# Appendix A. Summary of model performance to predict various soil properties (clay content, sand content, pH, organic carbon and cation exchange capacity) using two different regression models (Partial Least Square Regression (PLSR) and Cubist) with various sampling algorithms (Random, Kennard-Stone (KS), conditioned Latin Hypercube sampling (cLHS), k-Means(KM)) and calibration sample sizes (50-3000) in the continental dataset. The results reported are averages and standard deviations from 50 repetitions.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sampling Algorithm | Calibration sample size | Soil Property | PLSR | | | | Cubist | | | |
| R2 | RMSE | bias | RPIQ | R2 | RMSE | bias | RPIQ |
| Random | 50 | clay | 0.37 ± 0.08 | 11.64 ± 1.99 | 0.09 ± 1.34 | 0.70 ± 0.09 | 0.35 ± 0.10 | 11.25 ± 1.22 | -0.41 ± 1.64 | 0.72 ± 0.08 |
| KS | 50 | clay | 0.45\* | 10.00\* | 2.72\* | 0.80\* | 0.54\* | 9.08\* | -2.18\* | 0.88\* |
| cLHS | 50 | clay | 0.39 ± 0.10 | 12.15 ± 5.23 | -0.03 ± 1.22 | 0.71 ± 0.14 | 0.37 ± 0.10 | 11.24 ± 1.28 | -0.23 ± 1.84 | 0.72 ± 0.08 |
| KM | 50 | clay | 0.39 ± 0.08 | 10.75 ± 1.18 | 0.47 ± 1.49 | 0.75 ± 0.07 | 0.37 ± 0.09 | 10.88 ± 0.92 | -0.23 ± 1.72 | 0.74 ± 0.06 |
| Random | 100 | clay | 0.50 ± 0.08 | 9.84 ± 1.36 | 0.06 ± 1.07 | 0.83 ± 0.10 | 0.48 ± 0.09 | 9.91 ± 1.25 | -0.31 ± 1.11 | 0.82 ± 0.08 |
| KS | 100 | clay | 0.56\* | 9.43\* | 3.75\* | 0.85\* | 0.48\* | 9.53\* | -1.15\* | 0.84\* |
| cLHS | 100 | clay | 0.47 ± 0.11 | 10.67 ± 3.01 | 0.15 ± 0.67 | 0.79 ± 0.14 | 0.49 ± 0.07 | 9.77 ± 0.87 | -0.26 ± 0.92 | 0.83 ± 0.07 |
| KM | 100 | clay | 0.54 ± 0.08 | 9.12 ± 1.07 | 0.41 ± 0.93 | 0.89 ± 0.09 | 0.48 ± 0.08 | 9.65 ± 0.87 | -0.39 ± 1.12 | 0.84 ± 0.07 |
| Random | 150 | clay | 0.55 ± 0.08 | 9.47 ± 1.93 | 0.18 ± 0.95 | 0.87 ± 0.12 | 0.52 ± 0.09 | 9.48 ± 1.34 | 0.00 ± 1.05 | 0.86 ± 0.11 |
| KS | 150 | clay | 0.57\* | 8.80\* | 2.12\* | 0.91\* | 0.55\* | 8.76\* | -0.88\* | 0.91\* |
| cLHS | 150 | clay | 0.55 ± 0.07 | 9.02 ± 0.95 | 0.09 ± 0.57 | 0.90 ± 0.09 | 0.52 ± 0.07 | 9.32 ± 0.86 | -0.11 ± 0.79 | 0.87 ± 0.08 |
| KM | 150 | clay | 0.59 ± 0.08 | 8.60 ± 1.45 | 0.48 ± 0.72 | 0.95 ± 0.10 | 0.54 ± 0.08 | 9.07 ± 1.02 | 0.01 ± 0.93 | 0.89 ± 0.09 |
