



Predicting coastal deltaic change on a global scale

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Coastal deltaic change is expected to be one of the major Earth-surface hazards of the 21st century. We have quantified the effect of waves, tides, and fluvial sediment supply on delta morphology to predict future changes to deltaic coasts in response to river damming, land-use changes, and climate change. Simple parameterizations and key insights from global wave, tide, and fluvial sediment data have allowed us to make morphologic predictions for Earth's deltas ($n \sim 14000$). We project that many deltas with human-induced decreases in fluvial sediment loads will experience wave reworking into barrier islands or tide reworking into alluvial estuaries. Other deltas are projected to experience increased fluvial sediment flux, and, in some cases these growing deltas could transition to river-dominated morphologies. This unified, global picture of future deltaic change will aid local management of deltaic areas. Our analysis also provides opportunities for the inclusion of river deltas into Earth system and climate models. This multi-disciplinary approach can benefit delta management solutions by indicating sustainable delta morphologies in their new anthropogenically modified environments.