

General comments: The paper seeks to analyze the medium-term (seasons to years) morphological evolution of sandy multiple-barred beaches using bathymetry observations at Senigallia in 2006 and annually from 2010 to 2013, and nearby wave buoy observations from 2010. The need for this analysis is well motivated and the kinematic/geometric description of the bar behavior is interesting. However, a more direct quantitative link needs to be made between the wave climate and morphological change to support the central conclusion. While the writing is good overall, the paper would be improved by text edits for grammar and clarity.

Specific scientific comments:

“Medium-term dynamics”: This term is defined nicely in the conclusions section. It seems important to introduce this early in the paper, both in the abstract and introduction, to provide a concrete definition for timescales and types of features that are the focus of the paper.

“Cumulative effects”, overview: The hypothesis that the medium term response can be considered a result of the sum of the contributions of all wave events in some time range is interesting and worthy of study. My understanding is that an additional related hypothesis considered by the authors is that the contributions of all wave events in some time range can be parameterized by a single representative wave condition, which they define in Section 4.1. Specifically, they hypothesize that medium-term wave conditions that are characterized by steeper and larger waves are correlated with seaward bar migration, while medium-term wave conditions that are less steep and smaller are correlated with shoreward bar migration. This relationship has been shown for short-term bar response considering the short-term wave conditions, but not for medium-term response considering a medium-term wave statistic. As the authors point out, if this relationship holds using medium-term wave statistics, this could be a powerful tool to predict bar changes from one time to the next without directly considering shorter-term changes in between.

“Cumulative effects”, point 1: While the three data points provided (2010-2011, 2011-2012, and 2012-2013) are roughly qualitatively consistent with this relationship (medium-term bar response and medium-term wave statistic), a more quantitative test should be performed and the discussion should be clarified. The authors could attempt to make a more direct quantitative comparison by (1) computing a single representative (alongshore-averaged) bar position for each year, (2) subtracting those positions to estimate the change, and (3) plotting that change as a function of the wave steepness. Similar analysis already has been done for the outer bar geometry in Table 3 (this may be clearer if shown graphically). Even if that approach is pursued, it likely will be difficult to establish correlation with only three data points. Additional data could be sought by (1) adding the 2006 to 2010 time window by obtaining nearby wave observations or model hindcasts or (2) extending the analysis forward to 2017 using new surveys and/or video observations in 2015-2017.

“Cumulative effects”, point 2: It is possible that details of the wave climate in between intervening medium-term time periods that are not captured by the authors’ single metric may be important to the bar states observed at various times in 2006-2013. To test this hypothesis, perhaps the time series of a wave metric related to bar migration could be integrated in time to achieve a wave metric that captures the “cumulative” effect the authors discuss. This could be compared with the simpler bulk estimate the authors describe in Section 4.1. If video observations are included, the hypotheses about the relationship between short-term and medium-term dynamics could be tested more rigorously.

Specific technical comments:

While much of the writing and organization are good, the readability could be improved significantly by fixing grammatical errors and confusing phrases throughout the paper. Below I list examples in the introduction. Similar revisions could be made in the other sections.

P1 L18: word “and” is missing at end of list

P1 L19-20: phrase “strictly related to the above-mentioned aspects” could be made clearer

P1 L20: unclear what “also” refers to. Meaning may be both summer and winter?

P1 L22: unclear what “also” refers to. Meaning may be “nearshore dynamics *including* rapid morphological changes to the beach”?

P2 L3: word “due” seems unneeded

P2 L9: “both” should be removed (list of three methods)

P2 L11: “experiences” maybe should be replaced with “experiments”

P2 L17&20 and P3 L8: word “this” not needed

P2 L23: “have” should be replaced with “has”