| Random | 200 | clay | 0.60 ± 0.07 | 8.65 ± 1.21 | 0.14 ± 0.74 | 0.94 ± 0.10 | 0.57 ± 0.09 | 8.85 ± 1.17 | -0.31 ± 0.86 | 0.92 ± 0.11 |
| KS | 200 | clay | 0.59\* | 8.52\* | 1.63\* | 0.94\* | 0.58\* | 8.72\* | -2.09\* | 0.92\* |
| cLHS | 200 | clay | 0.59 ± 0.07 | 8.63 ± 1.31 | 0.09 ± 0.58 | 0.94 ± 0.10 | 0.55 ± 0.07 | 8.98 ± 0.85 | -0.13 ± 0.78 | 0.90 ± 0.08 |
| KM | 200 | clay | 0.62 ± 0.04 | 8.07 ± 0.46 | 0.35 ± 0.52 | 0.99 ± 0.05 | 0.57 ± 0.07 | 8.78 ± 0.89 | -0.19 ± 0.66 | 0.92 ± 0.09 |
| Random | 250 | clay | 0.63 ± 0.05 | 8.10 ± 0.70 | 0.16 ± 0.67 | 0.99 ± 0.08 | 0.59 ± 0.08 | 8.61 ± 0.98 | -0.26 ± 0.66 | 0.94 ± 0.10 |
| KS | 250 | clay | 0.61\* | 8.27\* | 1.59\* | 0.97\* | 0.53\* | 9.10\* | -0.85\* | 0.88\* |
| cLHS | 250 | clay | 0.62 ± 0.07 | 8.29 ± 1.21 | 0.03 ± 0.47 | 0.98 ± 0.11 | 0.59 ± 0.06 | 8.50 ± 0.77 | -0.27 ± 0.65 | 0.95 ± 0.08 |
| KM | 250 | clay | 0.64 ± 0.03 | 7.84 ± 0.34 | 0.31 ± 0.50 | 1.02 ± 0.04 | 0.58 ± 0.07 | 8.56 ± 0.81 | -0.25 ± 0.69 | 0.94 ± 0.09 |
| Random | 300 | clay | 0.63 ± 0.05 | 8.06 ± 0.80 | 0.12 ± 0.54 | 1.00 ± 0.09 | 0.60 ± 0.06 | 8.53 ± 0.88 | -0.18 ± 0.73 | 0.95 ± 0.09 |
| KS | 300 | clay | 0.63\* | 8.17\* | 1.60\* | 0.98\* | 0.51\* | 9.31\* | -0.72\* | 0.86\* |
| cLHS | 300 | clay | 0.63 ± 0.07 | 8.11 ± 1.47 | 0.18 ± 0.45 | 1.00 ± 0.10 | 0.58 ± 0.07 | 8.69 ± 1.00 | 0.04 ± 0.61 | 0.93 ± 0.10 |
| KM | 300 | clay | 0.65 ± 0.06 | 7.81 ± 1.09 | 0.23 ± 0.41 | 1.04 ± 0.08 | 0.59 ± 0.07 | 8.51 ± 0.79 | -0.26 ± 0.55 | 0.95 ± 0.09 |
| Random | 400 | clay | 0.65 ± 0.07 | 7.93 ± 1.43 | 0.14 ± 0.42 | 1.03 ± 0.11 | 0.61 ± 0.07 | 8.31 ± 0.82 | -0.18 ± 0.45 | 0.97 ± 0.09 |
| KS | 400 | clay | 0.65\* | 7.91\* | 1.33\* | 1.01\* | 0.51\* | 9.20\* | -1.40\* | 0.87\* |
| cLHS | 400 | clay | 0.66 ± 0.03 | 7.70 ± 0.45 | 0.10 ± 0.38 | 1.04 ± 0.05 | 0.61 ± 0.08 | 8.36 ± 0.93 | -0.18 ± 0.54 | 0.97 ± 0.10 |
| KM | 400 | clay | 0.67 ± 0.02 | 7.50 ± 0.30 | 0.30 ± 0.38 | 1.07 ± 0.04 | 0.60 ± 0.06 | 8.37 ± 0.63 | -0.29 ± 0.51 | 0.96 ± 0.07 |
| Random | 500 | clay | 0.67 ± 0.03 | 7.60 ± 0.49 | 0.08 ± 0.38 | 1.06 ± 0.06 | 0.61 ± 0.07 | 8.28 ± 0.86 | -0.35 ± 0.40 | 0.98 ± 0.09 |
