Modeling and dynamics of sand bed vortex ripples
JUSTIN KAO, ABIGAIL KOSS, TAYLOR PERRON, Massachusetts Institute of Technology — Vortex ripples arise through the instability of a flat sand bed under oscillatory water flow, for example due to wave action at a beach or continental shelf. Fully developed vortex ripples display complex interactions through the mutual influence of fluid flow and bed topography on each other, via sediment transport. We discuss a mechanistic model of ripple dynamics in which the hydrodynamic influence is linearized, and show that this reduced model nonetheless captures many of the ripple dynamics observed in experiments. Cross-sectional profiles of experimentally generated ripples constrain the modeled sediment flux and provide support for our approximations.