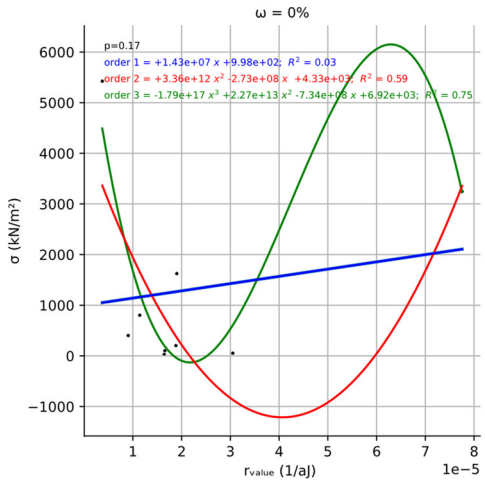
Supplementary Materials



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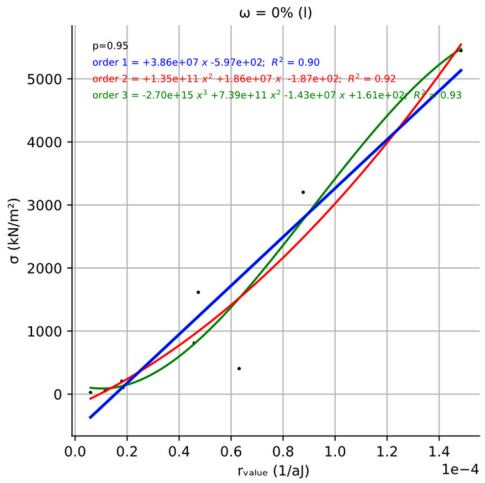

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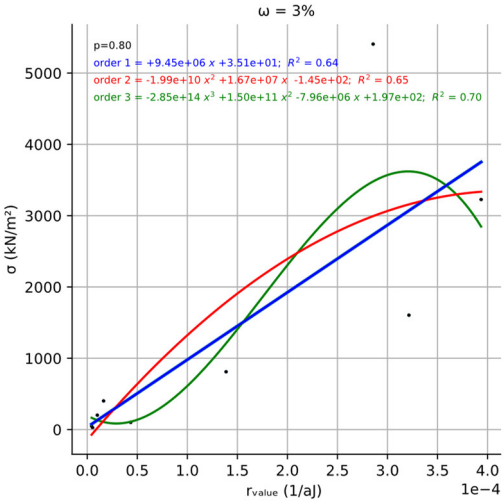

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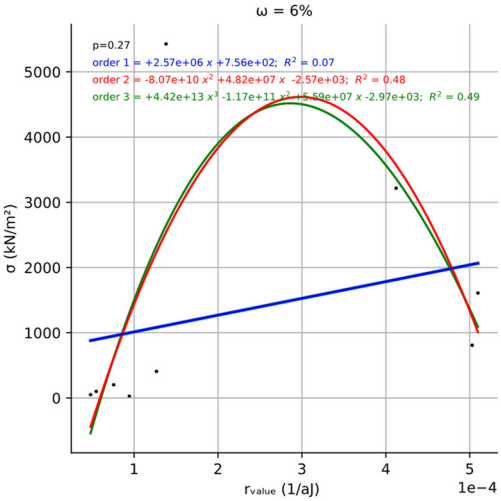

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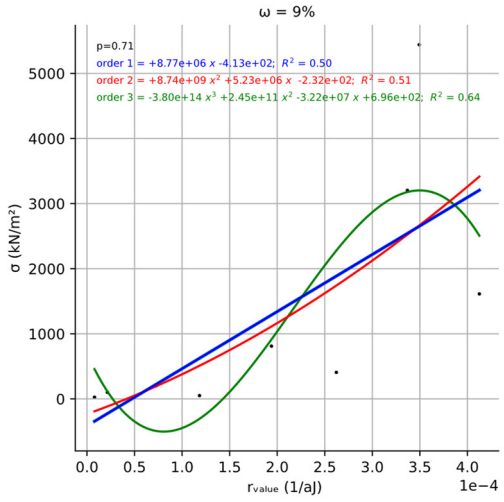

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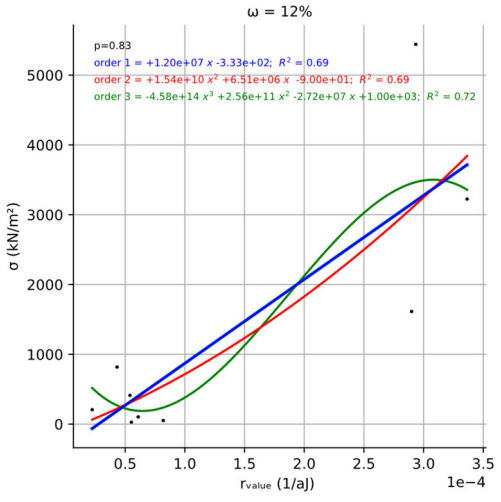


(**f**)

Figure S1. Regression lines for the correlation between loading stage effective stress (σ'_{ls}) and loading stage r value r_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%

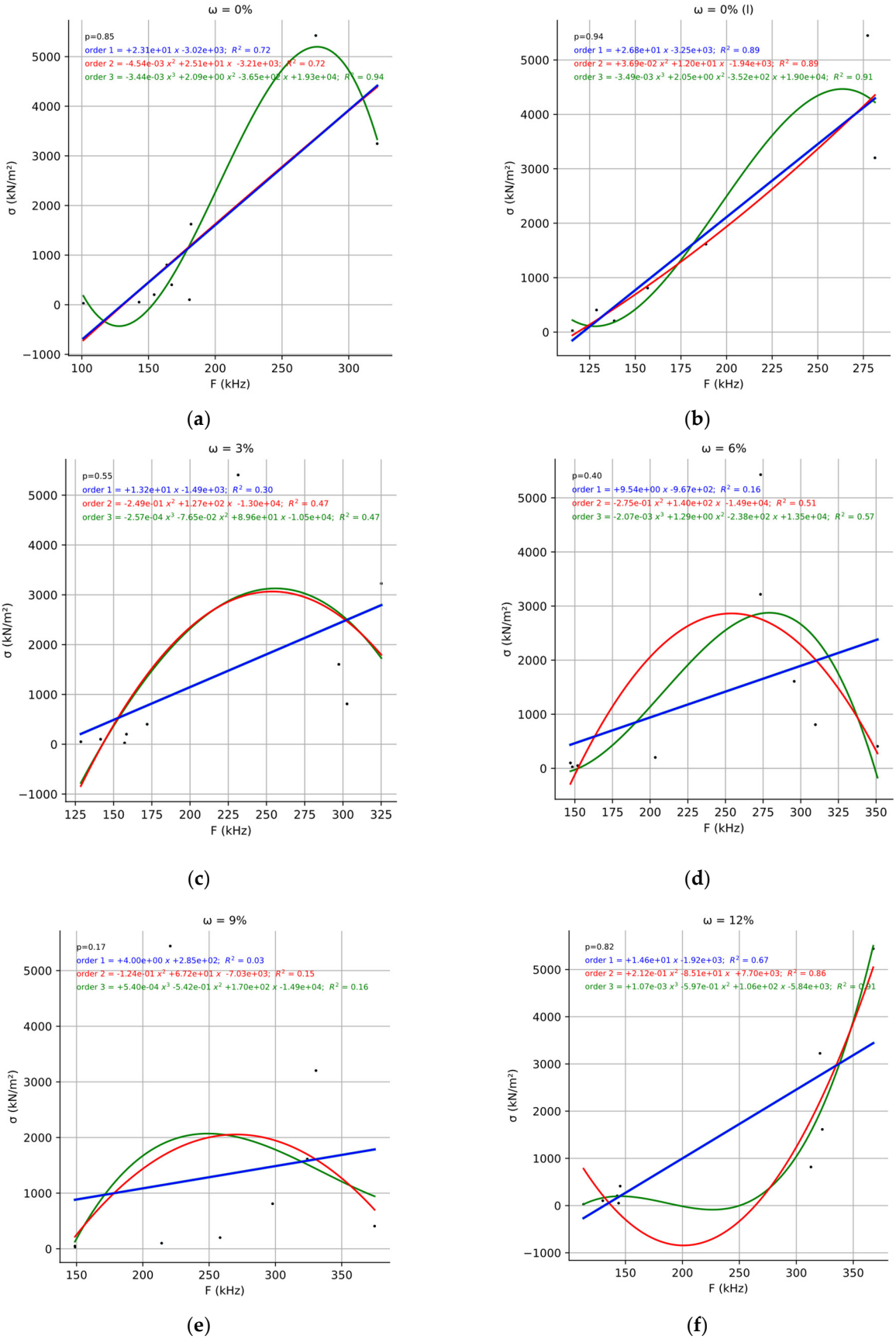


Figure S2. Regression lines for the correlation between loading stage effective stress (σ'_{ls}) and loading stage frequency F_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%

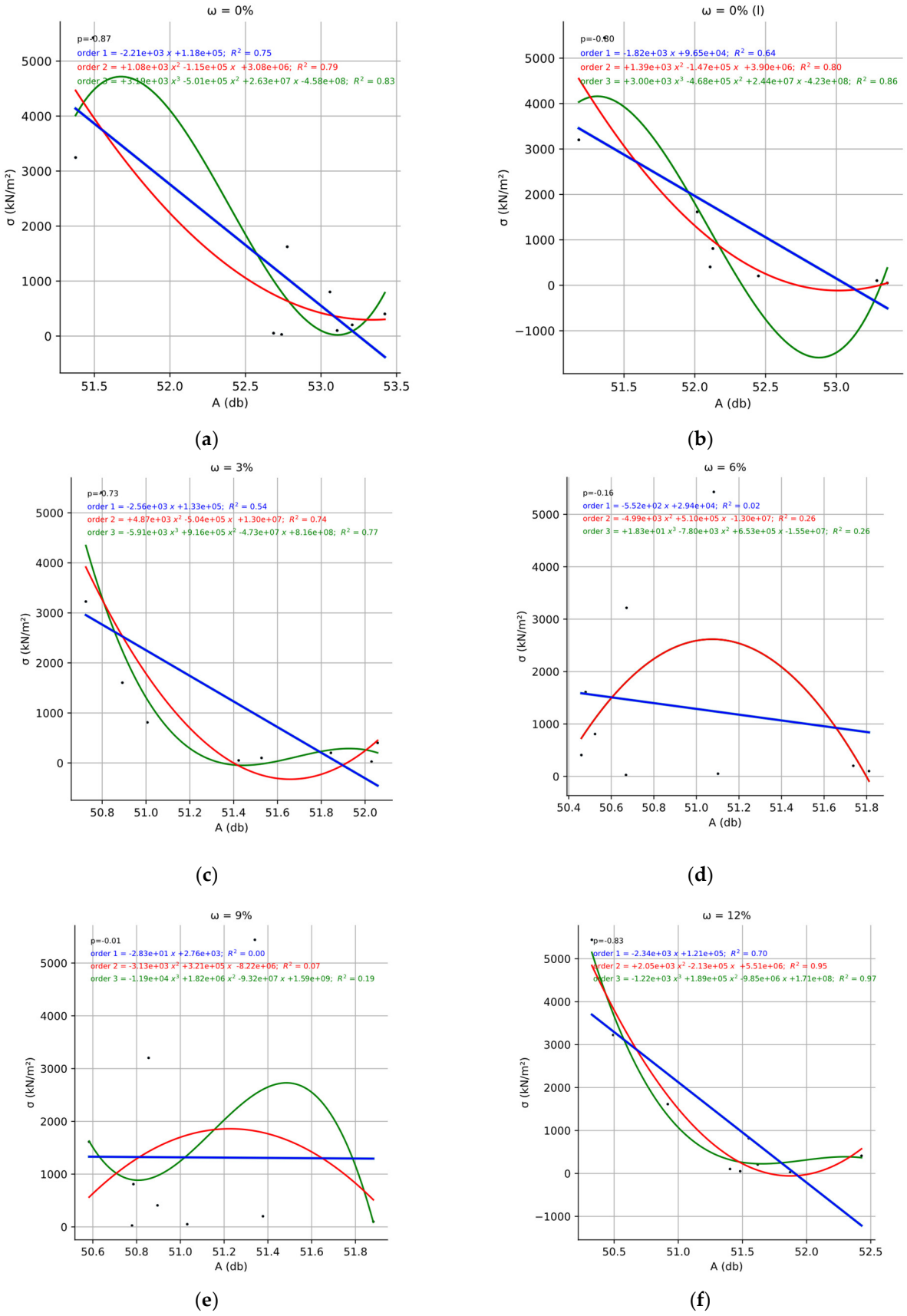


Figure S3. Regression lines for the correlation between loading stage effective stress (σ'_{ls}) and loading stage amplitude A_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%