| KS | 500 | clay | 0.66\* | 7.81\* | 1.56\* | 1.02\* | 0.61\* | 8.19\* | 0.67\* | 0.98\* |
| cLHS | 500 | clay | 0.68 ± 0.03 | 7.46 ± 0.39 | 0.11 ± 0.32 | 1.08 ± 0.05 | 0.63 ± 0.07 | 8.03 ± 0.80 | -0.31 ± 0.45 | 1.01 ± 0.10 |
| KM | 500 | clay | 0.67 ± 0.03 | 7.43 ± 0.34 | 0.23 ± 0.30 | 1.08 ± 0.04 | 0.61 ± 0.05 | 8.19 ± 0.63 | -0.23 ± 0.45 | 0.98 ± 0.08 |
| Random | 1000 | clay | 0.70 ± 0.02 | 7.14 ± 0.29 | 0.13 ± 0.20 | 1.12 ± 0.04 | 0.64 ± 0.04 | 7.87 ± 0.54 | -0.25 ± 0.32 | 1.02 ± 0.07 |
| KS | 1000 | clay | 0.70\* | 7.24\* | 0.77\* | 1.10\* | 0.63\* | 7.91\* | -0.26\* | 1.01\* |
| cLHS | 1000 | clay | 0.70 ± 0.01 | 7.09 ± 0.15 | 0.13 ± 0.20 | 1.13 ± 0.02 | 0.66 ± 0.04 | 7.66 ± 0.47 | -0.24 ± 0.31 | 1.05 ± 0.06 |
| KM | 1000 | clay | 0.70 ± 0.03 | 7.17 ± 0.34 | 0.21 ± 0.19 | 1.12 ± 0.05 | 0.64 ± 0.04 | 7.92 ± 0.54 | -0.19 ± 0.30 | 1.02 ± 0.07 |
| Random | 1500 | clay | 0.72 ± 0.01 | 6.91 ± 0.17 | 0.13 ± 0.14 | 1.16 ± 0.03 | 0.67 ± 0.04 | 7.60 ± 0.48 | -0.17 ± 0.23 | 1.06 ± 0.06 |
| KS | 1500 | clay | 0.71\* | 7.09\* | 0.78\* | 1.13\* | 0.63\* | 7.96\* | 0.43\* | 1.01\* |
| cLHS | 1500 | clay | 0.72 ± 0.01 | 6.89 ± 0.12 | 0.15 ± 0.17 | 1.16 ± 0.02 | 0.68 ± 0.03 | 7.49 ± 0.40 | -0.16 ± 0.29 | 1.07 ± 0.06 |
| KM | 1500 | clay | 0.72 ± 0.01 | 6.86 ± 0.10 | 0.17 ± 0.15 | 1.17 ± 0.02 | 0.65 ± 0.03 | 7.80 ± 0.45 | -0.09 ± 0.26 | 1.03 ± 0.06 |
| Random | 2000 | clay | 0.73 ± 0.01 | 6.80 ± 0.10 | 0.15 ± 0.11 | 1.18 ± 0.02 | 0.67 ± 0.03 | 7.53 ± 0.36 | -0.18 ± 0.21 | 1.06 ± 0.05 |
| KS | 2000 | clay | 0.72\* | 6.91\* | 0.67\* | 1.16\* | 0.73\* | 6.72\* | -0.18\* | 1.19\* |
| cLHS | 2000 | clay | 0.73 ± 0.01 | 6.81 ± 0.08 | 0.12 ± 0.11 | 1.17 ± 0.01 | 0.68 ± 0.03 | 7.40 ± 0.35 | -0.14 ± 0.21 | 1.08 ± 0.05 |
| KM | 2000 | clay | 0.73 ± 0.01 | 6.82 ± 0.09 | 0.15 ± 0.15 | 1.17 ± 0.02 | 0.65 ± 0.04 | 7.86 ± 0.60 | -0.02 ± 0.24 | 1.02 ± 0.08 |
| Random | 3000 | clay | 0.73 ± 0.00 | 6.70 ± 0.06 | 0.14 ± 0.08 | 1.19 ± 0.01 | 0.70 ± 0.02 | 7.27 ± 0.31 | -0.08 ± 0.19 | 1.10 ± 0.05 |
| KS | 3000 | clay | 0.73\* | 6.76\* | 0.60\* | 1.18\* | 0.68\* | 7.33\* | -0.15\* | 1.09\* |
| cLHS | 3000 | clay | 0.73 ± 0.00 | 6.73 ± 0.06 | 0.20 ± 0.08 | 1.19 ± 0.01 | 0.70 ± 0.03 | 7.23 ± 0.34 | -0.10 ± 0.19 | 1.11 ± 0.05 |
