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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Impact of coastal forcing and groundwater recharge on the growth of fresh groundwater resources in a mega-scale beach nourishment" *by* Sebastian Huizer et al.

Anonymous Referee #1

Received and published: 17 September 2017

This manuscript deals with a relatively young but interesting field of expertise: the hydrology of large beach nourishments. There is limited scientific research reported to date dealing with this topic, apart from a few earlier papers by the these authors (HESS, 2016; WRR, 2017). This manuscpript presents interesting (modelling) insights on the development of freshwater bodies below these beach nourishments. The content is scientifically relevant, of good quality, and properly presented. Some minor revisions are, however, required.

1. Being the third modelling paper on this topic in a row. The reader would be pleased with a clear picture of what is presented in which paper and what the differences be-

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tween the applied groundwater models are. The WRR paper isn't even mentioned in the current manuscript.

2. The reader would be pleased with more quantitative information, mainly in Section 3, especially on the freshwater volume developed. For instance: not 'substantially higher fresh groundwater volumes' (P11, line 11/12), but a percentage of volume increase. Another example: P10, line 20 and 21.

3. Parts of Section 3 would better fit in Section 2.

Aspects to consider (HESS):

1.Does the paper address relevant scientific questions within the scope of HESS? Yes

2.Does the paper present novel concepts, ideas, tools, or data? Yes, but readers might doubt this because of the previous 2 papers. This should be better clarified by the authors.

3.Are substantial conclusions reached? Yes

4.Are the scientific methods and assumptions valid and clearly outlined? Yes

5.Are the results sufficient to support the interpretations and conclusions? Yes

6.Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Yes

7.Do the authors give proper credit to related work and clearly indicate their own new/original contribution? No, see #2

8.Does the title clearly reflect the contents of the paper? Yes

9.Does the abstract provide a concise and complete summary? Yes, but also here: more quantication is required.

10.Is the overall presentation well structured and clear? No, part of the methods are found in Section 3

11.Is the language fluent and precise? OK. But excessive use of brackets. Are they really needed???

12.Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? OK

13.Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? No

14.Are the number and quality of references appropriate? No, one relevant paper is lacking, even though it is written by the same authors...

15.Is the amount and quality of supplementary material appropriate? Yes

Minor comments: - Title (and rest of manuscript): is 'resources' really the best term? I would associate that with use (abstraction) of the freshwater, which is not the case. Perhaps 'lenses' or 'bodies' are better alternatives - Intro: first sentence can be removed - P1, line 17: rmove 'similarly,' - P2, line 2, replace 'clean' by 'high-quality' - P2, line 14: do you really mitigate 'climate'? Suggest to replace 'climate' by 'climate change'. - P3, line 6. remove 'this study analyses' and add 'are analysed in this study' after 'fresh groundwater' - P3, line 7: remove e.g. and state only what you have analysed - P3, line 8: 'In this paper are described' instead of 'This paper describes' - P3, line 26: add 'groundwater' before 'model' - P3, line 29: add 'and salt' after 'fresh' - P4, line 10: use 'Aquifer 1a' instead of 'aquifer 1a'. Some holds for 'Monitoring well'. Capitals - P4, line 24-28: Vague, please add a figure to support this section - P4, 33: replace 'maintain' by 'keep' - P4, line 34: why is this control of groundwater direction needed? - P6, line 16: where was the wave set-up and run-up based on? - P6, line 18-22: make schematization and give max, min, average. - P6, line 28: no water level measurements available in the lagoon? - P7, line 21: 'smaller-sized' –> quantify - P8, line 21: sentence missing? - P9, line 8: did you check of these changes in abstraction rates might have occured? - P9, line 15-21: This part more or less just drops in here. Partly methods... - P9, line 28-29: Please provide more information on this initial

groundwater salinity (figure) - P10, line 1-4: consider to move this to methods section - P10, line 21-30: separate field observation and models results. Now, this part is confusing. Start with field observations. - P11, line 21: A1 or A2? C1 or C2? - P11, line 29: replace 'will be' be 'was' - P12, line 29: quantify - P13, line 6: North Sea salinity: speculative, you don't know if this can really explain deviations - P13, line 9: Why aren't there more measurements? - P13, line 31: any reference to studies with comperable approach? - P14, line 2: what is the basis for 'one to three monthly' - P14, line 3: what is a 'unsaturated groundwater model'? - P14, line 6: 'the study area' by 'a mega-scale beach nourishment (the Sand Motor)' - P14, line 10: Please introduce these bullets with one sentence.

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