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Interactive comment on "Morphological effects of vegetation on the fluvial-tidal transition in Holocene estuaries" *by* Ivar Lokhorst et al.

Anonymous Referee #3

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Review of "Morphological effects of vegetation on the fluvial-tidal transition in Holocene estuaries" by Lokhorst et al. for Earth Surface Dynamics (esurf-2018-29).

General Comments:

This work explores mud and vegetation feedbacks in estuaries to examine changes in estuarine planform using Delft3D (for flow and morphodynamics) and a Matlab script (for vegetation dynamics). This work is generally well written and the figures are of sufficient quality to support the claims made in the paper. This work fits well within the scope of ESurf and I recommend it be accepted with minor revisions. See my comments below.

Specific Comments:

1. The authors use several terms for marshes without a clear distinction between what defines these terms or whether some or all are interchangeable such as saltmarsh, saltmarsh in estuaries, tidal marsh (page 4, lines 5-14). Furthermore it is unclear how these correspond, or not, to tide dominated or mixed energy areas of Figure 1. Or "outer, middle, and river part of the estuary" of Figure 2. I suppose my comment is that there are a lot of terms for areas within the fluvial-tidal transition zone and it is not fully clear if these are all distinct or not and what is the meaning of each specific term. You start to define some of this at the bottom of page 10.

2. The authors use a riparian vegetation model for saltmarsh vegetation. Can you elaborate on why riparian vegetation is a good model for saltmarsh vegetation? Do these two types of vegetation (which I assume represent different species in each area) have similar traits to warrant such a translation of the model from riparian to saltmarsh areas?

3. It is not clear to me within section 2.1 on the hydromorphic model which components/equations are embedded in Delft3D that you are turning on versus which are components you are newly incorporating into Delft3D as part of this study (I would guess none but it is not clear).

4. Page 7, Line 17: Do you have a basis for choosing the 2 week ecological timestep beyond a simple assumption? Can you calculate a vegetation growth/change timescale and see how this compares to the 2 week timescale?

5. Page 17, Line 3-13: Okay, I can see this in Figure 9, but it would be more convincing if you showed a cross section through your results showing the bathymetry, %mud, and vegetation cover for the different scenarios.

Technical Corrections:

Page (P) 2, Line (L) 26: Define "2DH". I understand 2D as two dimensional and assume the H is for depth averaged, but this would be good to define.

P 4, L 24: It is not clear what "bedload converges" means. What is the bedload converging with?

P 5, L 20: "waterdepth" should be 2 words.

P 5, L 21: You have not defined q_x or q_y.

P 5, L 26: For Chezy roughness it is not clear what you mean by (sqrt(m)/s). I think these are units, but I am wondering why you do not specify units for all of your variables then and only this one.

P 5, L 29: Can you provide more detail on your model grid than it was rectangular? How big was your domain, what was your grid size, how many cells/nodes did your grid have, etc.? I see some of this has been provided in section 2.3. You can maybe instead say earlier on along with equations 1-3 that the grid is rectangular (because that is the form of the equations), rather than tack that statement on at the end.

P 6, L 16: What was the assumed mud settling velocity and how was it determined?

P 6, L 23: Is kappa the von Karman constant = 0.41? This is not defined prior to this point. I see that it is defined later (P 7, L 11).

P 6, L 18, 20, 27, 28: You use both phi_tau and phi_t. I think these variables are supposed to represent the same thing?

P 6, L 27, 28: The variables q_s and z_b are not defined.

P 7, L 24: Which month? Reference table 2 or specify April.

P 8, L 16-18: What threshold values and slopes specifically were used for this study? Reference table 3.

P 8, L 20: What earlier work? Add a reference? Braat et al. (2017)?

P 8, L 24: I see cell size here, but what are the units?

P 13, L 8: It is still not clear to me what is meant by "convergence". I see in the

conclusion that you have been referring to a Bedload Convergence Zone that has been described in the literature. Please add more detail on this or at least add a reference to this term.

P 13, L 10: "optimum" -> "peak"?

P 19, L 11: Typo, "a the"

P 24, L 4-8: Another limitation is the constant flow conditions. The constant flow condition results in no vegetation farther upstream due to the absence of wetting and drying (page 13, lines 18-19). Having this effect may expand or contract the area of vegetation, but agree that it would not undermine the central mechanisms of the paper of mud and vegetation feedbacks.