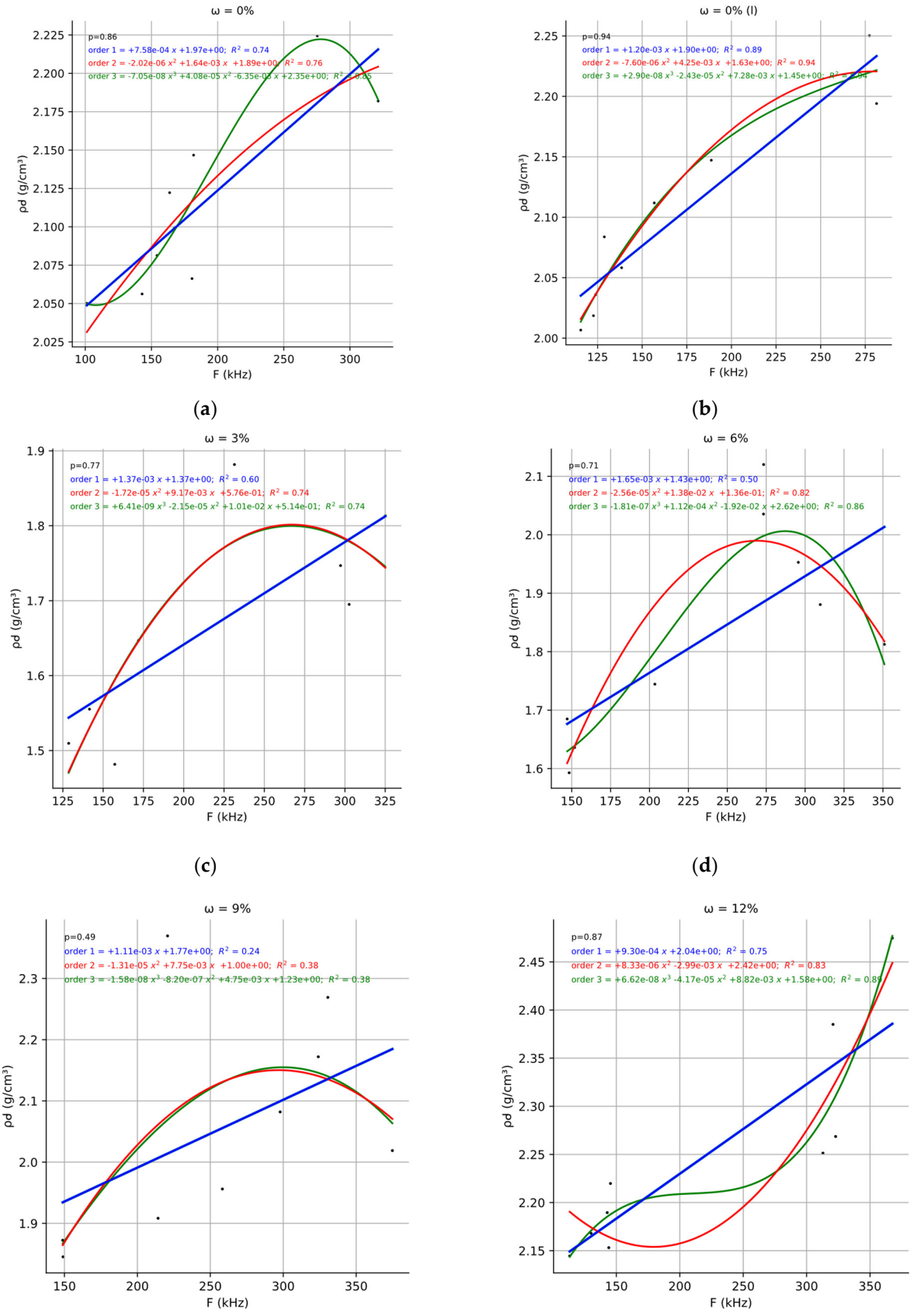


Figure S4. Regression lines for the correlation between loading stage density $\rho_{d,ls}$ and loading stage frequency F_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%

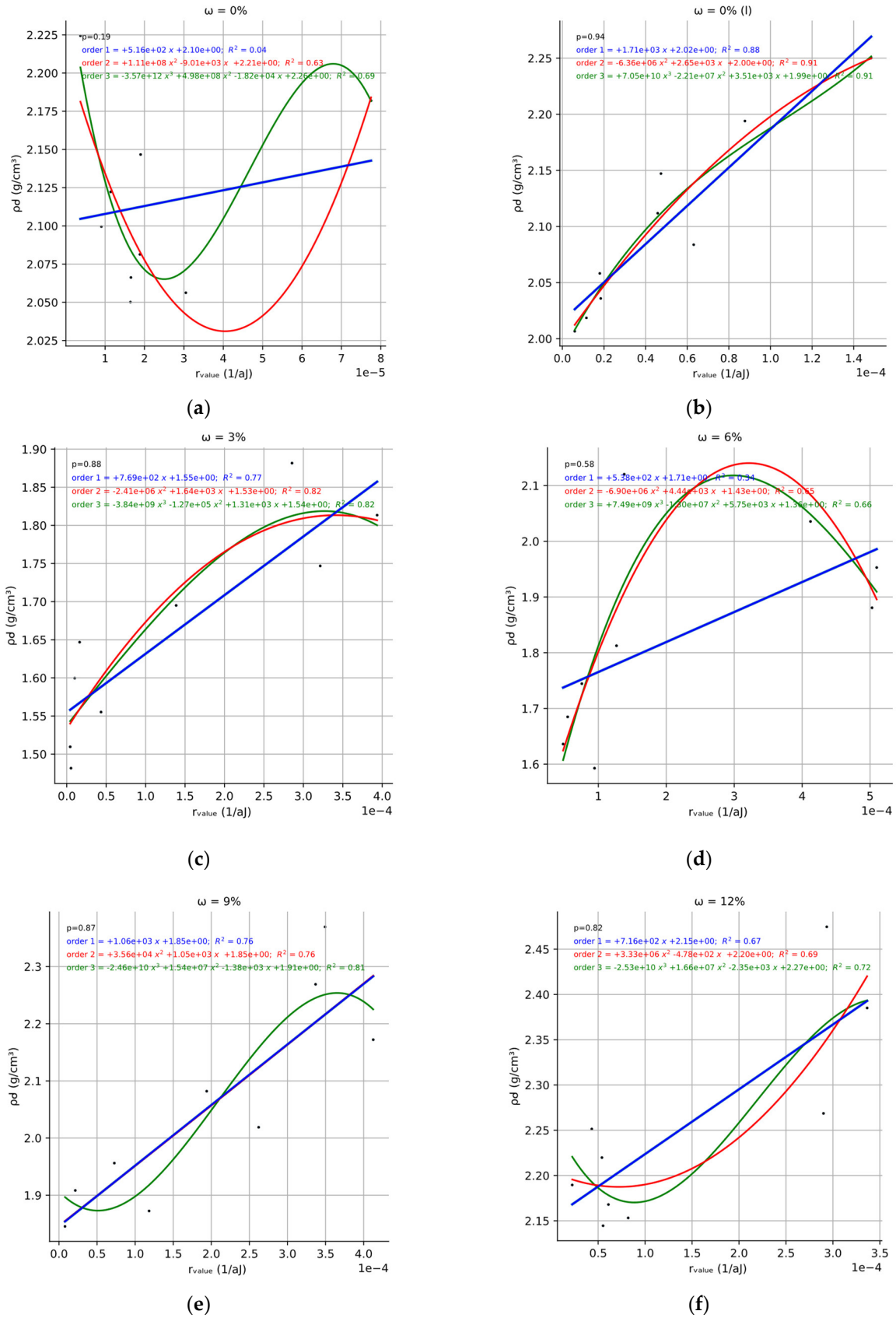


Figure S5. Regression lines for the correlation between loading stage density $\rho_{d,ls}$ and loading stage r value r_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%

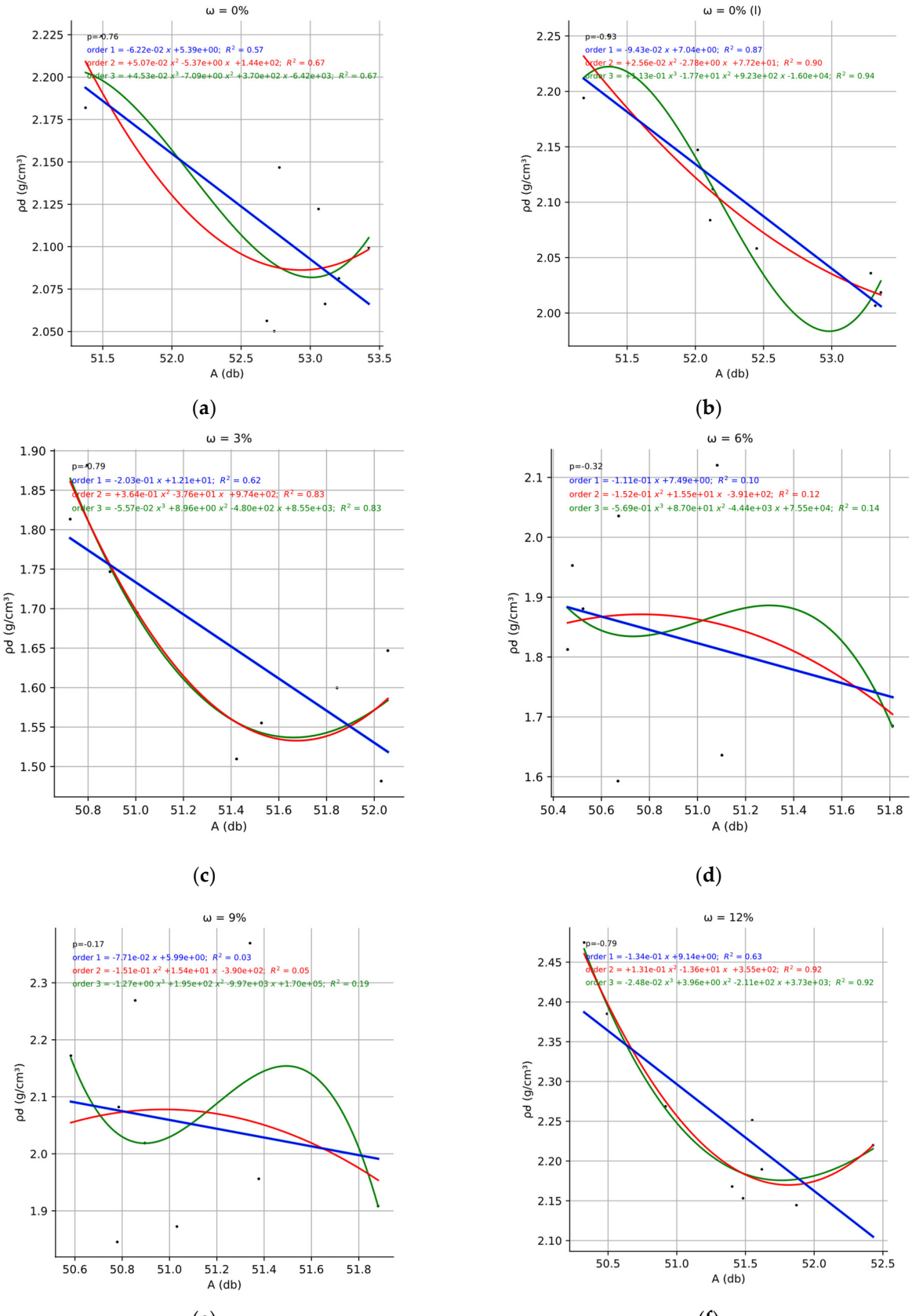


Figure S6. Regression lines for the correlation between loading stage density $\rho_{d,ls}$ and loading stage amplitude A_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%

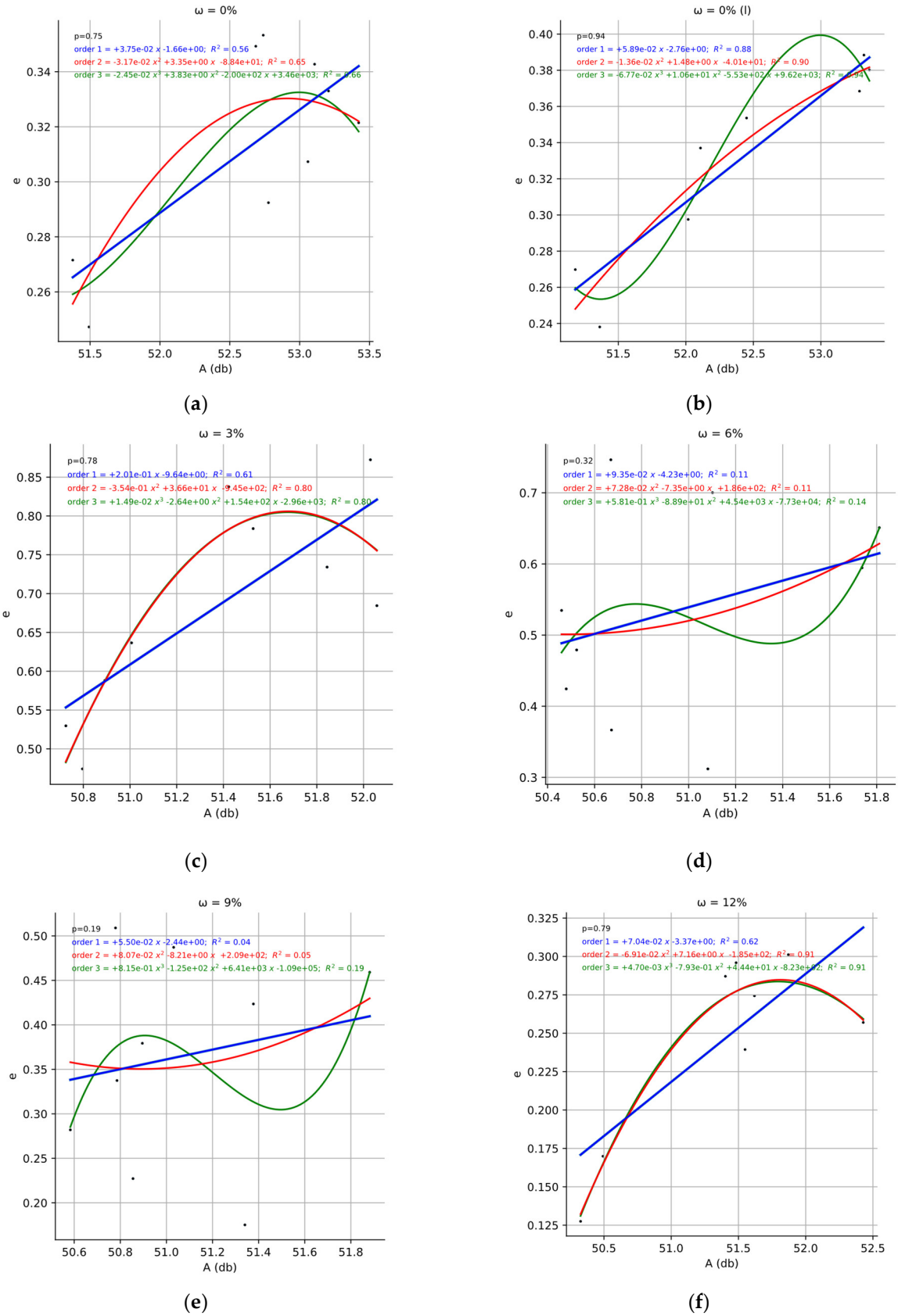


Figure S7. Regression lines for the correlation between loading stage void ratio e_{ls} and loading stage amplitude A_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%

