SPACING OF MEGA-RIPPLES: MODELS MEET DATA, DATA MEET MODELS

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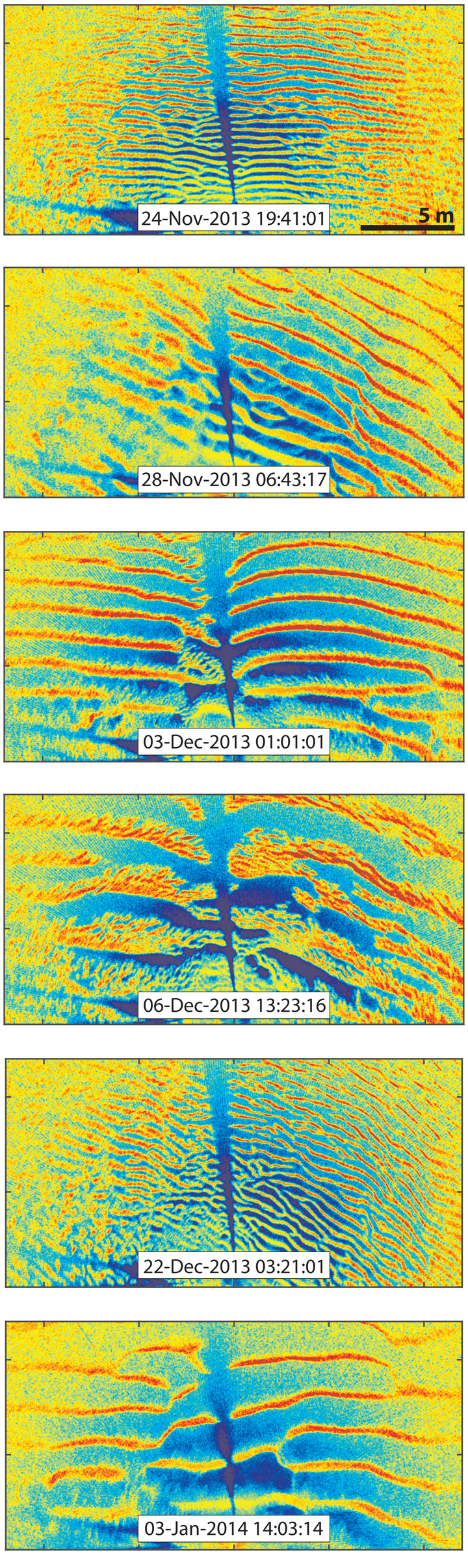
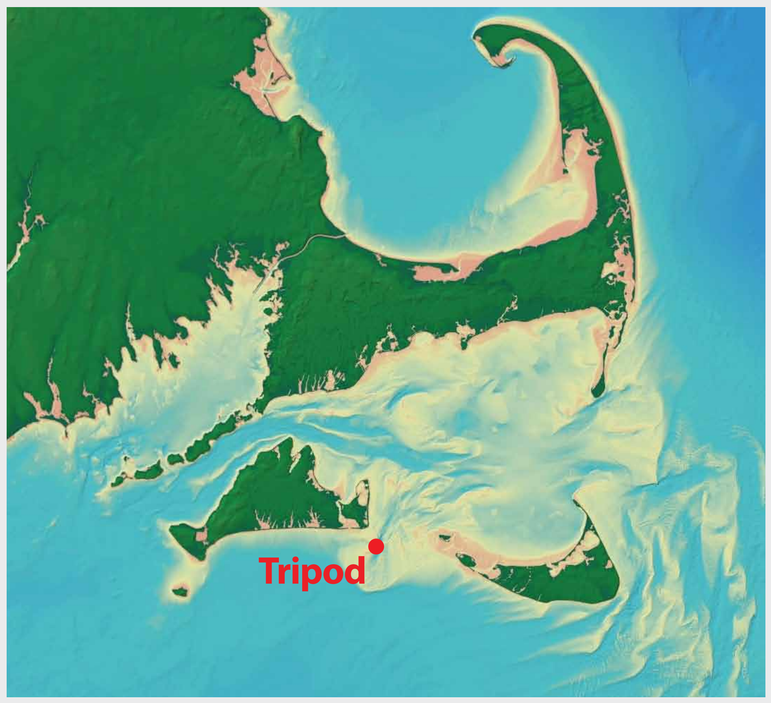
Sidescan sonar reflections show ripples

