Title: Variability of distributions of wave set-up heights along a shoreline with complicated geometry
Author(s): Tarmo Soomere and Katri Pindsoo
MS No.: os-2019-25
MS Type: Research article

General comments

The Authors did a thorough revision of the text which is now much more clear and readable. In particular Section 2 (Methods and data) and 3 (Results) have been greatly improved. Still the main problem of the study is the result, which indicates that in complex morphology the wave set-up can follow several (at least two) different statistical distributions, with no way to predict which one will be occurring at any given coastal point. On the whole the manuscript still suffers from being a bit too qualitative and somewhat lacking in rigour concerning the analysis, see specific comments. The latter would be a serious issue in any situation, but here the results presented are rather hard to accept and, furthermore, no clear explanation is given. So the thesis must be proved ' beyond a reasonable doubt'.

Specific comments

The only measure of uncertainty considered in the study is the use of the 95% significance level in the evaluation of the coefficients of the quadratic polynomial, which is not the same as to evaluate the goodness of the fit to the theoretical distribution, See figure 8.
A major weak point is the choice of a particular range of data to be fitted: a fixed interval [0.01,0.4] or a variable interval [.01,α], where α the first gap in the distribution. It especially bothers me that in all cases shown, the frequency does not change with the increase of set-up height above 50 cm. Bottom line, in my opinion it appears that both choices are rather arbitrary. The first because the entire domain of setup heights is in the range [0,1] (fig.5) and the second because the threshold depends on the bin size. If I'm not badly mistaken the gaps would disappear if the frequencies were evaluated using different (i.e. larger) bins. Figure 3e-f show clearly the problem. Besides, how many points have been excluded in the region $x > 50\ cm$ in order to get a straight line in figure 3f ?
The procedure of building the empirical distribution is not described in sufficient detail and this should really be fixed. The choice of the bins size in particular should be discussed showing what happens if classes of heights

are merged. This is a critical point for the kind of analysis proposed in the manuscript.
Another point to discuss in section 2 is the bathymetry, as it is critical factor in the evaluation of the set-up. In particular it should be verified that the bathymetry used to run the model has a resolution greater than or at least comparable with the model grid resolution. If not, the possible effect on the results should be discussed.

Technical corrections

The significant wave height is a statistical measure of the sea state on a wide area and during a long time, compared to a wave height at a fixed point in space and time. In section 2 they are sometimes used improperly (for example in paragraph 20). My suggestion is to define significant wave height as H_S or H_{m0} and monocromatc wave height as H, but more important is to stick to it in all the manuscript. A symbol for the set-up height would also help readability of the manuscript.
When Weibull distributions are considered is important to mention the value of the shape factor used, because it causes the the shape of the curve to change drastically.