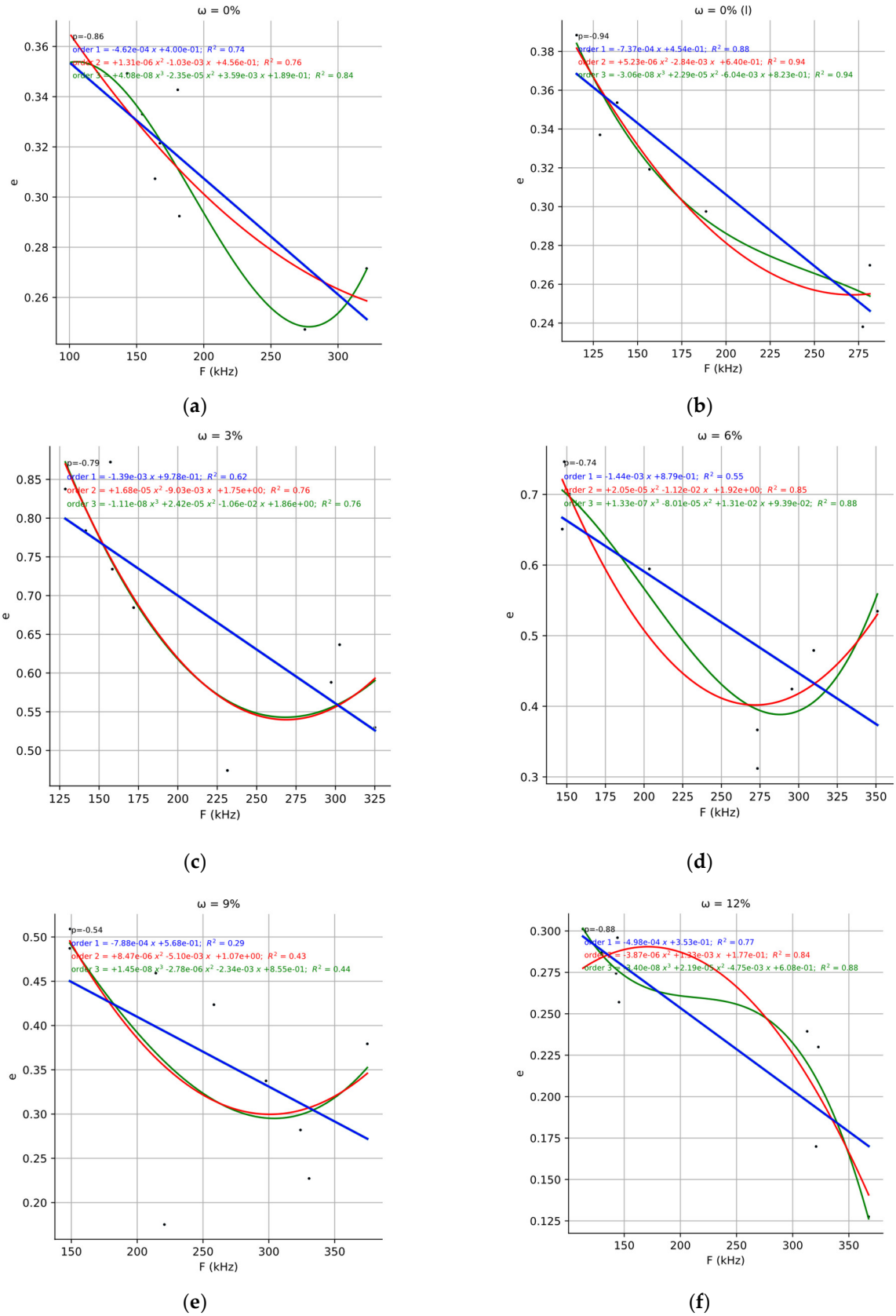
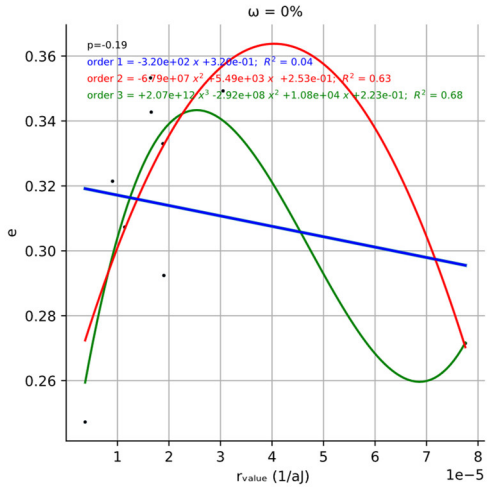


Figure S8. Regression lines for the correlation between loading stage void ratio e_{ls} and loading stage frequency F_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%



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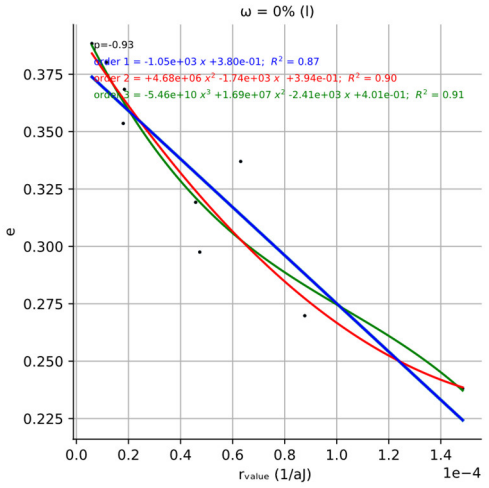

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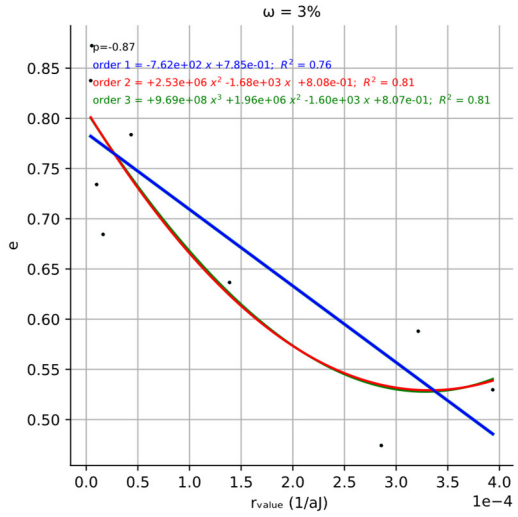

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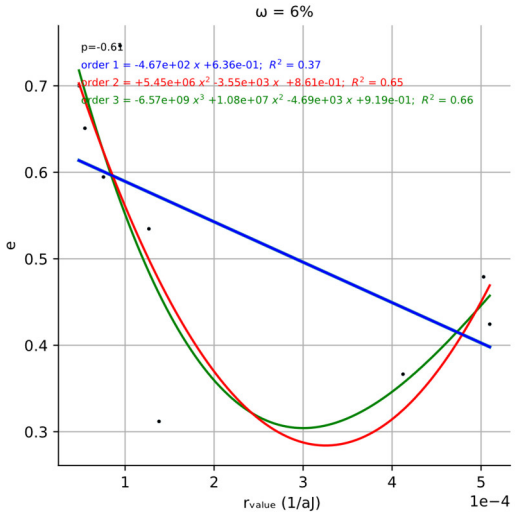

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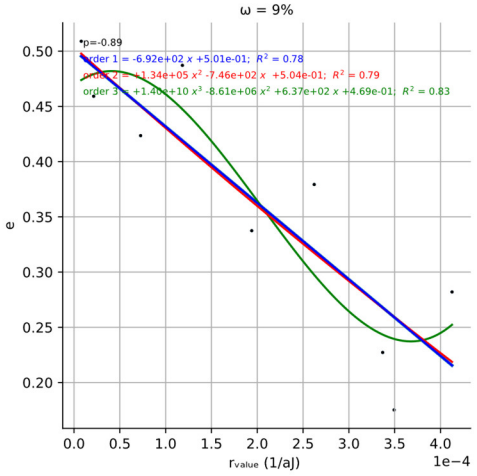

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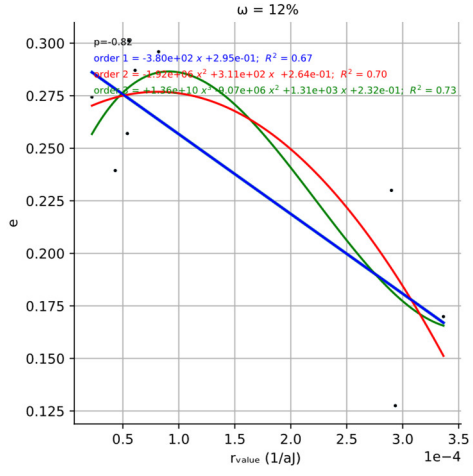
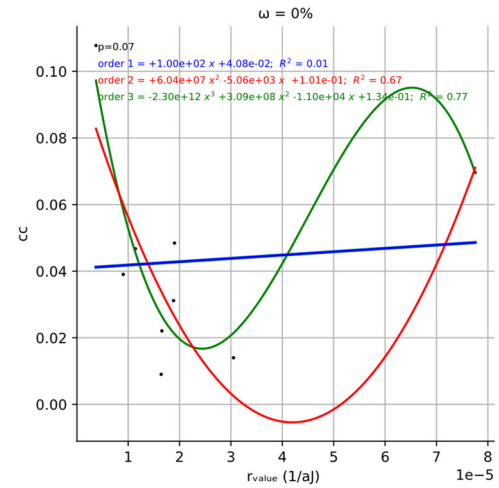


(**f**)

Figure S9. Regression lines for the correlation between loading stage void ratio e_{ls} and loading stage r value r_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%



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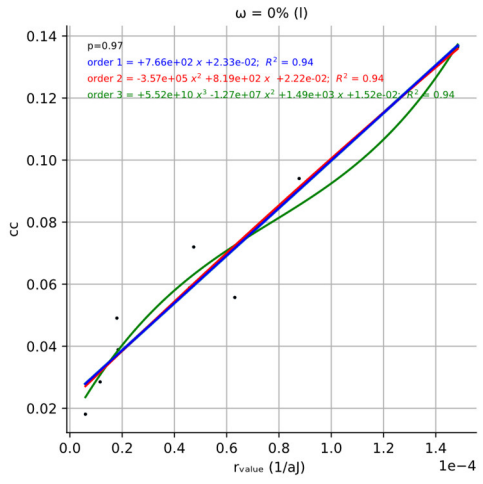

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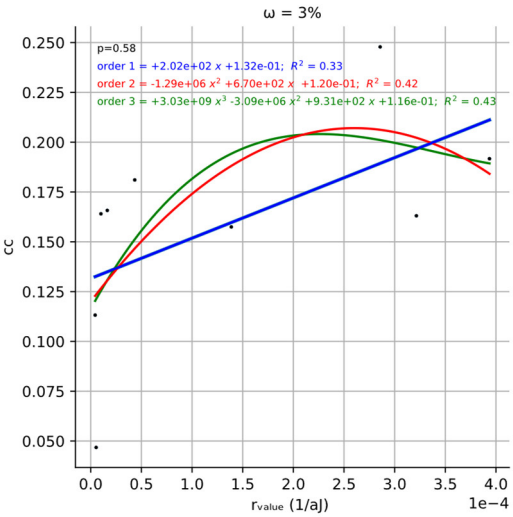

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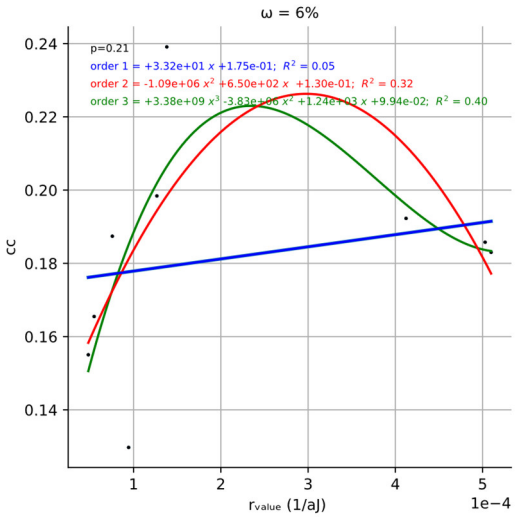