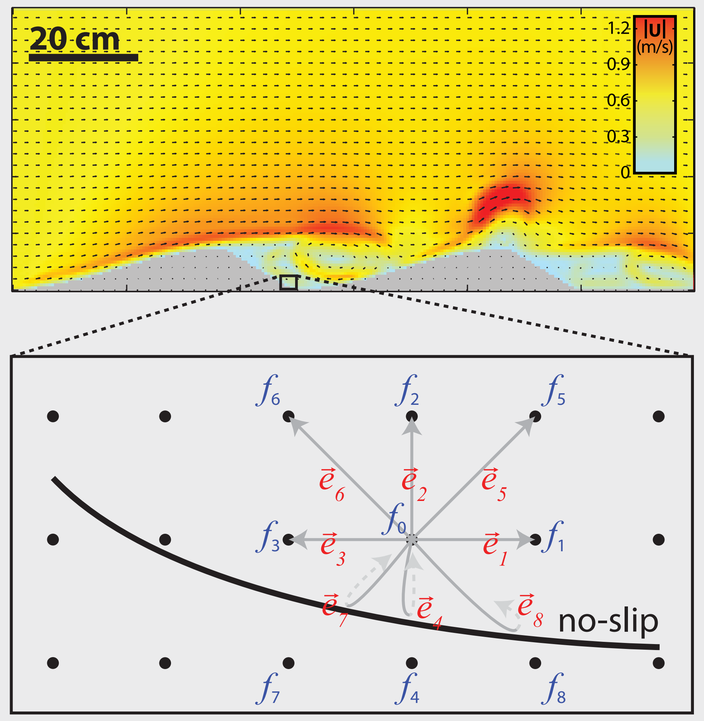


Field measurements



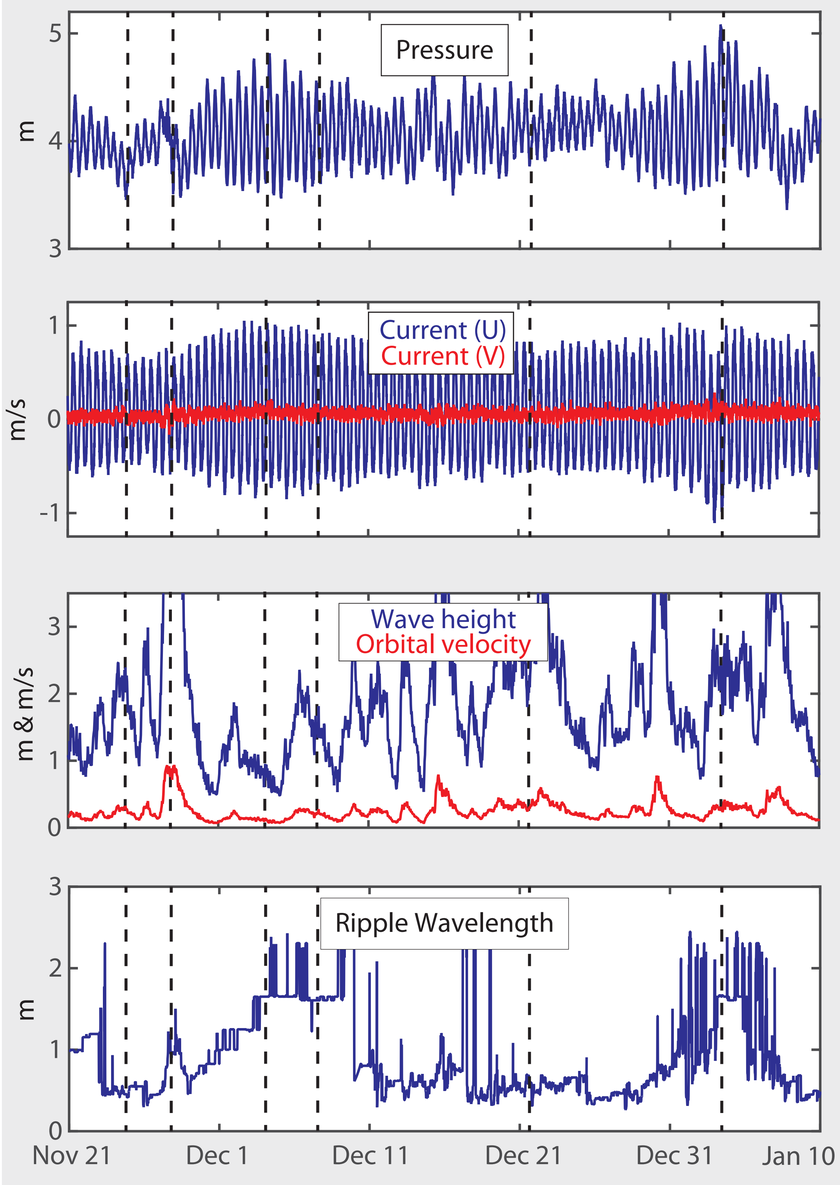
A tripod deployed for 50 days offshore on Wasque Shoals, Massachusetts shows tidally reversing mega ripples and wave driven ripples (Traykovski, Coastal Sediments, 2015).

