SUPPLEMENTAL MATERIALS

ASCE *Journal of Geotechnical and Geoenvironmental Engineering*

Geotechnical Parameters from Portable Free Fall Penetrometer Measurements in Coastal Environments

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DOI: 10.1061/JGGEFK.GTENG-11013

Datasets were compiled from Delaware Bay (DB), Delaware; Pea Island (PI), North Carolina; the York River (YR), Virginia; the Potomac River (PR), Maryland; the James River (JR), Virginia; the Brazos River (BR), Texas, and Yakutat Bay (YB), Alaska (Fig. S1). A summary of the location names and site numbers referred to in this paper is presented in Table S1.

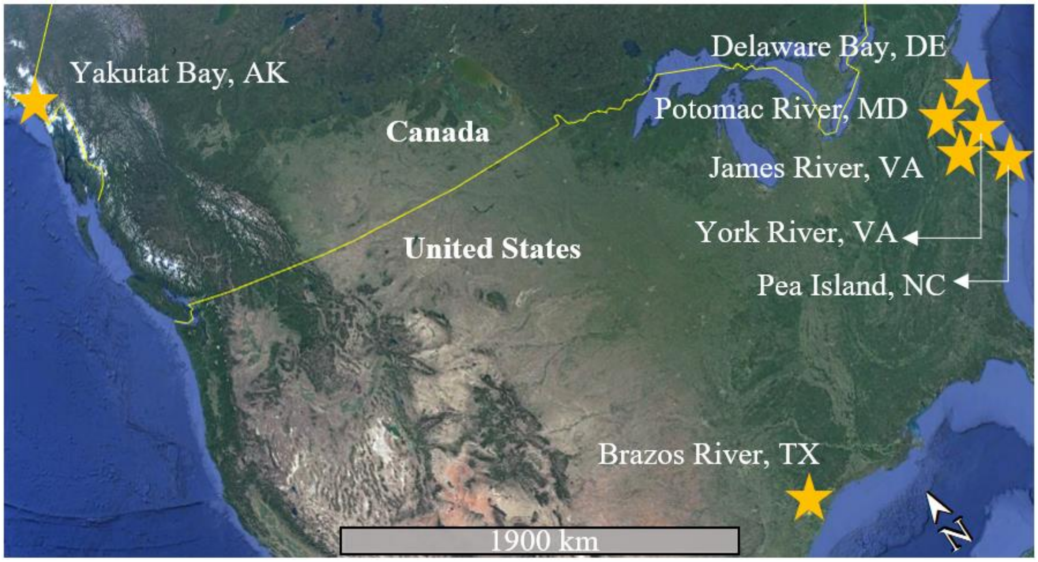

Figure S1. Map with the different dataset locations (Map data from Google, SIO, NOAA, U.S Navy, NGA, GEBCO.)

Table S1. Location names, abbreviations and site numbers for the different sites referred to in this paper.

Location	Abbreviation	Site number referred to in this paper	Representative coordinates
Delaware Bay	DB	DB1-9	38°52'32.21"N; 75°12'46.00"W
Pea Island	PI	PI1-5	35°45'53.46"N; 75°31'26.07"W
York River	YR	YR1-4	37°20'36.96"N; 76°37'21.72"W
Potomac River	PR	PR1-2	38°26'38.62"N; 77°16'35.05"W
James River	JR	JR1-4	36°59'3.33"N; 76°19'27.18"W
Brazos River	BR	BR1	29°34'21.16"N; 95°41'51.65"W
Yakutat Bay	YB	YB1-5	59°33'56.16"N; 139°44'19.43"W

Figure S2a demonstrated the effect of R_d on the calculated $q_{net,dyn}$ by choosing five different random R_d profiles (Fig. S3), where R_d magnitude and changes with depth control the shape of the estimated $q_{net,dyn}$ – depth profile (Fig. S2a colored lines). A perfect match between the measured $q_{net,dyn}$ – depth profile (Fig. S2a dashed back line) was achieved for the relative density profile R_{d1} (Fig. S2a dark red lines; Fig S3). Here, a best match was achieved with Q =6. R_{d1} represents a layered density profile with a loose sand top layer of ~8 cm in thickness over medium dense sands. This represents a reasonable scenario considering local sediment transport and deposition processes (Stark et al. 2012). For Fig. S2a, Q and c_v were kept constant at 6 and 0.031 m^2/s, respectively. Figure S2b shows variations of estimated $q_{net,dyn}$ – depth profiles when applying the relative density profile R_{d1} and c_v = 0.031 m^2/s but varying Q from 5 to 10. Figure S2c shows the effect of c_h for six different values ranging from 0.00031 to 0.031 m^2/s, representing a standard range for c_h in sandy soil and as suggested by White et al. (2018).