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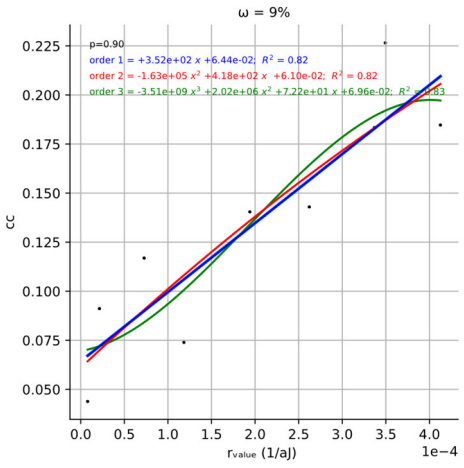

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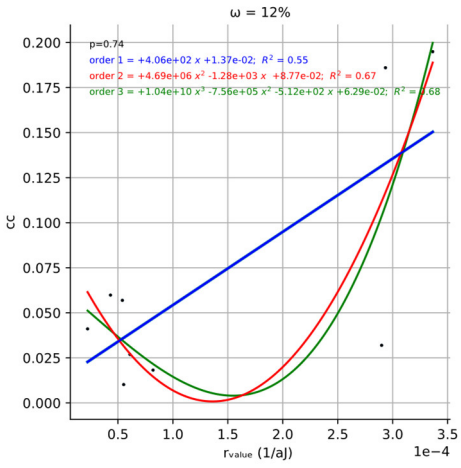
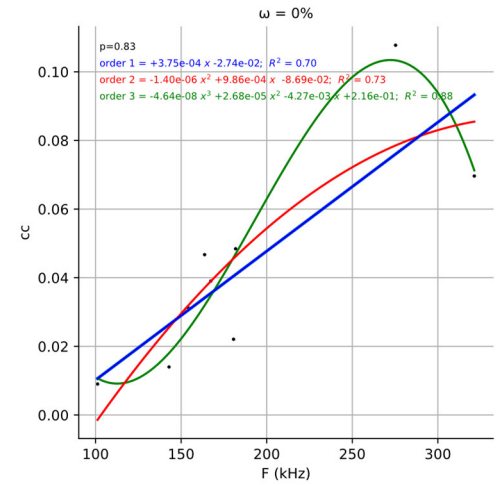


(**f**)

Figure S10. Regression lines for the correlation between loading stage compression index $c_{c,ls}$ and loading stage r value r_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%



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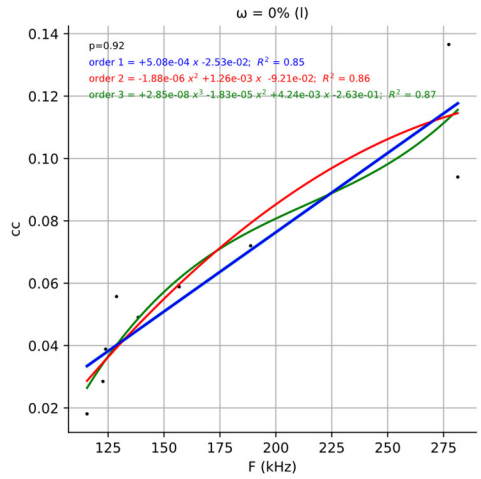

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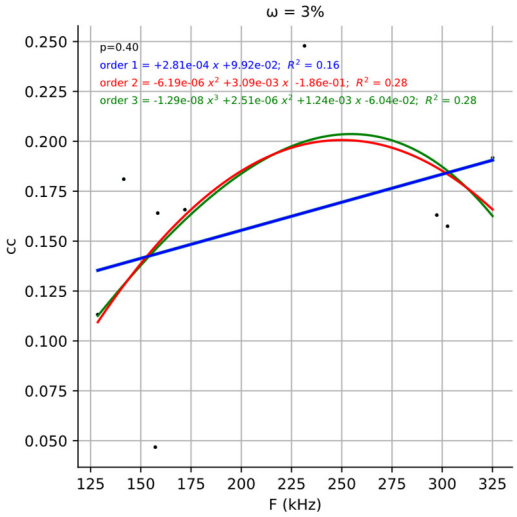

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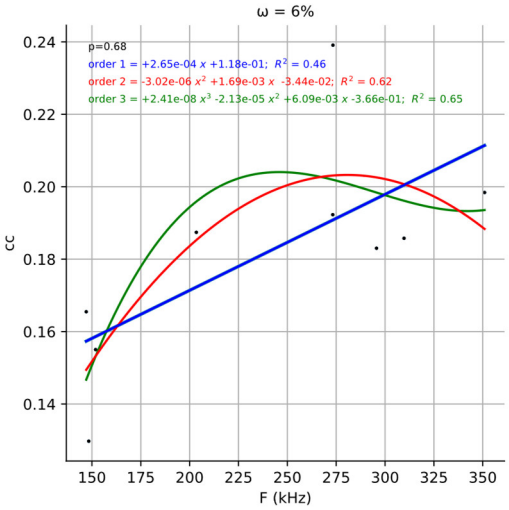

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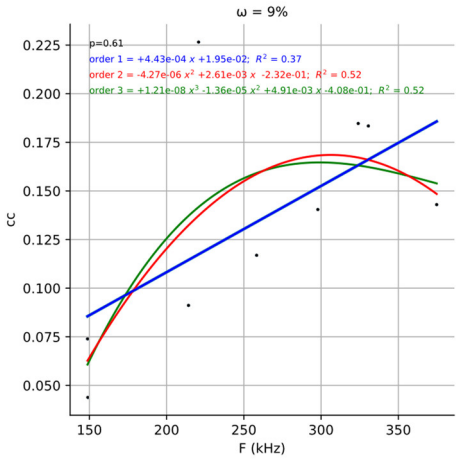

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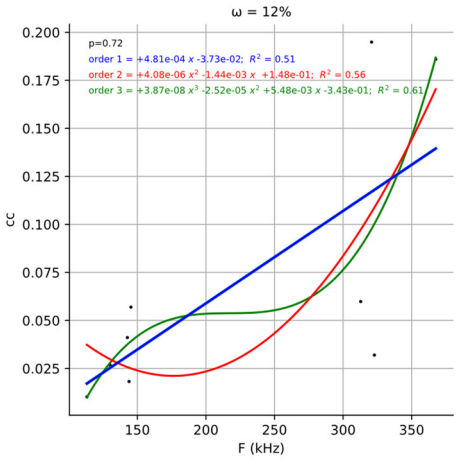
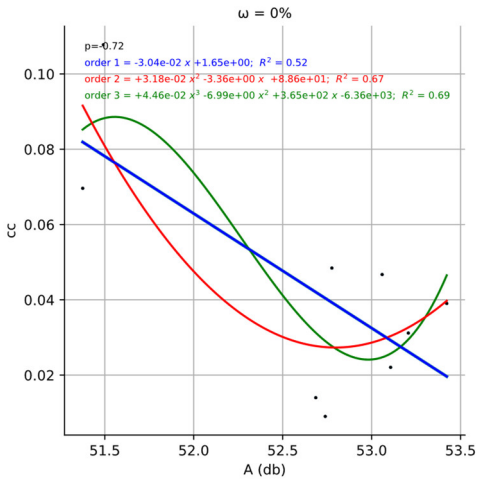


(**f**)

Figure S11. Regression lines for the correlation between loading stage compression index $c_{c,ls}$ and loading stage frequency F_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%



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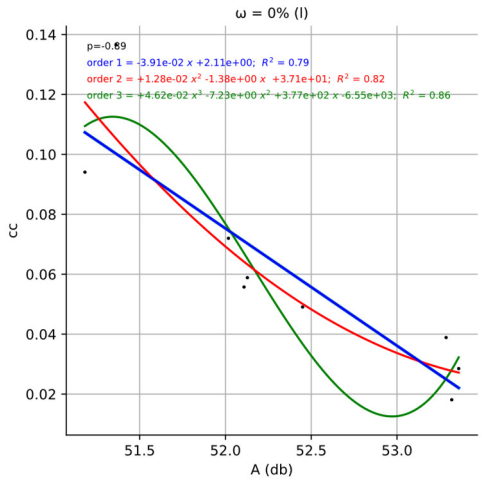

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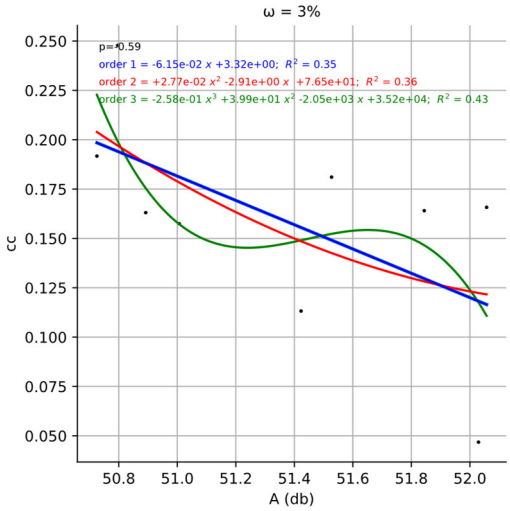

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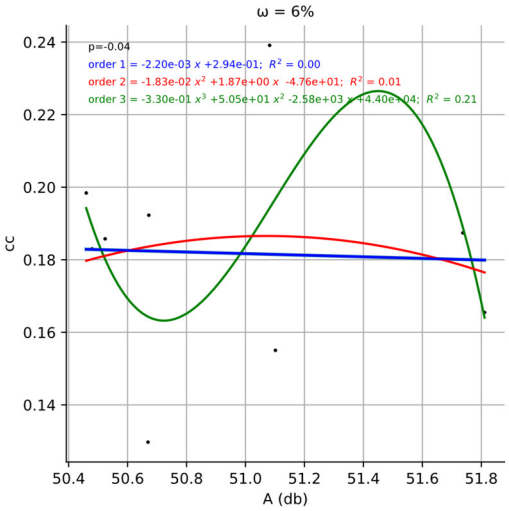

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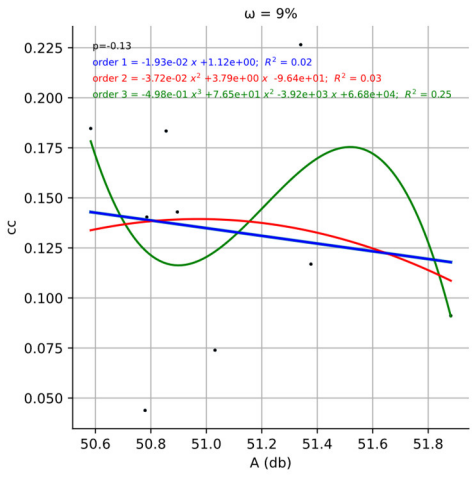

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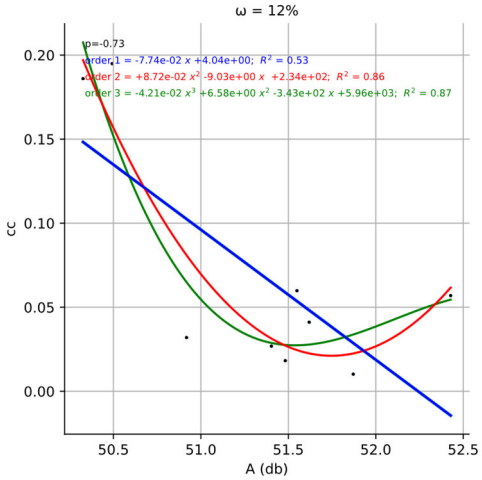
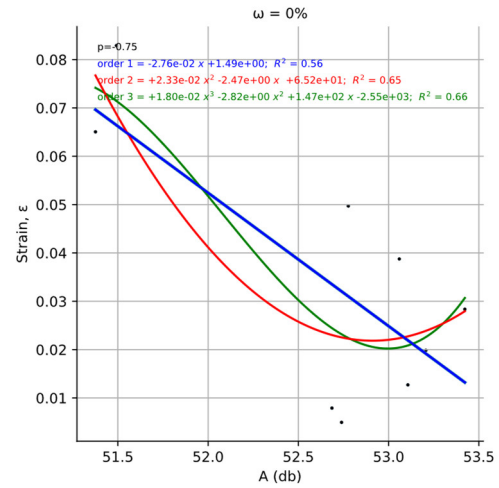


(**f**)

Figure S12. Regression lines for the correlation between loading stage compression index $c_{c,ls}$ and loading stage amplitude A_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%



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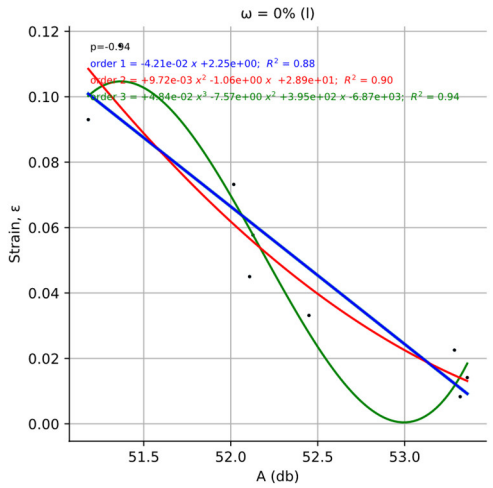