Lattice Boltzmann model



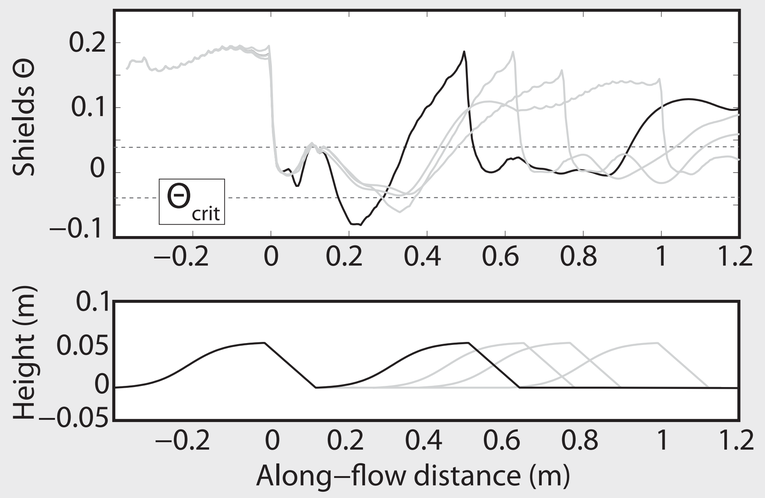
We apply a Lattice Boltzmann model (Nienhuis, JGR, 2014) to study the effect of flow velocity on ripple spacing.

Wavelength controlled by waves and tides

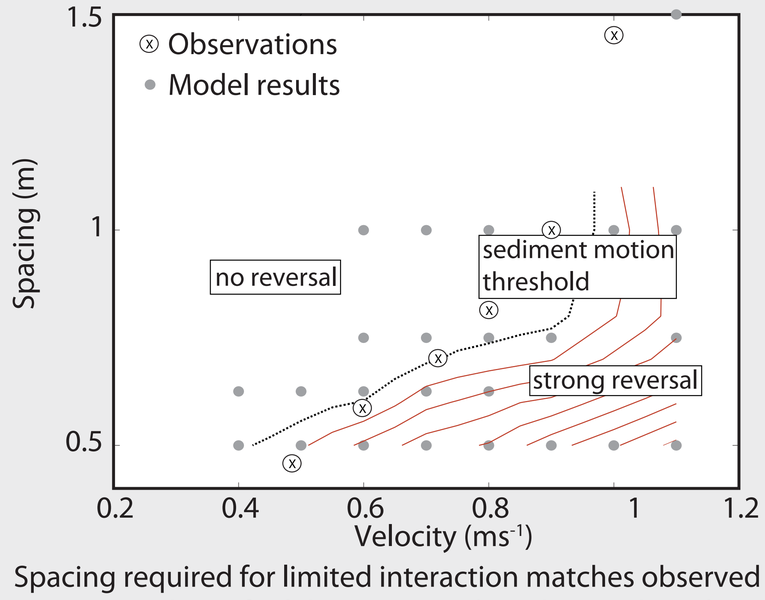


These tidally reversing (transient) megaripples are not predicted by existing dune or ripple models.

Wavelength selection



Separation shear stress is strongly dependent on ripple spacing and velocity.



Spacing required for limited interaction matches observed strong coupling of tidal currents and ripple wavelength.