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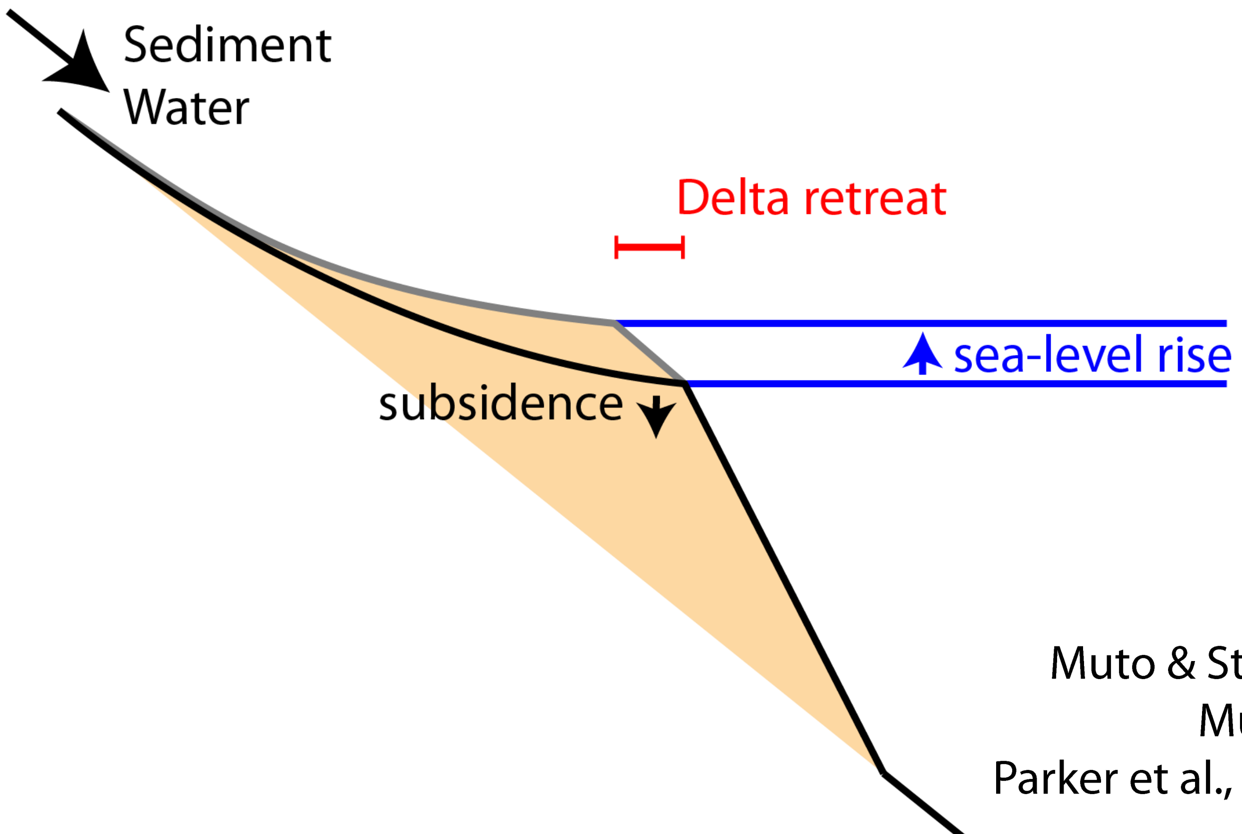
# global river delta change in response to sea-level rise in the 21st century