| KM | 3000 | clay | 0.72 ± 0.01 | 6.84 ± 0.19 | 0.13 ± 0.18 | 1.17 ± 0.03 | 0.58 ± 0.11 | 9.07 ± 1.71 | 0.06 ± 0.27 | 0.91 ± 0.16 |
| Random | 50 | sand | 0.23 ± 0.07 | 24.84 ± 3.46 | -0.01 ± 3.41 | 0.98 ± 0.10 | 0.19 ± 0.08 | 25.89 ± 2.43 | 0.62 ± 4.06 | 0.93 ± 0.08 |
| KS | 50 | sand | 0.26\* | 23.35\* | 4.78\* | 1.03\* | 0.18\* | 23.87\* | 3.55\* | 1.01\* |
| cLHS | 50 | sand | 0.26 ± 0.07 | 23.28 ± 1.26 | 0.52 ± 2.93 | 1.03 ± 0.06 | 0.20 ± 0.08 | 25.64 ± 2.55 | 0.47 ± 4.24 | 0.94 ± 0.09 |
| KM | 50 | sand | 0.25 ± 0.07 | 23.32 ± 1.50 | 0.55 ± 3.46 | 1.03 ± 0.06 | 0.20 ± 0.08 | 25.24 ± 2.02 | 1.12 ± 4.87 | 0.96 ± 0.07 |
| Random | 100 | sand | 0.33 ± 0.06 | 22.39 ± 3.52 | 0.15 ± 2.10 | 1.09 ± 0.10 | 0.27 ± 0.08 | 23.67 ± 1.80 | 0.89 ± 3.11 | 1.02 ± 0.08 |
| KS | 100 | sand | 0.36\* | 22.04\* | -2.20\* | 1.09\* | 0.30\* | 21.93\* | -0.86\* | 1.09\* |
| cLHS | 100 | sand | 0.33 ± 0.05 | 21.87 ± 2.26 | 0.76 ± 1.64 | 1.11 ± 0.08 | 0.29 ± 0.06 | 22.87 ± 1.42 | 0.97 ± 2.28 | 1.05 ± 0.06 |
| KM | 100 | sand | 0.32 ± 0.06 | 22.07 ± 2.24 | -0.14 ± 2.44 | 1.09 ± 0.08 | 0.29 ± 0.06 | 23.13 ± 1.54 | 0.56 ± 3.32 | 1.04 ± 0.07 |
| Random | 150 | sand | 0.35 ± 0.07 | 22.41 ± 5.69 | -0.06 ± 1.90 | 1.10 ± 0.14 | 0.33 ± 0.06 | 22.15 ± 1.13 | 0.21 ± 2.34 | 1.09 ± 0.06 |
| KS | 150 | sand | 0.35\* | 21.52\* | 1.75\* | 1.12\* | 0.35\* | 21.66\* | 4.37\* | 1.11\* |
| cLHS | 150 | sand | 0.37 ± 0.05 | 21.53 ± 3.87 | -0.03 ± 1.83 | 1.13 ± 0.10 | 0.33 ± 0.05 | 22.21 ± 1.10 | 0.23 ± 2.17 | 1.08 ± 0.05 |
| KM | 150 | sand | 0.38 ± 0.04 | 20.73 ± 0.70 | -0.35 ± 1.55 | 1.16 ± 0.04 | 0.34 ± 0.04 | 21.85 ± 1.06 | -0.16 ± 2.32 | 1.10 ± 0.05 |
| Random | 200 | sand | 0.37 ± 0.05 | 21.41 ± 2.59 | 0.04 ± 1.62 | 1.13 ± 0.09 | 0.36 ± 0.05 | 21.56 ± 1.25 | 0.01 ± 2.26 | 1.12 ± 0.06 |
| KS | 200 | sand | 0.38\* | 21.35\* | 2.52\* | 1.12\* | 0.37\* | 21.35\* | 2.97\* | 1.12\* |
| cLHS | 200 | sand | 0.35 ± 0.09 | 23.35 ± 8.82 | 0.12 ± 1.73 | 1.09 ± 0.18 | 0.36 ± 0.06 | 21.69 ± 1.38 | 0.08 ± 2.26 | 1.11 ± 0.07 |
| KM | 200 | sand | 0.40 ± 0.03 | 20.35 ± 0.58 | -0.16 ± 1.47 | 1.18 ± 0.03 | 0.37 ± 0.06 | 21.21 ± 1.28 | 0.76 ± 1.87 | 1.14 ± 0.06 |
