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Interactive comment on "Measuring Subaqueous Progradation of the Wax Lake Delta with a Model of Flow Direction Divergence" *by* John B. Shaw et al.

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We thank the reviewer for their comments. We agree with many of them: Nardin and Leonardi do indeed model marine environments with microtidal regimes. The D_cr variable (P5L11) is left over from a previous nomenclature and should be removed. The 7% uncertainty was referring to the error (701 m) relative to the delta length (10 km). Further, we agree that the mean Δl in some cases is indistinguishable from zero in some cases, and that the treatment of sediments beyond channel tips could be improved. For nearly all of the short comments, we see small changes that can improve our manuscript. We will respond to each of these comments directly at the

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Discussion paper

end of the discussion period.

However, we disagree with the reviewer's assertion that our paper lacks significance or lacks advances to process-based understanding. We would argue that the processes investigated in our study are (first) fluid flow over a complex, self-formed channel tip, and (second) delta growth. These are both earth surface processes that fall within our reading of this journal's scope. The expansion and contraction of fluid flow over a self-formed distributary channel tip is certainly a processes to us. The reviewer might be seeking a dynamic understanding of the conditions that cause the process to occur, and we cannot provide that yet. Fluid flow on a low-Froude number delta front is influenced by non-local aspects of the bed and flow field, making a simple scaling difficult. Even so, we review the existing literature about flow contraction (Page 4 lines 6-14). We hope that the discovery and validation of the process that we document will pave the way for a detailed dynamic understanding of flow expansion and contraction over complex surfaces in the future.

The second process is delta growth. Our study allows the extension of subaqueous channel tips and subaqueous delta area to be characterized for the first time using remote sensing (one of this journal's objectives). We do not claim that this method is a "better characterization of delta growth." Instead, we argue that delta growth is a complex process, and multiple approaches can lead to an understanding of this complexity. We make several conclusions about delta growth on the Wax Lake Delta from this data (Section 4.2), and relate it to existing theory such as soft avulsion between channels and radially symmetric growth of deltas (Section 5.2). We also looked carefully for breaks in growth rate in the data that would indicate a possible process change, but could not find any unequivocal shifts or trends beyond linear. Linear growth rates are not a jaw-dropping finding, but they do contrast with interpreted breaks in growth sub-aerial rate found by both Allen et al. (2012) and Olliver and Edmonds (2017) (See P10L1-10). Linear growth rates are also valuable validation for certain models of delta growth that require many simplifying assumptions (Kim et al., 2009). Hence, our find-

ings help us better understand the Wax Lake Delta, and provide a case to test on other similar delta fronts such as those shown in Figure 1. In our initial submission, it seemed better to focus primarily on the method, but we will consider adding more detail and context to the progradation rates upon revision.

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