Review of

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Title: Model-driven optimization of coastal sea observatories through data
assimilation in a finite element hydrodynamic model (SHYFEM v.7_5_65)
Author(s): Christian Ferrarin et al.
MS No.: gmd-2020-61
MS type: Development and technical paper
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The paper analyzes optimization of observational grid via analyzing the impact that assimilation of station data has on the high resolution numerical model of the Venice lagoon. Several modes of assimilation are employed to introduce data into the model. I must say I really like the idea of how DA was used in the paper. The paper is interesting, contains new insight and is well written. The figures are clear. The abstract reflects the contents well.

I recommend publication after minor revision.

Specific comments:

p3, L76: pa should be p_a (_a denoting subscript)
p3, L77: \rho_q should be \rho_w
p4, L107: ""the mean is:" should probably be "the ensemble mean is:"

p7 L185: I am not sure I understand this phrase "...at which degree the obervations represent the state variable over the whole system." Can the authors please include a specific description and/or metrics by which this degree was measured?

P8 L207: should sigma be a greek letter? Why did you set it to 2 km rather than something else?

Perhaps I missed something but I still do not clearly understand how the boundary condition perturbations were generated. The paper states that 60 perturbations (gaussian, it seems?) were used as OBCs. Do I understand correctly that you used mean(A) as the open boundary conditions and then further added a constant (in space and time) perturbation to each ensemble member, where the amount of each member sea level perturbation was sampled from a gaussian N(mu, sigma)?

P9, L255: perhaps: "...towards the observations WHILE keeping the physical dynamics..."

p10, L298: I don't entirely see what is meant by "scalability". Can you please rephrase or clarify?

P12, L351: These correlationS…