| Random | 250 | sand | 0.38 ± 0.07 | 21.54 ± 3.68 | 0.10 ± 1.51 | 1.13 ± 0.13 | 0.37 ± 0.04 | 21.30 ± 0.90 | 0.26 ± 1.98 | 1.13 ± 0.05 |
| KS | 250 | sand | 0.41\* | 20.68\* | 1.77\* | 1.16\* | 0.34\* | 21.29\* | 0.24\* | 1.13\* |
| cLHS | 250 | sand | 0.38 ± 0.06 | 21.45 ± 2.77 | -0.04 ± 1.48 | 1.13 ± 0.11 | 0.38 ± 0.06 | 21.21 ± 1.28 | 0.32 ± 1.89 | 1.14 ± 0.07 |
| KM | 250 | sand | 0.41 ± 0.03 | 20.11 ± 0.53 | -0.19 ± 1.25 | 1.19 ± 0.03 | 0.40 ± 0.05 | 20.62 ± 0.99 | 0.09 ± 1.70 | 1.17 ± 0.06 |
| Random | 300 | sand | 0.37 ± 0.09 | 22.33 ± 4.45 | 0.35 ± 1.39 | 1.11 ± 0.16 | 0.40 ± 0.05 | 20.77 ± 0.98 | 0.45 ± 1.58 | 1.16 ± 0.05 |
| KS | 300 | sand | 0.43\* | 20.34\* | 0.06\* | 1.18\* | 0.33\* | 21.76\* | 2.71\* | 1.10\* |
| cLHS | 300 | sand | 0.39 ± 0.07 | 21.72 ± 5.28 | 0.18 ± 0.91 | 1.14 ± 0.14 | 0.41 ± 0.05 | 20.54 ± 1.06 | 0.24 ± 1.36 | 1.17 ± 0.06 |
| KM | 300 | sand | 0.42 ± 0.04 | 20.07 ± 1.33 | -0.20 ± 1.27 | 1.20 ± 0.06 | 0.40 ± 0.05 | 20.65 ± 1.15 | 0.47 ± 1.94 | 1.17 ± 0.06 |
| Random | 400 | sand | 0.39 ± 0.09 | 21.86 ± 4.69 | 0.26 ± 1.09 | 1.13 ± 0.16 | 0.41 ± 0.05 | 20.61 ± 1.20 | 0.13 ± 1.45 | 1.17 ± 0.07 |
| KS | 400 | sand | 0.46\* | 19.41\* | -1.27\* | 1.24\* | 0.38\* | 20.54\* | 1.23\* | 1.17\* |
| cLHS | 400 | sand | 0.43 ± 0.04 | 20.04 ± 1.10 | 0.20 ± 1.02 | 1.20 ± 0.06 | 0.41 ± 0.05 | 20.58 ± 1.18 | 0.52 ± 1.27 | 1.17 ± 0.07 |
| KM | 400 | sand | 0.44 ± 0.02 | 19.57 ± 0.44 | -0.35 ± 0.98 | 1.23 ± 0.03 | 0.41 ± 0.04 | 20.30 ± 0.87 | 0.17 ± 1.21 | 1.18 ± 0.05 |
| Random | 500 | sand | 0.41 ± 0.10 | 21.41 ± 4.58 | 0.47 ± 1.04 | 1.16 ± 0.17 | 0.41 ± 0.06 | 20.64 ± 1.14 | 0.10 ± 1.28 | 1.17 ± 0.06 |
| KS | 500 | sand | 0.45\* | 20.29\* | -1.36\* | 1.18\* | 0.26\* | 22.57\* | -2.01\* | 1.06\* |
| cLHS | 500 | sand | 0.44 ± 0.09 | 20.61 ± 5.02 | 0.15 ± 1.02 | 1.20 ± 0.16 | 0.41 ± 0.04 | 20.68 ± 0.92 | 0.27 ± 1.56 | 1.16 ± 0.05 |
| KM | 500 | sand | 0.46 ± 0.02 | 19.18 ± 0.43 | -0.28 ± 0.92 | 1.25 ± 0.03 | 0.41 ± 0.05 | 20.40 ± 1.08 | 0.19 ± 1.14 | 1.18 ± 0.06 |
| Random | 1000 | sand | 0.50 ± 0.02 | 18.59 ± 0.42 | 0.13 ± 0.62 | 1.29 ± 0.03 | 0.46 ± 0.04 | 19.70 ± 0.80 | 0.20 ± 0.87 | 1.22 ± 0.05 |
