

Review of  
**Hydrogeological controls on the spatio-temporal variability of surge-induced hydraulic gradients along coastlines: implications for beach surface stability**

by Paldor et al.

This paper reports on a series of numerical simulations to quantify surge-induced vertical hydraulic gradients in coastal aquifers. The topic is of great interest, the paper is well written and organized. However, I have several concerns before I can recommend the paper for publication in HESS.

1 – l.32: I do not interpret the beach groundwater observations of Sous et al. 2016 as soil failure, please check.

2- l.34: I do not fully agree with the definition given for liquefaction. A zero-stress soil needs an external force to be liquified

3- l.42: depends

4- l. 53: Mory et al. 2007, I would emphasize here that liquefaction events were related to the presence of a rigid structure in the soil, and rather use Michallet et al. 2009 (JGR) for the same site but finer analysis.

5- l.121: What is meant by “seepage vector” ?

6- I do not see the input provided by Section 2. The data analysis has been already published, and the results presented here do not bring real insight (no vertical gradient, nothing new than much older works) and certainly do not show the statement in the Conclusions section (‘may substantially affect...’)

7- l.163: Please detail the definition of unit weights and more generally provide a unified and clear discussion about saturation vs submersion effets (e.g. l. 292).

8-Can you justify the anistropy in K ?

9- Can you describe in detail your sensitivity analysis (parameters and ranges) ?

10- The surge imposed here shows the same typical height and time scales than typical macrotidal areas. Does it mean that the potential “liquefaction” predicted here can be observed in any comparable macro-tidal coast ? Please comment.

11- l.308, 368 etc: What is meant by “overpressure” ?

12- The role played by horizontal gradients is not explored, and this may significantly affect the interpretation.