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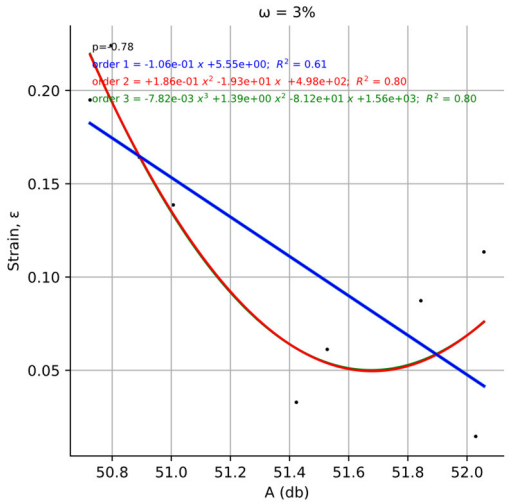

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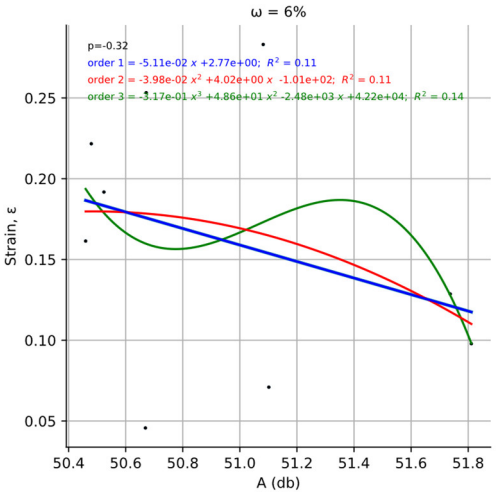

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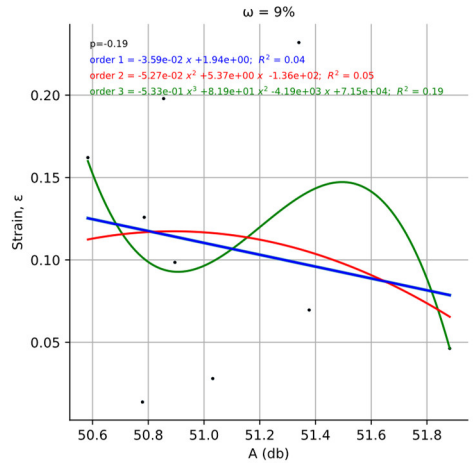

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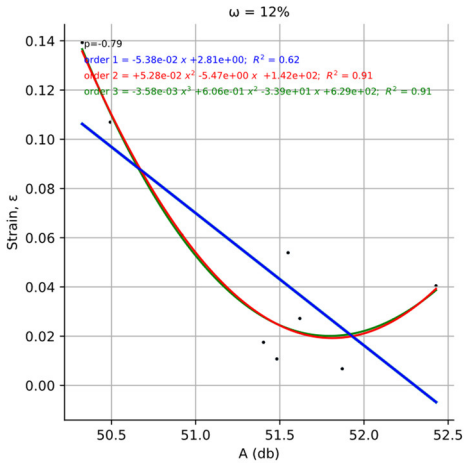


(**f**)

Figure S13. Regression lines for the correlation between loading stage strain ε_{ls} and loading stage amplitude A_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%

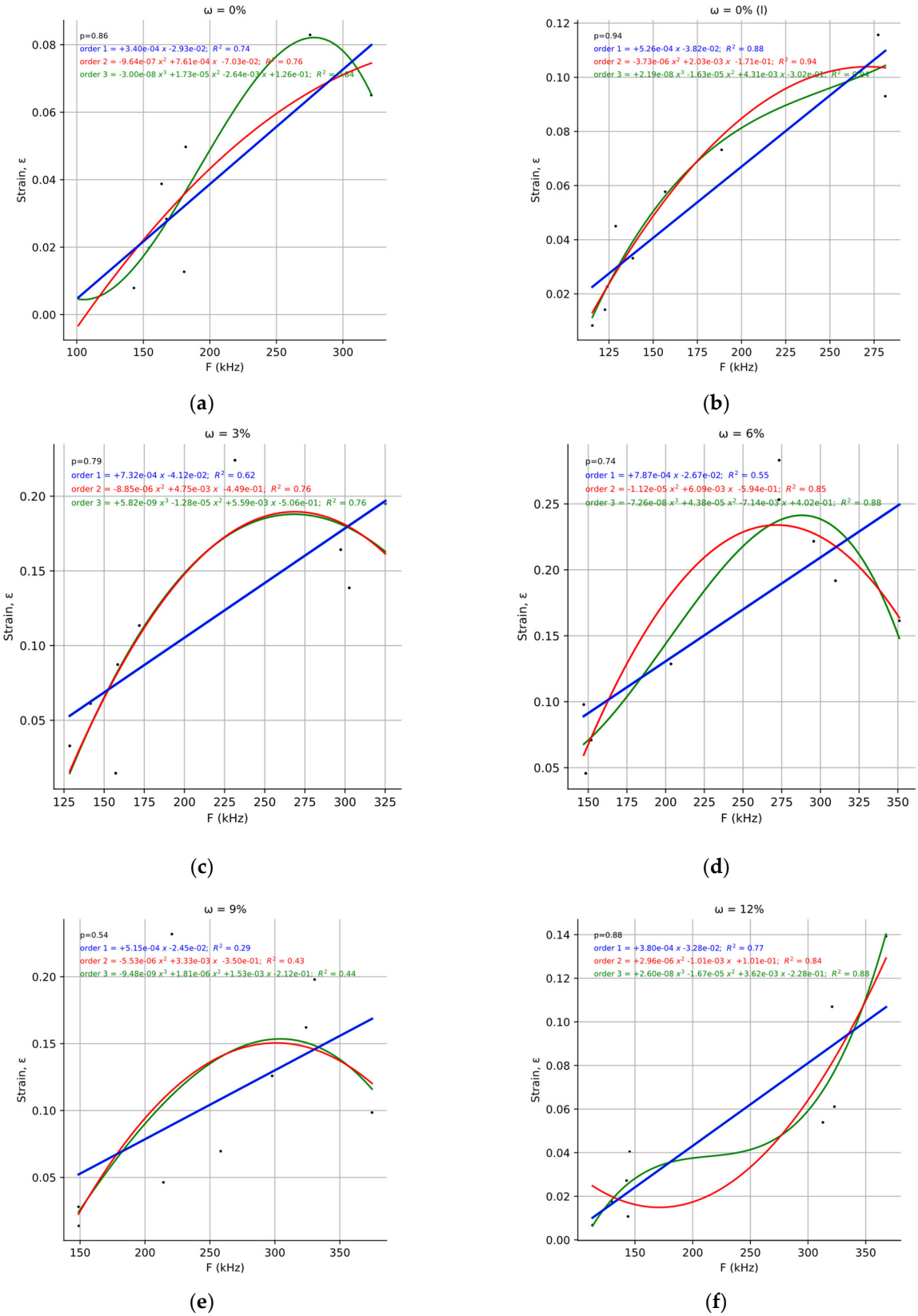


Figure S14. Regression lines for the correlation between loading stage strain ε_{ls} and loading stage frequency F_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%

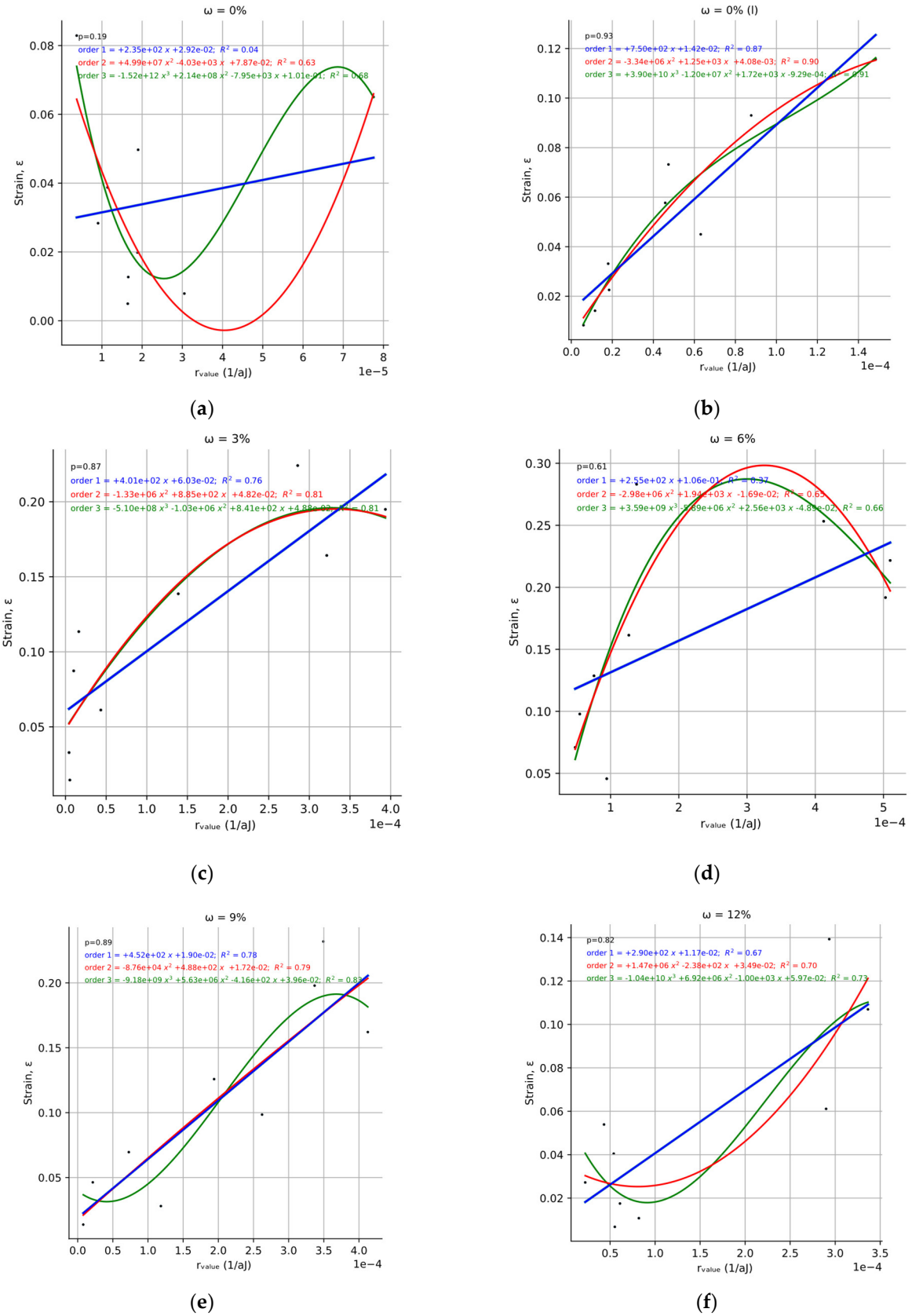
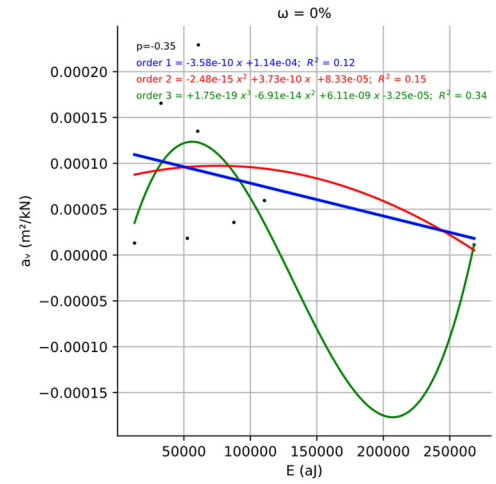


Figure S15. Regression lines for the correlation between loading stage strain ε_{ls} and loading stage r value r_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%



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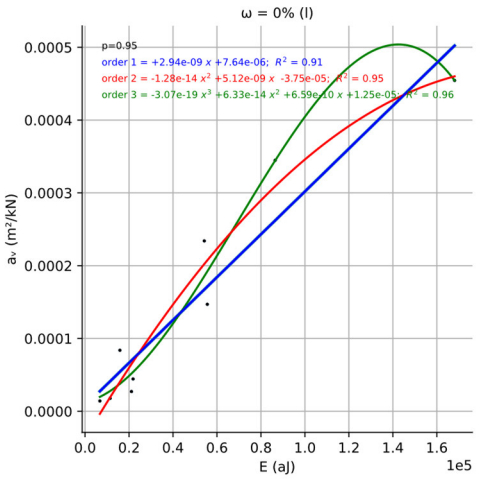

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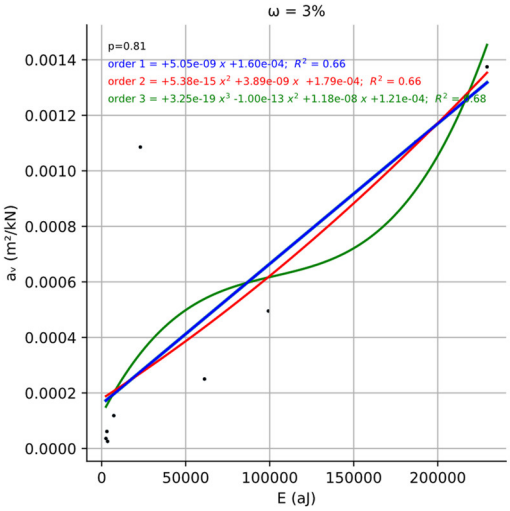

