript. The comments from the Reviewer below are in italic font and our point-by-point responses are in bold.

I have read with interest the paper "Medium-term dynamics of a middle Adriatic barred beach" by Postacchini et al. The MS paper deals with the morphodynamic analysis of a natural sandy littoral stretch located along a highly urbanized coastal sector on the west Adriatic Sea. The morphologic variability of submerged sandbars is analysed and compared with in situ wave data, on order to evaluate medium-term dynamics. Generally speaking, I find the paper interesting, tackling an important aspect in a convincing

way (although of course dealing with the usual problems of having "not enough" data) and well organized. The English is also rather fluent.

We thank again the Reviewer for their appreciation of our work.

However, the MS may benefit from some minor improvements that could be easily implemented by the authors.
-I feel the need of more specific links to some of the several existing wave-climate studies on the Adriatic basin. - The paper tackles a subject relatively unexplored, i.e. the medium-term behavior, that is a timescale that between short term (days) and long term (years/decades), on the order of seasons or years, using annual bathymetric surveys and offshore wave buoy data. There is no doubts that improving the knowledge on the relations between wave climate and changes in nearshore morphology is a necessary step, in order to improve numerical models capable of predicting storm effects, beach erosion, and more generally the efficiency of shoreline protection measures. This is even more valid in a context of climate change, that should be also mentioned in the paper more clearly. Benetazzo et al. 2012, DOI:10.5194/nhess-12-1-2012, and references therein inlcluded may give some useful hints on this.

We agree with the Reviewer. In the revised version of the manuscript, we will properly discuss the morphological changes of a barred beach, induced by the wave forcing, within the climate-change frame.

-at the same time, some lines addressing the realtionship between the local scale dynamics with a more regional scenario of sediment dynamics and transport should possibly be introduced by the authors. Sherwood et al., 2004, Oceanography; or Harris et al., DOI: 10.1029/2006JC003868. Even though not strictly pertinent to the study, it should be indeed mentioned that the longshore and cross-shore budget of the local beach is however to be framed within a more regional dynamics.

To better contextualize the observed morphological changes in the Adriatic framework, we will introduce the suggested regional aspects in Section 2.

-other existing approaches could be mentioned in order to provide a more complete series of wave data nearshore, including the transfer of offshore wave data to the coast by means of wave models, e.g. SWAN, in order to reconstruct a more detailed and spatially meaningful wave climate (Carniel et al., 2011, DOI: 10.2478/s13545-011-0036-1)

Numerical models commonly used to reconstruct the wave propagation from the offshore to the nearshore region will be mentioned, in addition to the classical Goda (2000)'s approach[1].

-Some more caveats should be discussed, since the bathymetric data was collected once per year and are therefeore somehow limited. Possible workarounds could be put more in evidence, as the use of video images to reconstruct the coastline (see Archetti et al., 2016, . doi:10.5194/nhess-16-1107-2016, and references therein included.

We agree with the Reviewer and their suggestions will be implemented. Further, a video-monitoring station has been recently installed at the Senigallia harbor to collect images of the coastal area between the jetty and the "Rotonda". Recently discussed preliminary data[2] seem to confirm our conclusions about bar migration. Such a system will be exploited to analyze the short-term bar migration in dedicated future works. Further, recent experiments carried out at the Misa River estuary identified an intense nearbed sediment transport towards the offshore just off the estuary[3]. This occurred during a NNE storm and suggested a

[1]Goda, Y. (1985). Random seas and design of marine structures. Advanced series on ocean engineering vol. 15, World Scientific, Singapore.

[2]Palmsten M.L., Calantoni, J., Brocchini M., Soldini L. & Postacchini M. (2016). Sand bar behavior in a mixed sediment environment, Ocean Sciences Meeting. https://agu.confex.com/agu/os16/meetingapp.cgi/Paper/89790

[3]Brocchini M., Calantoni J., Postacchini M., Sheremet A., Staples T., Smith J., Reed A.H., Braithwaite III E.F.,

seaward bar migration in the studied area.

-Since it is somehow difficult to be sure about the separation of short-term changes due to winter storms with respect to medium-term changes due to medium-term wave climate, in this filed even a relatively quick reference/analysis of wind and wave data resulting from climate models or satellite-verified database may be of direct help. Although the wave data presented here seems to be sufficient for the proposed medium-term analysis, and a more careful analysis of available wave-data also from global reanalysis or modeling efforts would improve the soundness of analysis but being too heavy, the authors may refer to existing efforts that are represented by available regional cliamte models, originated possibly from efforts such as the MEDATLAS project.

We thank the Reviewer for their comment. Though we believe the proposed statistic analysis is appropriate for the scope of our manuscript, i.e. coupling medium-term wave climate and morphological changes, a different approach, like wave-data reanalysis, would be certainly useful but too heavy. However, such aspect will be properly discussed in the text.

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Lorenzoni C., Russo A., Corvaro S., Mancinelli A., & Soldini L. (2017). Comparison between the wintertime and summertime dynamics of the Misa River estuary, Marine Geology, 385, 27-40.