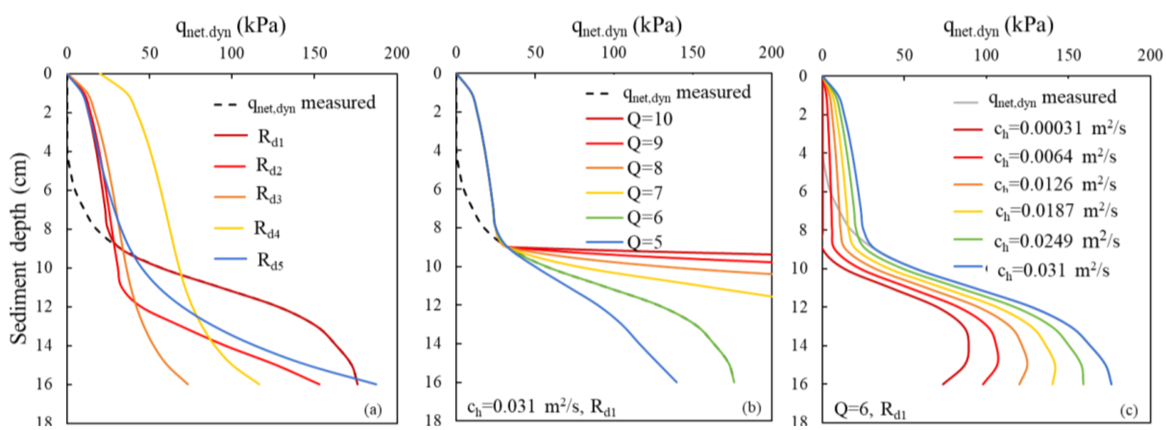

Figure S2. Estimated values of $q_{net,dyn}$ profiles for DB-7 based on White et al. (2018) approach assuming (a) different R_d values (b) different Q values and (c) different c_h values.

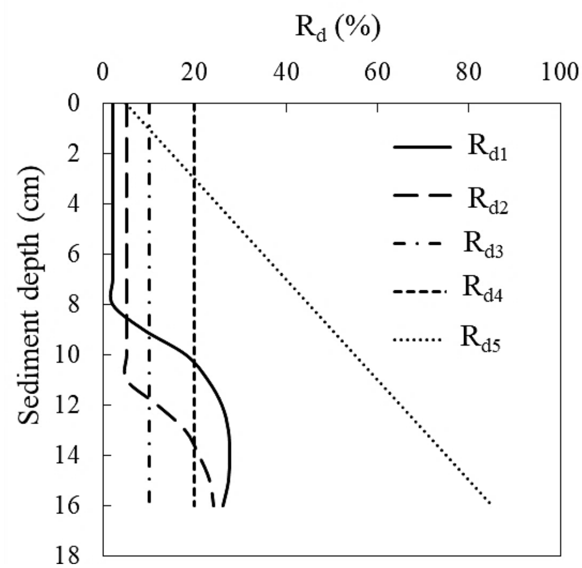

Figure S3. Profiles of relative density (*R_d*) values used in Fig. 3.

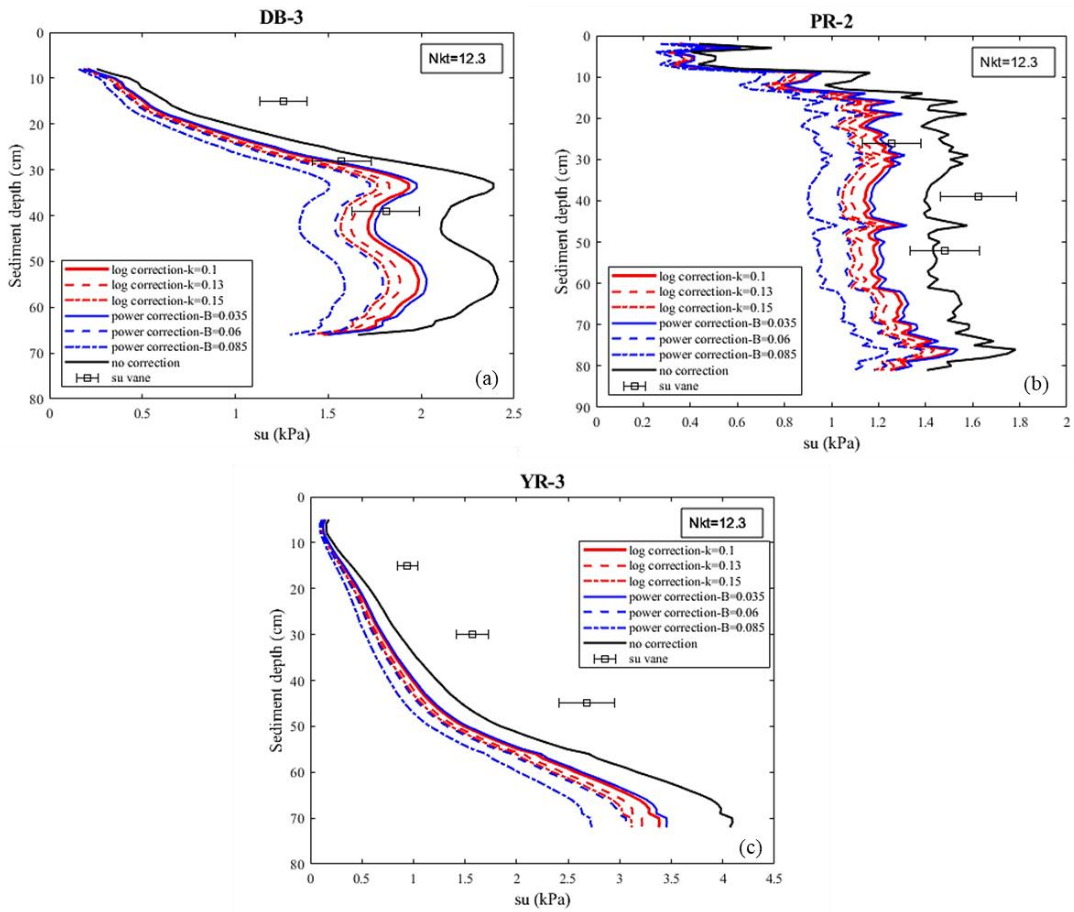

Figure S4. Results of estimated s_u profiles with depth and measured s_u vane values at different depth with 10% uncertainty (black boxes) using log strain rate correction with k between 0.1-0.15 (red color), power law correction with β between 0.035-0.085 (blue color), and no strain rate correction (black color) for (a) DB-3, (b) PR-2, (c) YR-3 for N_{kt}=12.3 .

References

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