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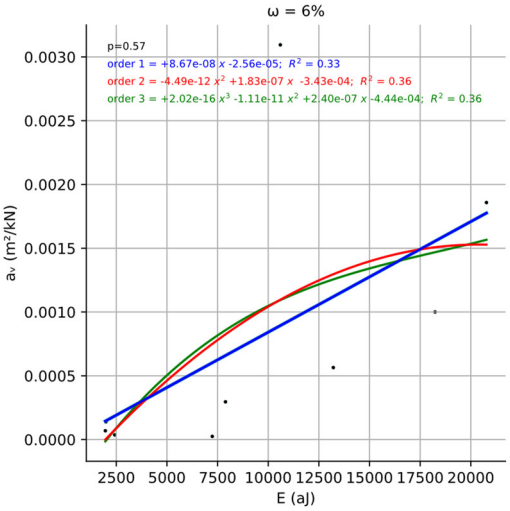

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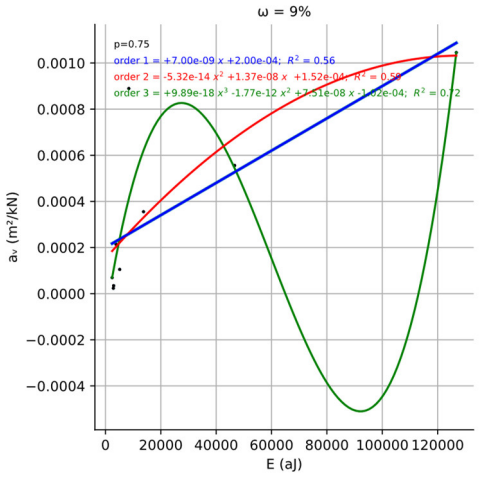

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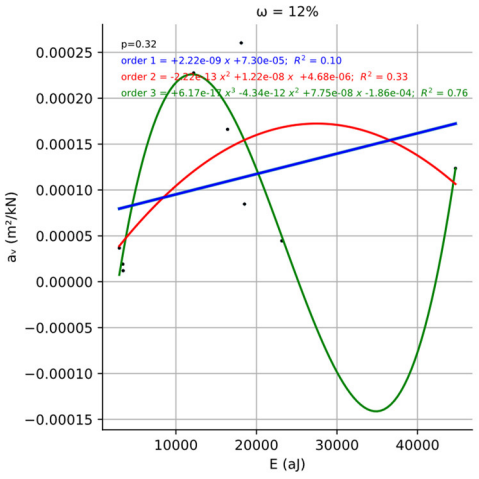


(**f**)

Figure S16. Regression lines for the correlation between loading stage coefficient of compressibility $a_{v,ls}$ and loading stage energy E_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%

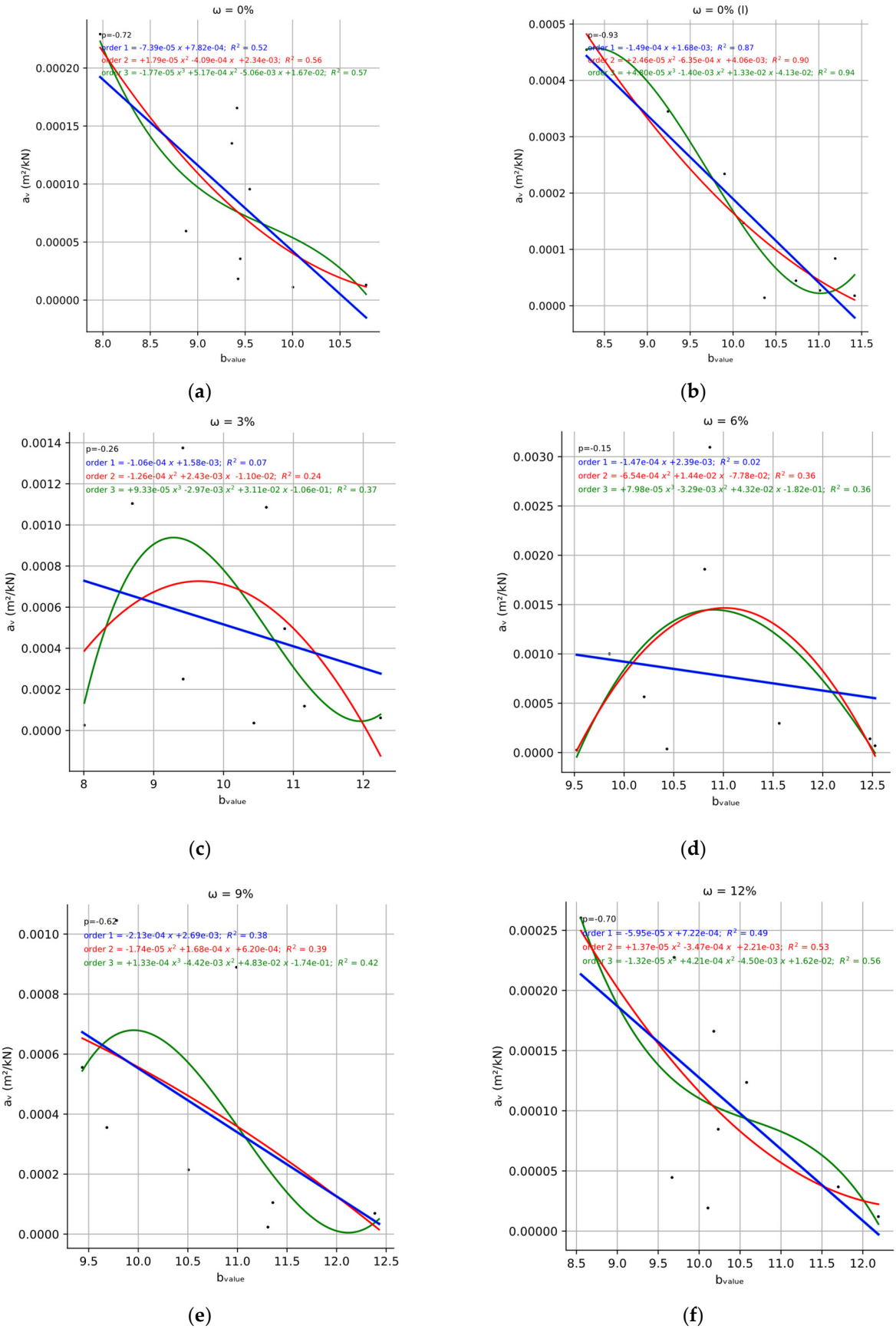


Figure S17. Regression lines for the correlation between loading stage coefficient of compressibility $a_{v,ls}$ and loading stage b value b_{ls}. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%

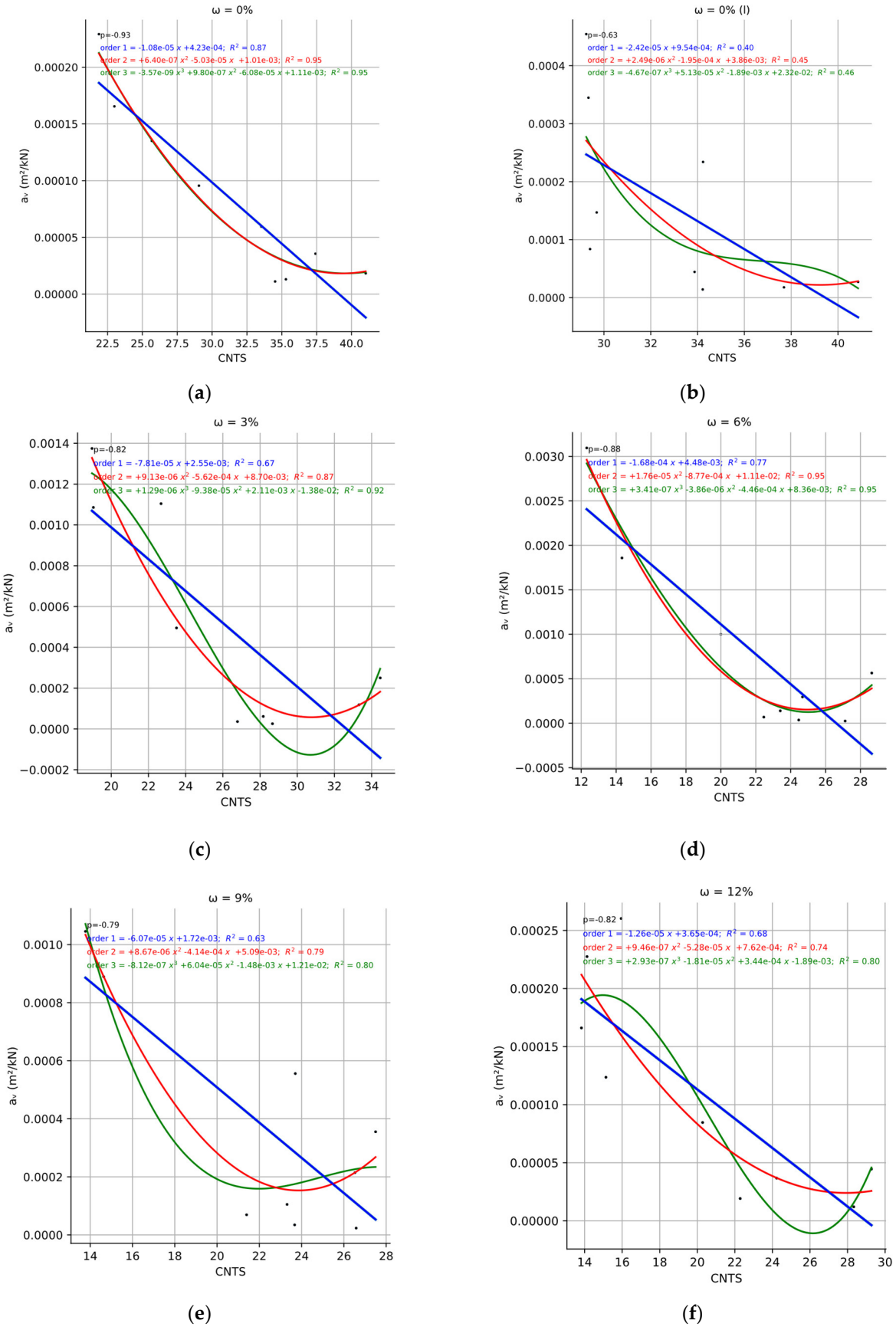


Figure S18. Regression lines for the correlation between loading stage coefficient of compressibility $a_{v,ls}$ and loading stage counts number $CNTS_{ls}$. 6 soils tested. (a) ω_c = 0%; (b) ω_c = 0% (L); (c) ω_c = 3%; (d) ω_c = 6%; (e) ω_c = 9%; (f) ω_c = 12%