| KS | 1000 | sand | 0.49\* | 18.85\* | -0.56\* | 1.27\* | 0.35\* | 21.21\* | 1.58\* | 1.13\* |
| cLHS | 1000 | sand | 0.50 ± 0.01 | 18.50 ± 0.27 | 0.08 ± 0.52 | 1.30 ± 0.02 | 0.46 ± 0.04 | 19.49 ± 0.74 | 0.28 ± 0.80 | 1.23 ± 0.05 |
| KM | 1000 | sand | 0.50 ± 0.03 | 18.50 ± 0.78 | -0.26 ± 0.52 | 1.30 ± 0.05 | 0.46 ± 0.04 | 19.62 ± 0.84 | 0.11 ± 0.71 | 1.23 ± 0.05 |
| Random | 1500 | sand | 0.51 ± 0.01 | 18.21 ± 0.26 | 0.09 ± 0.43 | 1.32 ± 0.02 | 0.49 ± 0.04 | 19.10 ± 0.75 | 0.06 ± 0.55 | 1.26 ± 0.05 |
| KS | 1500 | sand | 0.51\* | 18.42\* | -0.19\* | 1.30\* | 0.41\* | 20.51\* | -0.64\* | 1.17\* |
| cLHS | 1500 | sand | 0.52 ± 0.01 | 18.13 ± 0.17 | -0.10 ± 0.41 | 1.32 ± 0.01 | 0.49 ± 0.03 | 19.11 ± 0.63 | -0.09 ± 0.60 | 1.26 ± 0.04 |
| KM | 1500 | sand | 0.51 ± 0.01 | 18.24 ± 0.33 | -0.03 ± 0.40 | 1.32 ± 0.02 | 0.47 ± 0.04 | 19.59 ± 0.83 | 0.20 ± 0.83 | 1.23 ± 0.05 |
| Random | 2000 | sand | 0.52 ± 0.01 | 18.03 ± 0.17 | 0.01 ± 0.31 | 1.33 ± 0.01 | 0.50 ± 0.03 | 18.71 ± 0.61 | 0.15 ± 0.65 | 1.28 ± 0.04 |
| KS | 2000 | sand | 0.52\* | 18.16\* | -0.20\* | 1.32\* | 0.41\* | 20.06\* | -0.89\* | 1.20\* |
| cLHS | 2000 | sand | 0.52 ± 0.01 | 18.01 ± 0.16 | -0.04 ± 0.29 | 1.33 ± 0.01 | 0.51 ± 0.03 | 18.70 ± 0.70 | -0.02 ± 0.60 | 1.29 ± 0.05 |
| KM | 2000 | sand | 0.51 ± 0.01 | 18.20 ± 0.29 | 0.04 ± 0.47 | 1.32 ± 0.02 | 0.47 ± 0.04 | 19.67 ± 0.87 | 0.25 ± 0.66 | 1.22 ± 0.05 |
| Random | 3000 | sand | 0.53 ± 0.00 | 17.86 ± 0.10 | -0.04 ± 0.23 | 1.34 ± 0.01 | 0.52 ± 0.03 | 18.44 ± 0.61 | 0.19 ± 0.46 | 1.30 ± 0.04 |
| KS | 3000 | sand | 0.53\* | 17.87\* | -0.69\* | 1.34\* | 0.54\* | 17.79\* | 0.19\* | 1.35\* |
| cLHS | 3000 | sand | 0.53 ± 0.00 | 17.85 ± 0.07 | -0.20 ± 0.22 | 1.34 ± 0.00 | 0.52 ± 0.02 | 18.38 ± 0.42 | 0.06 ± 0.57 | 1.31 ± 0.03 |
| KM | 3000 | sand | 0.52 ± 0.02 | 18.19 ± 0.49 | 0.05 ± 0.73 | 1.32 ± 0.03 | 0.41 ± 0.08 | 22.07 ± 2.71 | 0.75 ± 0.90 | 1.10 ± 0.13 |
| Random | 50 | pH.in.CaCl2 | 0.49 ± 0.09 | 1.12 ± 0.43 | 0.02 ± 0.14 | 1.10 ± 0.19 | 0.36 ± 0.12 | 1.18 ± 0.15 | 0.06 ± 0.22 | 1.00 ± 0.13 |
| KS | 50 | pH.in.CaCl2 | 0.56\* | 0.95\* | -0.19\* | 1.22\* | 0.37\* | 1.08\* | -0.27\* | 1.07\* |
