We wish to thank Reviewer #1 (John Shaw) for his insightful and helpful comments. In the interest of promoting discussion, we have addressed this review in advance of submitting our revision. The specific points raised by the reviewer are addressed below:

The main point of improvement is that the applications chosen to illustrate the theory are somewhat cursory compared to the theory. I find the application to Atchafalaya Bay in particular to be too simplified. The 6 km long transects showing gradual shallowing are very focused in a small part of the bay, and might not be characteristic of the slopes that a delta progrades over.

Our purpose is not to model the growth of the Atchafalaya Bay deltas per se. We agree that the adverse slopes we measured are not characteristic of the slopes that the deltas prograde over – the pre-delta bathymetry is fairly uniform in the areas where the deltas are growing. Rather, the purpose of this section is to obtain realistic values of our model parameters based on a field setting, and thereby constrain the wavelengths that we could realistically expect to find in the field.

Then, the prediction of the stable wavelength is given for x = 10 and 16 km, which is far longer than the adverse bedslope measurements. Also, the S_F is roughly -0.00024 for the Wax Lake Delta, as reported by Shaw et al. (2016) and cannot be reasonably estimated as S_F=-1. This would increase the neutral wavelength and instability as described in Eq. 17 and 14.

We have removed the reference to the x coordinate, since our model is independent of the definition of the x coordinate. However, we nevertheless do find that the neutral wavelength is larger than the distance over which we measure the adverse slope. This reinforces our conclusion that the shoreline instability would probably not be observed, at least for this system. We have corrected our value of S_F, and find that this indeed increases the value of the neutral wavelength. We have also added a sentence to emphasize our conclusion that under the parameters we obtained from this field setting, stable shoreline growth is predicted. Our text (P10L2) will be modified as follows:

> …we see that, as a shoreline advances along this adverse slope, the predicted neutral wavelengths (Eq.17) are, compared to the system size, relatively large. Linearly decreasing with off-shore distance, we obtain values ranging from $\lambda_n \approx$ 63 km to $\lambda_n \approx$ 32 km. The two deltas growing in the modern Atchafalya Bay are around 10 km in diameter, smaller than the predicted neutral wavelength, so we are led to conclude that if these advancing deltas were to encounter an adverse slope, the indication of the resulting unstable growth would not be easily observable.

Ultimately, I would consider trying to find more or better examples of deltas prograding across adversely sloping beds. Leva Lopez et al. (2014) provide a good discussion that might yield another geological case study. Deltas forming near or underneath glaciers are a potentially great place to look (Carlson et al., 1999; Dowdeswell and Vásquez, 2013; Lønne and Nemec, 2011. . . these are not perfect but show potential). This effort might really broaden the appeal of this paper beyond theoreticians (like me).

We agree that adverse basement slopes should be relatively common in proglacial deltas, for example if the delta reaches a moraine, the wall of a fjord, or perhaps progradation reaching the flexural bulge. However, we were not able to find any clearly documented examples of proglacial deltas from which we could estimate an adverse bed slope. Ultimately, we chose Houseknecht et al. (2001), which was also cited by Lopez et al. (2014), as an additional example. We will add the following paragraph following our Atchafalaya Bay example:

> As a larger-scale field example, we consider the Torok formation in the Colville basin, as reported by Houseknecht et al. (2001). This formation displays clinoforms prograding over an adverse basement slope associated with a foredeep. Based on the schematic cross-section shown in Figure 7B of Houseknecht et al. (2001), we can estimate the adverse basement slope over which the shelf-margin prograded. Over a distance of roughly 200 km, we measure a steady decrease in the clinoform height from around 1900 to 710 m. Assuming that the clinoform heights correspond to basin depth, a minimum estimate of $|S_B|$ is $6*10-3$. This estimate is a minimum, because it does not account for relative sea level rise, which would cause the basin depth to increase over time. We measure a foreset slope of roughly 0.03, which is consistent with typical values for continental slopes. While we do not have an estimate for S_T available, it is reasonable to assume that it is small relative to the basement slope we measured. Based on these values, we obtain an estimate for the neutral wavelength λ_n that ranges from 629 to 237 km, decreasing as the shelf margin progrades into shallower water. The cross-section reported in Houseknecht et al. (2001) spans a distance of 450 km, so we see that the estimated neutral wavelengths are on the order of the system size.

In light of our modified calculations of the neutral wavelength, we will also alter the conclusion as follows:

> -In experiment and field systems the neutral wavelength of the perturbations (the wavelength at which there is no growth or decay) is expected to be large, in excess of the widths of experimental systems, and well beyond delimiting field length scale such as distributary channel spacings.
>
> Thus while we have clearly provided a positive answer to the question of this paper, "Can the growth of a deltaic shoreline be unstable?" we can also conclude that observing clear signals of unstable growth in typical experimental and field delta systems would be unlikely. In other words, while delta building along an adverse basement slope is unstable, the resulting signal of the shoreline growth instability in the landscape will probably be "shredded" by other surface building processes, e.g., channel avulsions and along-shore transport.

P4L16: I initially thought that this equation was incorrect because l_dot was on both sides of the equation. I am now sure that it is correct, but it may be good to show this equation solved for l_dot.

We will add this in our revision.

P7L13: I do not understand how a wavenumber k = 1 is chosen from the XES10 conditons.

The stated purpose of section 4.1 is to illustrate the nature of the evolution of the stability region. To put this in context we have chosen to do this using the XES data. The choice of wave number is somewhat arbitrary in such illustrative calculations and here, for convenience we have chosen k=1. We will modify the text as follows:

> In making these plots, for convenience of presentation, with no real loss of generality, we have arbitrarily set the wave number k = 1. Further, to establish consistency with XES10, we have set the topset slope as $S_T = 0.03$ (Hajek et al., 2014).

P9L11: shouldn't S_B always be positive? This looks like S_B must be negative.

Our convention is that S_B should be negative for an adverse basement slope. We will add the following text after equation (3).

> Recall the basement slope S_B is defined as change of water depth in the direction of the delta growth, $dD/dl = S_B$. Thus Eq.(3), simply states that autoacceleration would be expected when the delta is growing into shallowing water, such that the basement slope at the toe of the foreset is adverse (negative) with a value that exceeds the value of the topslope, i.e., $|S_B| > S_T$.

We also found a few instances in the text where we incorrectly reported the sign of S_B. This will be corrected in our revision.