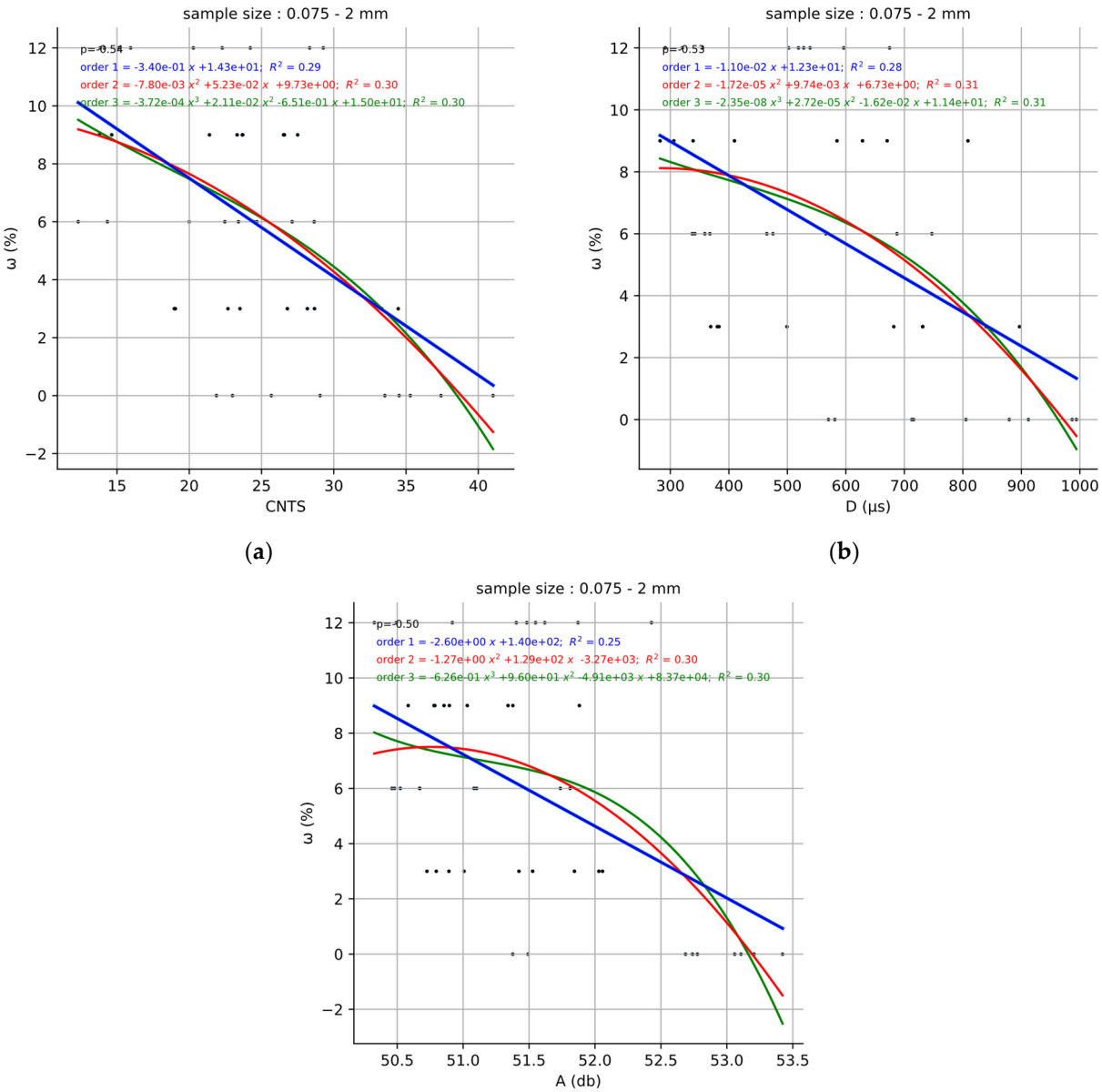
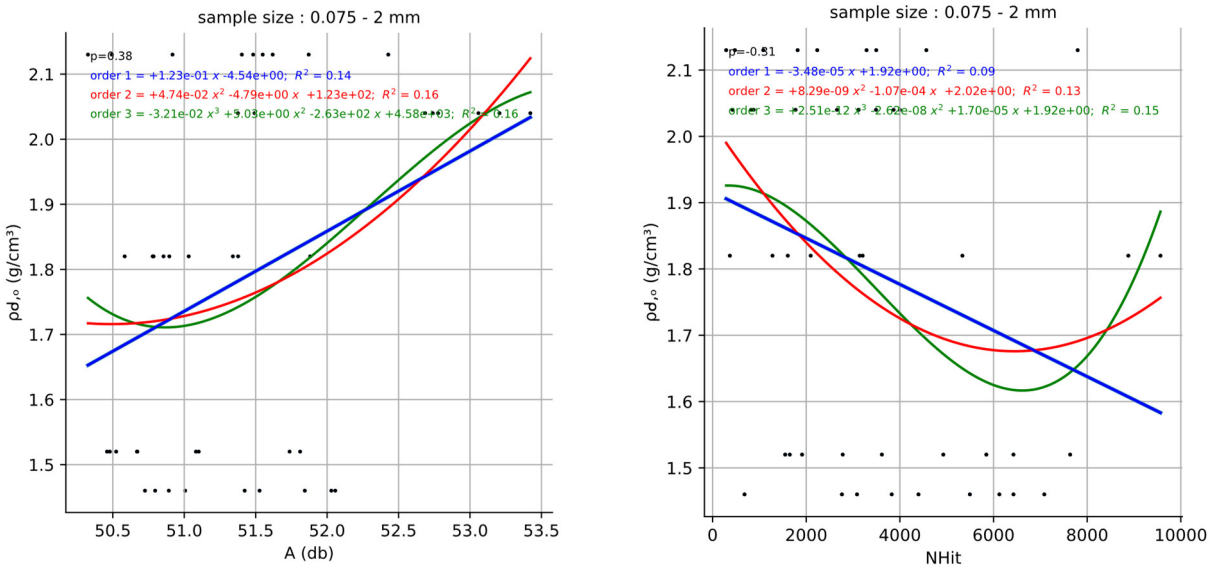
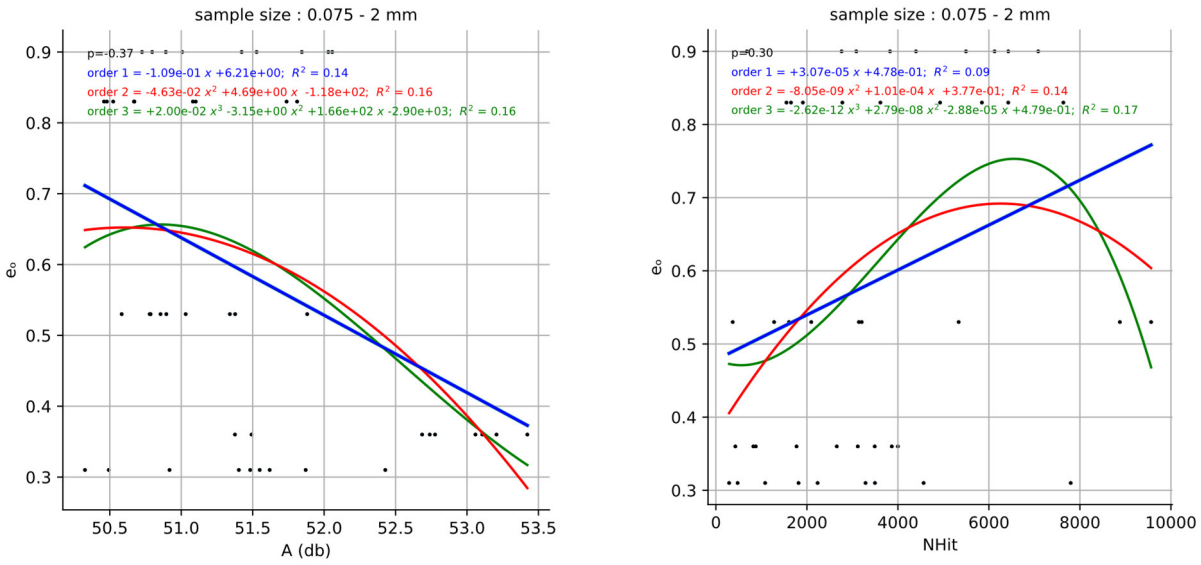


Figure S19. Regression lines for the best correlations between moisture content ω_c and monitored acoustic variables (any value of moisture content). (a) $CNTS_{ls}$; (b) D_{ls}, (c) A_{ls}.



(**a**) (**b**)

Figure S20. Regression lines for the best correlations between initial dry density $\rho_{d,0}$ and monitored acoustic variables (any value of moisture content). (a) A_{ls}. ; (b) $NHit_{ls}$.



(**a**) (**b**)

Figure S21. Regression lines for the best correlations between initial void ratio e_0 and monitored acoustic variables (any value of moisture content). (a) A_{ls}. ; (b) $NHit_{ls}$.

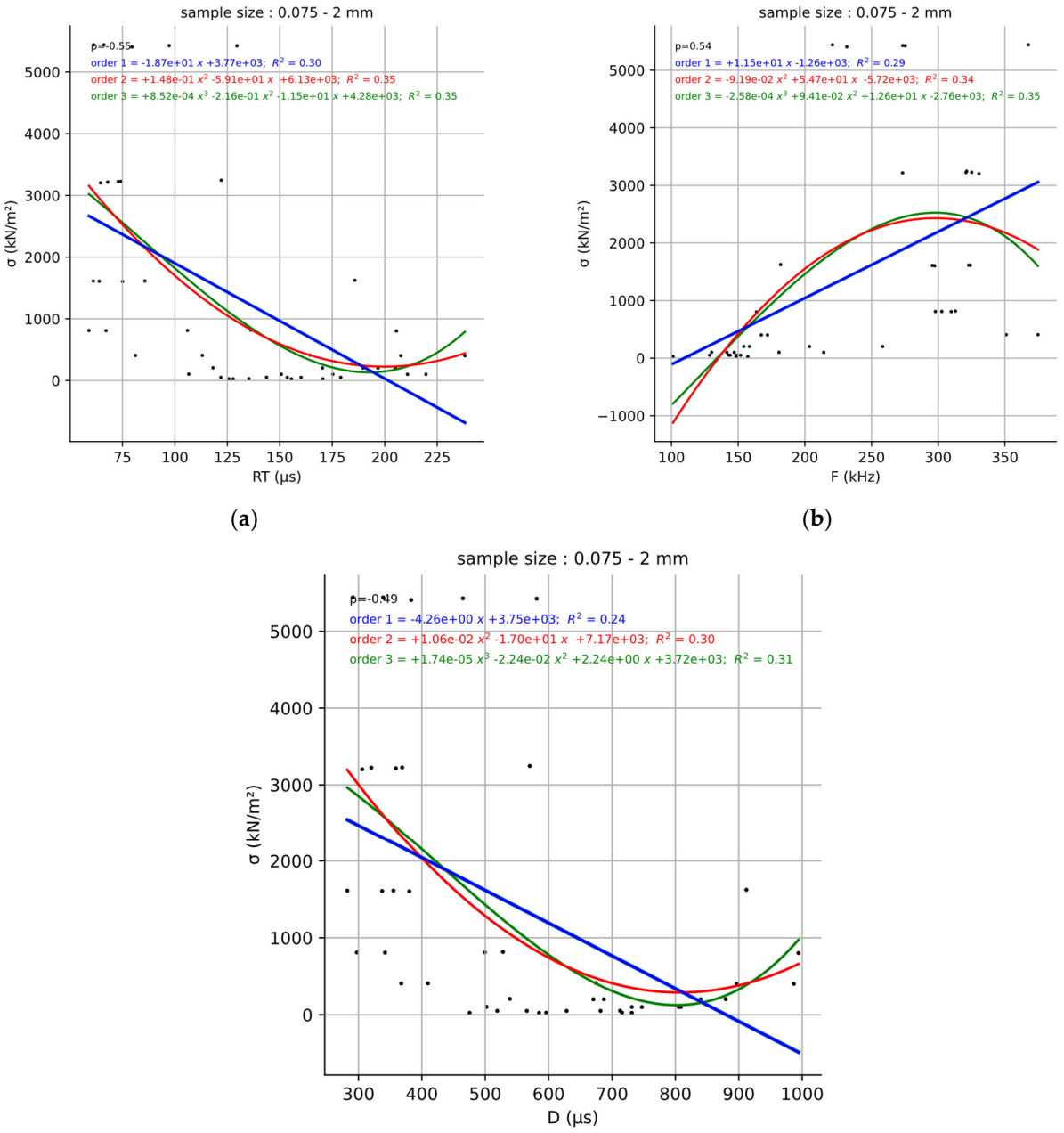
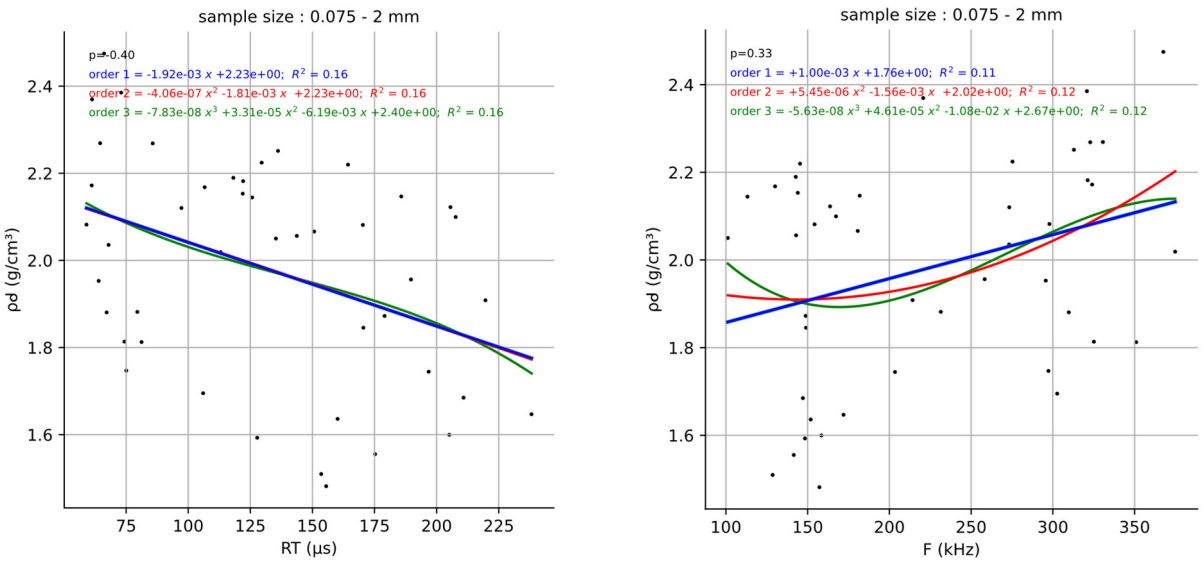
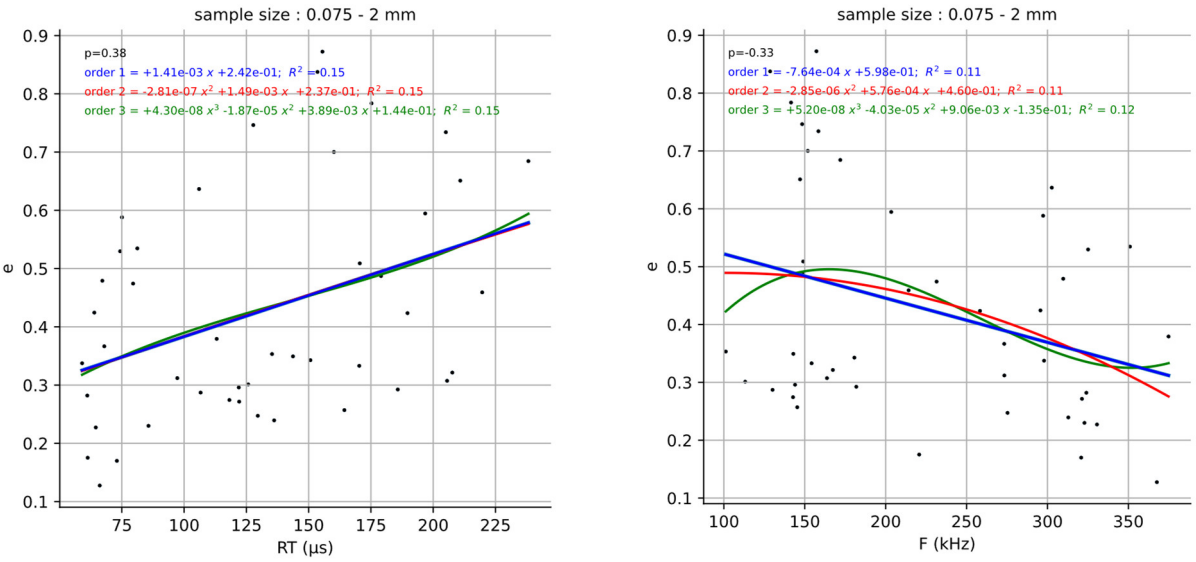


Figure S22. Regression lines for the best correlations between loading stage effective stress σ'_{ls} and monitored acoustic variables (any value of moisture content). (a) RT_{ls}; (b) F_{ls}, (c) D_{ls}.