| cLHS | 50 | pH.in.CaCl2 | 0.52 ± 0.10 | 1.06 ± 0.32 | 0.04 ± 0.11 | 1.15 ± 0.21 | 0.41 ± 0.10 | 1.09 ± 0.14 | 0.10 ± 0.19 | 1.07 ± 0.12 |
| KM | 50 | pH.in.CaCl2 | 0.53 ± 0.08 | 0.93 ± 0.08 | 0.07 ± 0.10 | 1.25 ± 0.10 | 0.40 ± 0.11 | 1.08 ± 0.13 | 0.08 ± 0.15 | 1.09 ± 0.13 |
| Random | 100 | pH.in.CaCl2 | 0.56 ± 0.09 | 0.98 ± 0.22 | 0.00 ± 0.09 | 1.23 ± 0.20 | 0.55 ± 0.08 | 0.93 ± 0.10 | 0.06 ± 0.10 | 1.25 ± 0.13 |
| KS | 100 | pH.in.CaCl2 | 0.54\* | 0.96\* | -0.08\* | 1.20\* | 0.21\* | 1.32\* | -0.04\* | 0.88\* |
| cLHS | 100 | pH.in.CaCl2 | 0.58 ± 0.08 | 0.93 ± 0.18 | 0.03 ± 0.08 | 1.28 ± 0.19 | 0.57 ± 0.05 | 0.90 ± 0.06 | 0.05 ± 0.11 | 1.29 ± 0.09 |
| KM | 100 | pH.in.CaCl2 | 0.62 ± 0.05 | 0.84 ± 0.12 | 0.03 ± 0.09 | 1.39 ± 0.11 | 0.54 ± 0.08 | 0.92 ± 0.09 | 0.03 ± 0.12 | 1.27 ± 0.12 |
| Random | 150 | pH.in.CaCl2 | 0.60 ± 0.12 | 0.97 ± 0.37 | 0.01 ± 0.07 | 1.29 ± 0.28 | 0.62 ± 0.07 | 0.85 ± 0.10 | 0.06 ± 0.09 | 1.38 ± 0.15 |
| KS | 150 | pH.in.CaCl2 | 0.70\* | 0.74\* | -0.15\* | 1.56\* | 0.56\* | 0.93\* | -0.30\* | 1.24\* |
| cLHS | 150 | pH.in.CaCl2 | 0.61 ± 0.11 | 0.93 ± 0.31 | 0.01 ± 0.06 | 1.32 ± 0.26 | 0.63 ± 0.07 | 0.83 ± 0.07 | 0.03 ± 0.09 | 1.40 ± 0.11 |
| KM | 150 | pH.in.CaCl2 | 0.65 ± 0.05 | 0.80 ± 0.09 | 0.04 ± 0.07 | 1.46 ± 0.12 | 0.62 ± 0.07 | 0.83 ± 0.09 | 0.04 ± 0.10 | 1.41 ± 0.14 |
| Random | 200 | pH.in.CaCl2 | 0.63 ± 0.13 | 0.91 ± 0.33 | 0.01 ± 0.05 | 1.38 ± 0.30 | 0.65 ± 0.06 | 0.80 ± 0.08 | 0.04 ± 0.07 | 1.45 ± 0.13 |
| KS | 200 | pH.in.CaCl2 | 0.72\* | 0.72\* | -0.12\* | 1.60\* | 0.53\* | 0.94\* | -0.24\* | 1.23\* |
| cLHS | 200 | pH.in.CaCl2 | 0.65 ± 0.09 | 0.83 ± 0.17 | 0.02 ± 0.05 | 1.43 ± 0.22 | 0.65 ± 0.06 | 0.80 ± 0.07 | 0.04 ± 0.07 | 1.47 ± 0.13 |
| KM | 200 | pH.in.CaCl2 | 0.70 ± 0.04 | 0.74 ± 0.05 | 0.03 ± 0.05 | 1.57 ± 0.10 | 0.66 ± 0.07 | 0.79 ± 0.08 | 0.05 ± 0.07 | 1.49 ± 0.14 |
| Random | 250 | pH.in.CaCl2 | 0.67 ± 0.09 | 0.82 ± 0.18 | 0.01 ± 0.05 | 1.48 ± 0.26 | 0.69 ± 0.06 | 0.76 ± 0.07 | 0.05 ± 0.06 | 1.54 ± 0.14 |
| KS | 250 | pH.in.CaCl2 | 0.72\* | 0.74\* | -0.09\* | 1.57\* | 0.63\* | 0.81\* | -0.02\* | 1.43\* |
| cLHS | 250 | pH.in.CaCl2 | 0.67 ± 0.11 | 0.84 ± 0.27 | 0.02 ± 0.05 | 1.47 ± 0.29 | 0.69 ± 0.05 | 0.76 ± 0.07 | 0.04 ± 0.05 | 1.54 ± 0.14 |
