SUPPLEMENTAL MATERIALS

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Shallow Seafloor Sediments: Density and Shear Wave Velocity

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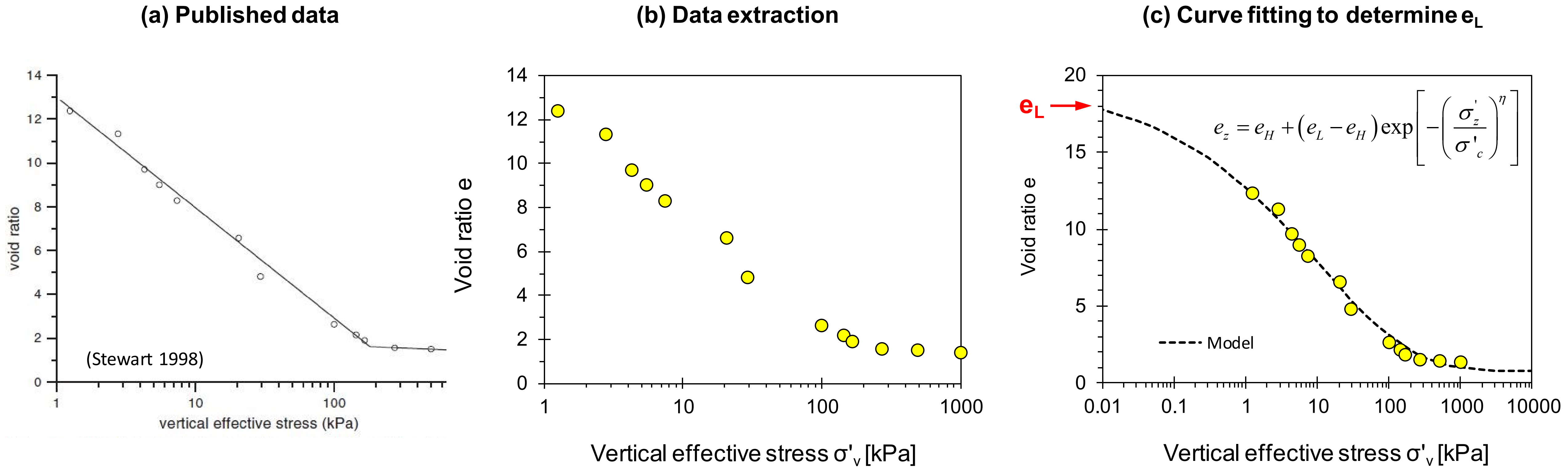
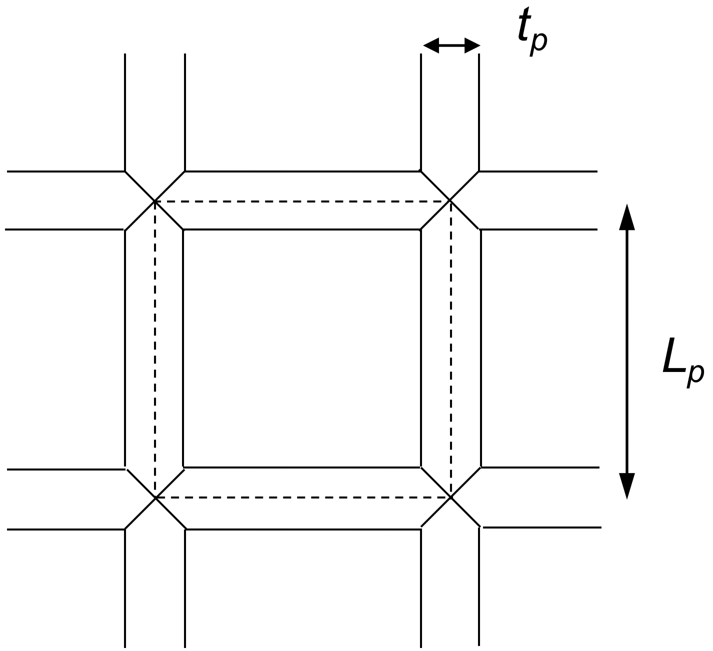


Fig. S1. Asymptotic void ratio determination from consolidation data. We fit the asymptotically-correct consolidation model to 1D oedometer data to determine the asymptotic void ratios e_L at $\sigma'_z \rightarrow 0$ and e_H at $\sigma'_z \rightarrow \infty$, and the characteristic effective stress σ'_c. Based on extensive database studies, the model parameter η is assumed η=1/3 in all cases.