(**a**) (**b**)

Figure S23. Regression lines for the best correlations between loading stage dry density $\rho_{d,ls}$ and monitored acoustic variables (any value of moisture content). (a) RT_{ls}; (b) F_{ls}.



(**a**) (**b**)

Figure S24. Regression lines for the best correlations between loading stage void ratio e_{ls} and monitored acoustic variables (any value of moisture content). (a) RT_{ls}; (b) F_{ls}.

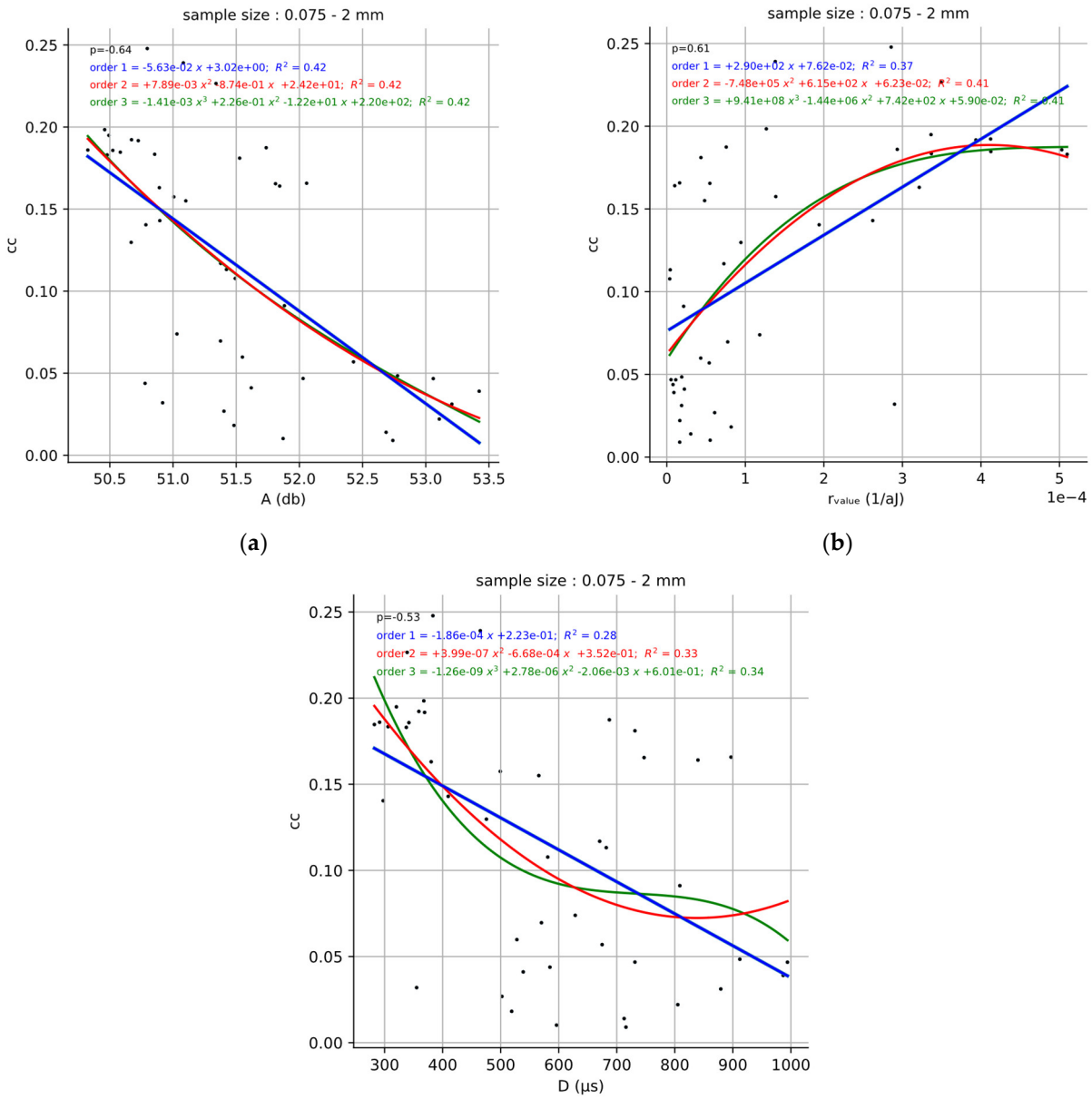


Figure S25. Regression lines for the best correlations between loading stage compression index $c_{c,ls}$ and monitored acoustic variables (any value of moisture content). (a) A_{ls}; (b) r_{ls}, (c) D_{ls}.

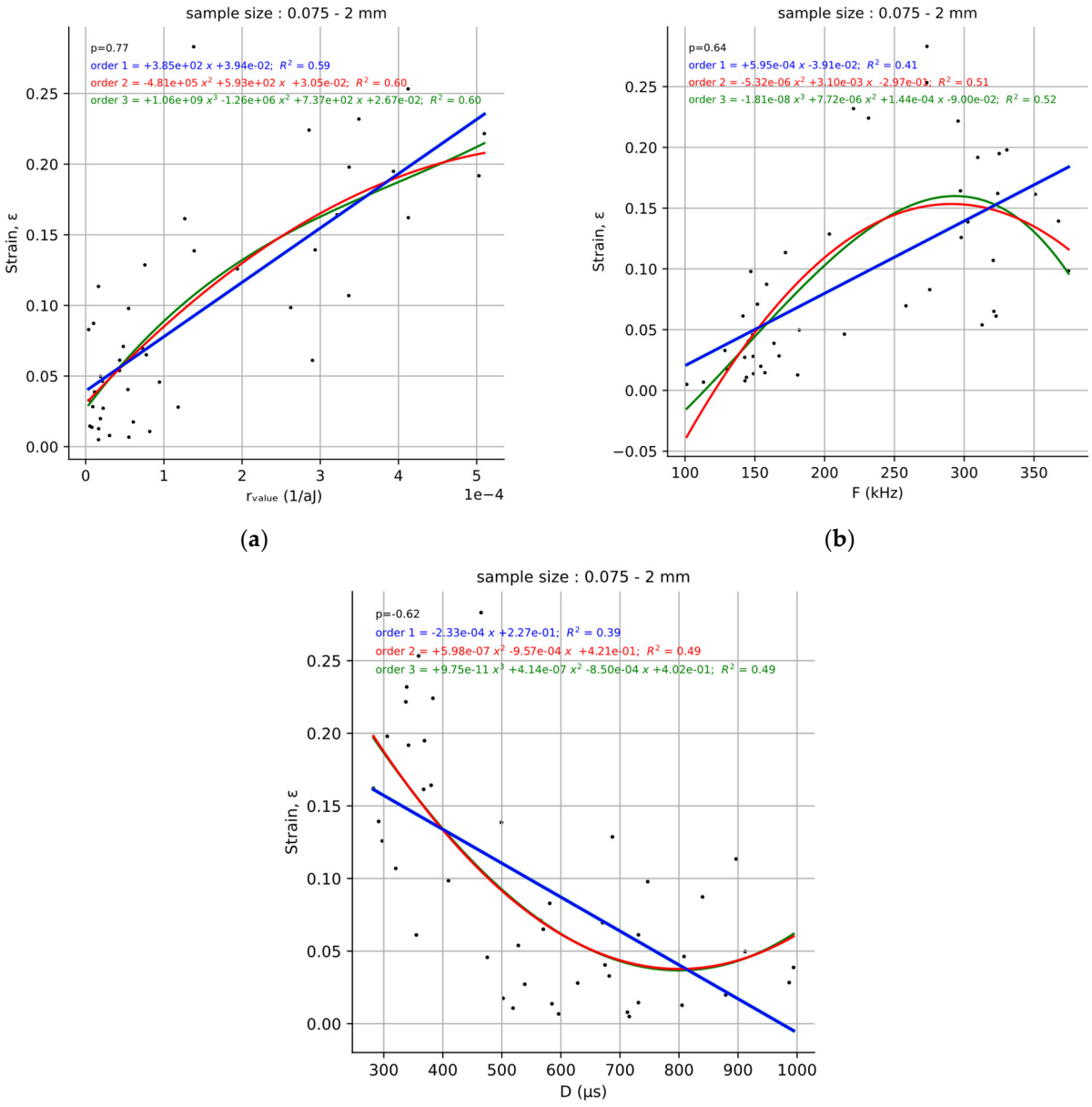


Figure S26. Regression lines for the best correlations between loading stage strain ε_{ls} and monitored acoustic variables (any value of moisture content). (a) r_{ls}; (b) F_{ls}, (c) D_{ls}.

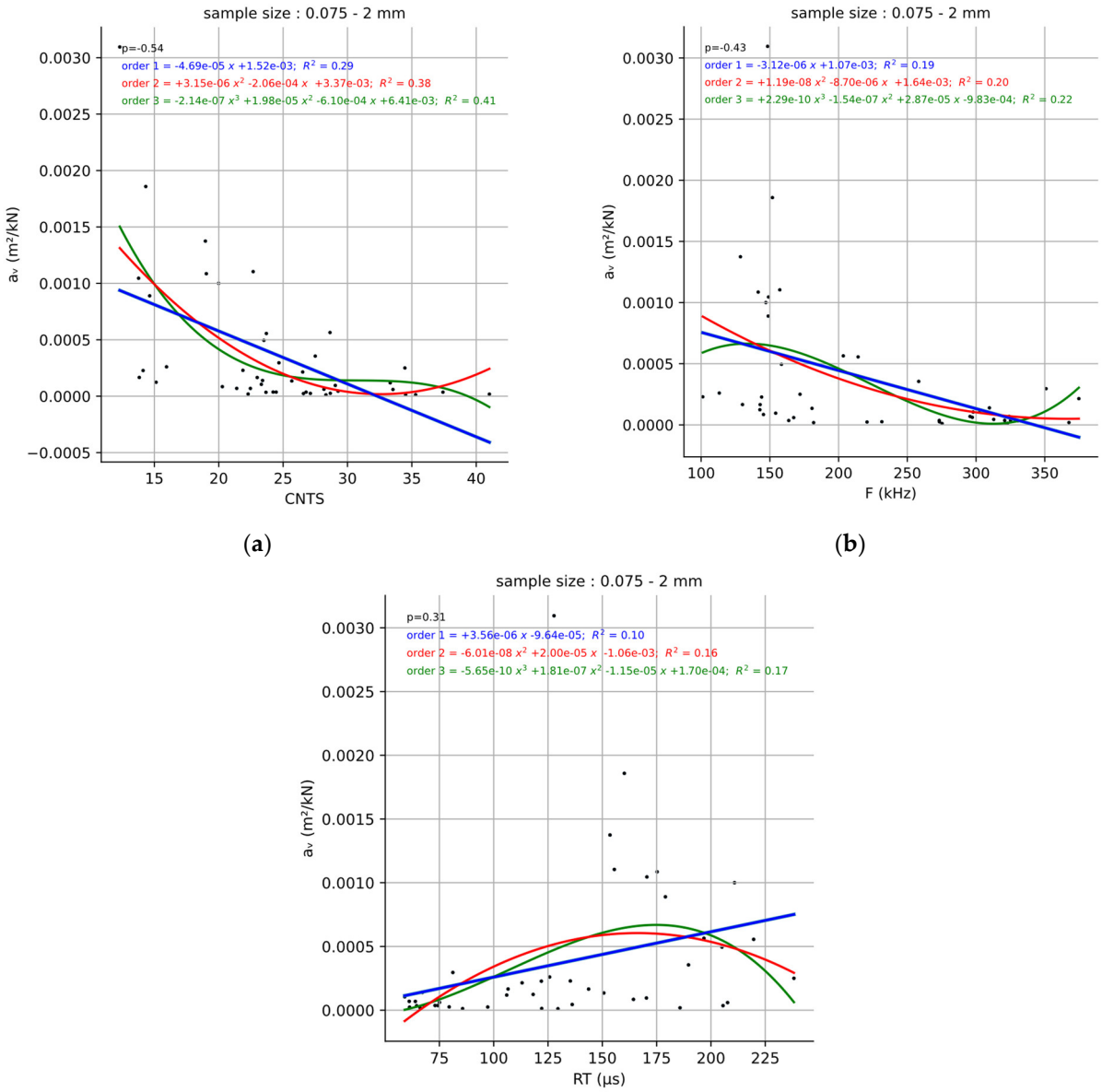


Figure S27. Regression lines for the best correlations between loading stage coefficient of compressibility $a_{v,ls}$ and monitored acoustic variables (any value of moisture content). (a) $CNTS_{ls}$; (b) F_{ls}, (c) RT_{ls}.