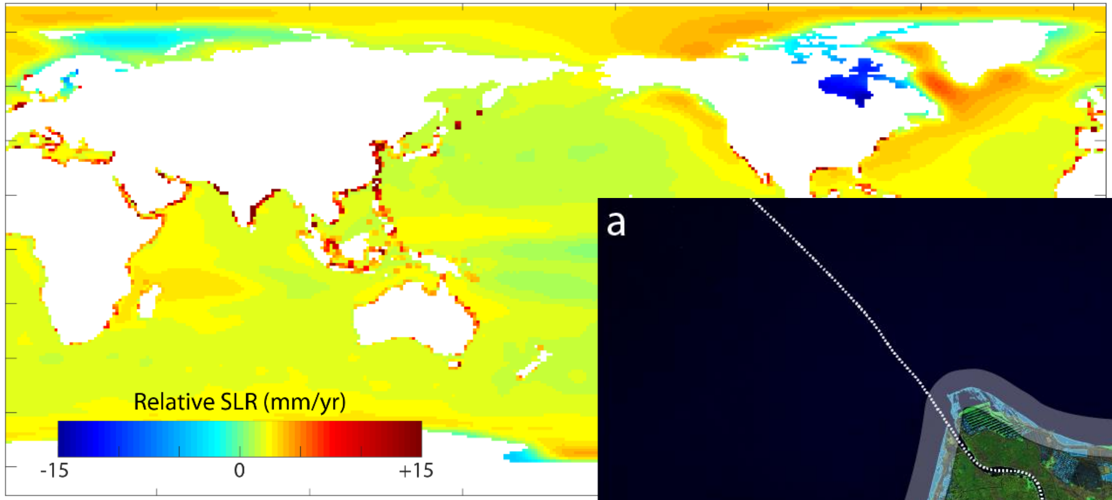
1. SLR inundation models predict significant coastal flooding/land loss under all SLR scenarios (e.g. Kulp & Straus, Nat Comm 2019, or the WRI aqueduct www.wri.org/aqueduct)
2. However, observations from 1985-2015 show net delta land gain despite SLR (Nienhuis et al., Nature 2020)
3. Here we try to reconcile this difference by allowing for coastal sedimentation: we provide a morphodynamic prediction for future land loss from SLR that is validated by observations

1. We apply a simple and tested morphodynamic model
2. It schematizes a delta by its cross-section and compares the incoming sediment flux to the SLR rate
3. The calculated shoreline movement and delta width together result in delta land loss or land gain

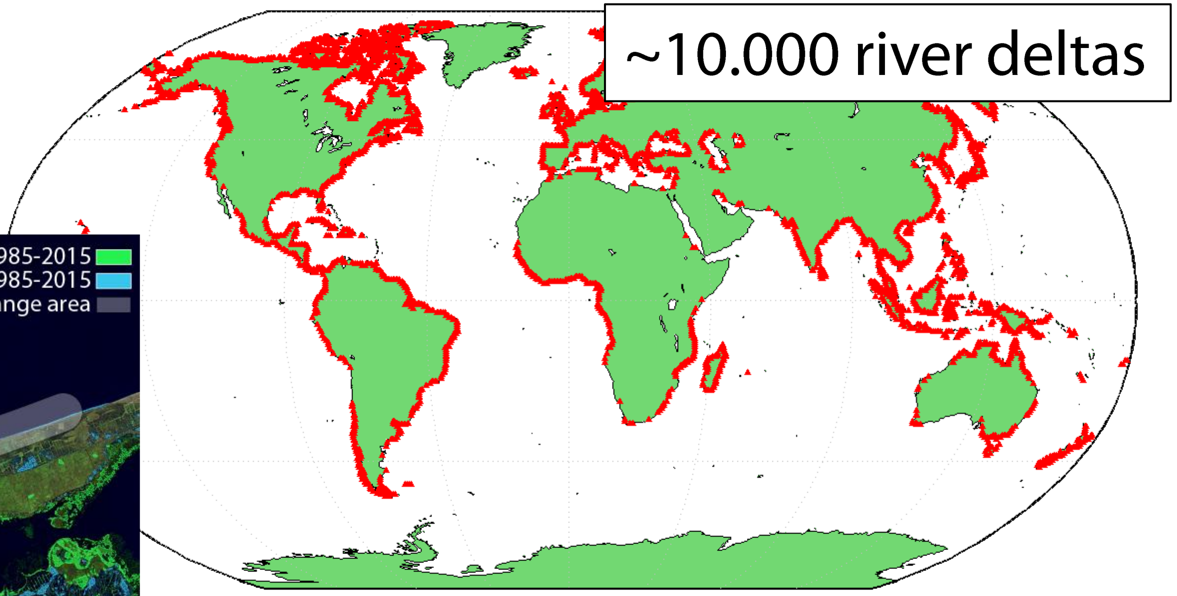



Muto & Steel, *J. Sed. Res.*, 1997
Muto, *J. Sed. Res.*, 2001
Parker et al., *Sedimentology* 2008

1. We apply our cross-section model to all 10,000 river deltas.
2. We validate our model using results from 1985-2015 vs. LandSat observations of delta change for all 10,000 deltas.
3. We find reasonable agreement when applied on a global scale. This is one of the major benefits of doing this analysis globally vs. for individual deltas.








Nienhuis et al., *Nature*, 2020

1. We find that sediment supply change, subsidence, and climate-change driven SLR are important in future delta change
2. Under RCP8.5 by the end of the century, deltas will lose 900 $km^2/yr$.
3. Cumulative from 2000-2100, RCP8.5 results in 35,000 $km^2$ delta land loss – equivalent to about 4% of global delta area.