Card castle in 3D



Variation of e_L with the slenderness ratio a

a	e_L	$\approx e_L$
1	0	0
10	2.7	3
100	33	33
200	66	66
1000	333	333

Slenderness $a = \frac{L_p}{t_p}$

Void ratio $e_L = \frac{(L_p - t_p)^3}{L_p^3 - (L_p - t_p)^3} = \frac{(a-1)^3}{a^3 - (a-1)^3}$ For high a, $e_L = \frac{a-2}{3}$

Fig. S2. The void ratio for an open 3D card-castle configuration provides an estimate of e_L for platy particles. Particle geometry: length L_p and thickness t_p, slenderness ratio $a = L_p/t_p$. The asymptotic void ratio approaches to $e_L \approx (a\text{-}2)/3$ for high slenderness ratio.

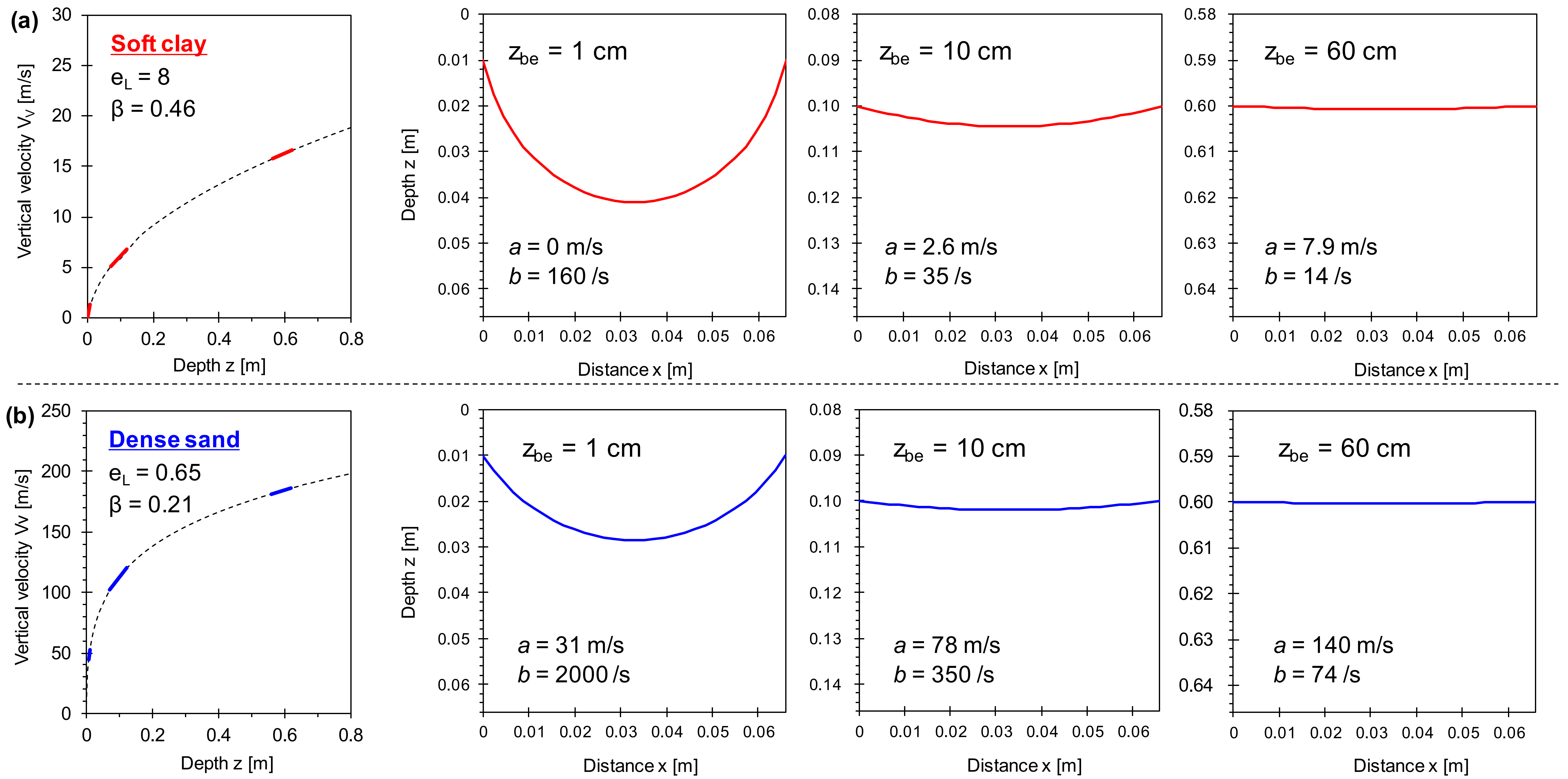


Fig. S3. Ray path between source and receiver bender elements at depth z_{be} – Closed form solution. (a) Soft clay. (b) Dense sand. The vertical velocity field increases locally-linearly with depth as $V_v = a + bz$; parameters a&b are extracted from the local secant to the true velocity field at the relevant depth (figures on the left). The velocity anisotropy reflects the k_o-state of stress. Distance between source and receiver: $L = 66$ mm.