

# ***Interactive comment on “Turning the tide: comparison of tidal flow by periodic sealevel fluctuation and by periodic bed tilting in the Metronome tidal facility” by Maarten G. Kleinhans et al.***

## **Anonymous Referee #1**

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Review Of "Turning the tide:..." by Kleinhans et al.

### General comments

This paper is principally a methods paper. They describe an experimental apparatus, they put it through its paces, and they report the performance specs. This is an awkward place for a paper. If it is truly a methods paper, it provides inadequate information on how this system works. For example, their description for measuring flow velocity - THE primary variable to diagnose the success of their experiment - is incomplete and unclear. Moreover, this is not a "method" that is likely to be widely adopted since it is

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a specific piece of hardware for a very specific purpose. Moreover, the authors have already published 3 papers(!) on the concept of a periodic tilting flume, albeit a smaller model, so the basic idea here is not new. This paper reports results of flows in a bigger version of an apparatus than they built before, and shows its superiority over the sea-level fluctuations. But, this was already shown in a way in the previous papers because they proved that tilting could move sand and make bars and shoals.

My personal take is that the authors should publish a paper when they have some science to show. Don't get me wrong, this is an impressive apparatus and it is likely to lead to new science insights. But in my opinion, experiments are not built to write papers about how they perform; they are built to learn new science. Lots of us have nice experimental equipment that we built. And if an experimental paper is written without science, it should at least be a very novel idea. The authors had a novel idea for sure, but that novelty has already been revealed in three previous papers. Based on this I believe this paper should be rejected - not because it is bad, but because it is incomplete. When the authors have some new significant science results - which they no doubt will in the future - they can write a nice paper and the current manuscript will serve as the methods section. But as is, this reads more like an internal laboratory technical report than a paper that is appropriate for ESurf. It may be appropriate for some engineering journal.

Detailed comments:

Abstract, line 5: ..."which in tidal systems with dynamic channel..." -> typo, or some words missing, in this sentence.

After a sentence saying that the "third, complementary method of research is controlled laboratory experiments", the authors cite the following paper: Kleinhans, M. G., van der Perk, M., and Bierkens, M.: On the use of laboratory experimentation: "Hydrologists, bring out shovels and garden hoses and hit the dirt", Hydrol. Earth Syst. Sci., 14, 369–382, 2010. There are so many papers laying out the rationale for geomorphology

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experiments, that are more fundamental and much farther ranging than this one.

This problem about novelty is reinforced in the closing two sentences of the Discussion - the two most important points made about the utility of this setup each make reference to a previous Kleinhans et al. paper.

-> PIV involves strobing a light (often laser) and taking synced images of a desired exposure. This generates streaks in each image, whose length and orientation are used to produce a velocity vector field. It doesn't sound like what was done here. Particle Tracking Velocimetry (PTV) is another technique where trajectories of individual particles are traced by correlating them from image to image. I am guessing that this is what was done? Either way, there are no specifications about the resolution or error of the methods, and no demonstration that they resolve the flow correctly.

"ten images were collected at 25 Hz simultaneously by all cameras." -> So they only recorded for ~0.3 seconds??

Note the following references that appear in the bibliography: Kleinhans, M. G., van der Vegt, M., Terwisscha van Scheltinga, R., Baar, A., and Markies, H.: Turning the tide: experimental creation of tidal channel networks and ebb deltas, *Netherlands J. of Geoscience*, 91, 311–323, 2012.

Kleinhans, M. G., van Rosmalen, T., Roosendaal, C., and van der Vegt, M.: Turning the tide: mutually evasive ebb- and flood-dominant channels and bars in an experimental estuary, *Advances in Geosciences*, 39, 21–26, doi:10.5194/adgeo-39-21-2014, 2014b.

Kleinhans, M. G., Terwisscha van Scheltinga, R., van der Vegt, M., and Markies, H.: Turning the tide: growth and dynamics of a tidal basin and inlet in experiments, *J. of Geophys. Res. Earth Surface*, 120, 95–119, doi:10.1002/2014JF003127, 2015.

Choosing artificial grass as the channel boundary seems like a really strange and not very good idea. Why would you choose such an uncontrollable boundary - made of things that are bendy and make varied structures.

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