| KM | 250 | pH.in.CaCl2 | 0.71 ± 0.05 | 0.72 ± 0.06 | 0.03 ± 0.03 | 1.62 ± 0.14 | 0.70 ± 0.06 | 0.73 ± 0.07 | 0.05 ± 0.04 | 1.59 ± 0.15 |
| Random | 300 | pH.in.CaCl2 | 0.68 ± 0.09 | 0.79 ± 0.17 | 0.02 ± 0.04 | 1.52 ± 0.25 | 0.71 ± 0.05 | 0.73 ± 0.07 | 0.04 ± 0.04 | 1.61 ± 0.13 |
| KS | 300 | pH.in.CaCl2 | 0.70\* | 0.75\* | -0.02\* | 1.55\* | 0.66\* | 0.78\* | -0.07\* | 1.48\* |
| cLHS | 300 | pH.in.CaCl2 | 0.69 ± 0.11 | 0.79 ± 0.27 | 0.02 ± 0.04 | 1.55 ± 0.28 | 0.70 ± 0.06 | 0.73 ± 0.07 | 0.05 ± 0.06 | 1.60 ± 0.15 |
| KM | 300 | pH.in.CaCl2 | 0.71 ± 0.07 | 0.73 ± 0.14 | 0.04 ± 0.04 | 1.63 ± 0.22 | 0.69 ± 0.07 | 0.74 ± 0.08 | 0.05 ± 0.05 | 1.57 ± 0.17 |
| Random | 400 | pH.in.CaCl2 | 0.72 ± 0.08 | 0.73 ± 0.16 | 0.02 ± 0.04 | 1.64 ± 0.24 | 0.72 ± 0.05 | 0.71 ± 0.07 | 0.04 ± 0.05 | 1.64 ± 0.16 |
| KS | 400 | pH.in.CaCl2 | 0.76\* | 0.67\* | -0.03\* | 1.72\* | 0.73\* | 0.69\* | -0.02\* | 1.67\* |
| cLHS | 400 | pH.in.CaCl2 | 0.72 ± 0.10 | 0.74 ± 0.27 | 0.02 ± 0.03 | 1.65 ± 0.28 | 0.73 ± 0.06 | 0.69 ± 0.08 | 0.04 ± 0.04 | 1.69 ± 0.17 |
| KM | 400 | pH.in.CaCl2 | 0.75 ± 0.04 | 0.67 ± 0.05 | 0.02 ± 0.03 | 1.75 ± 0.13 | 0.72 ± 0.06 | 0.70 ± 0.08 | 0.03 ± 0.04 | 1.66 ± 0.18 |
| Random | 500 | pH.in.CaCl2 | 0.74 ± 0.07 | 0.70 ± 0.12 | 0.02 ± 0.04 | 1.69 ± 0.22 | 0.73 ± 0.04 | 0.70 ± 0.06 | 0.04 ± 0.04 | 1.68 ± 0.15 |
| KS | 500 | pH.in.CaCl2 | 0.76\* | 0.67\* | -0.03\* | 1.74\* | 0.71\* | 0.72\* | -0.04\* | 1.61\* |
| cLHS | 500 | pH.in.CaCl2 | 0.75 ± 0.07 | 0.68 ± 0.12 | 0.01 ± 0.03 | 1.73 ± 0.21 | 0.74 ± 0.05 | 0.68 ± 0.07 | 0.03 ± 0.04 | 1.72 ± 0.17 |
| KM | 500 | pH.in.CaCl2 | 0.76 ± 0.04 | 0.65 ± 0.05 | 0.02 ± 0.03 | 1.79 ± 0.13 | 0.73 ± 0.06 | 0.69 ± 0.08 | 0.04 ± 0.04 | 1.70 ± 0.18 |
| Random | 1000 | pH.in.CaCl2 | 0.78 ± 0.05 | 0.62 ± 0.10 | 0.02 ± 0.02 | 1.88 ± 0.17 | 0.77 ± 0.04 | 0.64 ± 0.06 | 0.04 ± 0.03 | 1.82 ± 0.16 |
| KS | 1000 | pH.in.CaCl2 | 0.79\* | 0.63\* | 0.00\* | 1.85\* | 0.83\* | 0.55\* | -0.01\* | 2.12\* |
| cLHS | 1000 | pH.in.CaCl2 | 0.78 ± 0.04 | 0.62 ± 0.05 | 0.02 ± 0.02 | 1.89 ± 0.13 | 0.78 ± 0.04 | 0.63 ± 0.05 | 0.04 ± 0.03 | 1.86 ± 0.17 |
| KM | 1000 | pH.in.CaCl2 | 0.79 ± 0.03 | 0.61 ± 0.04 | 0.02 ± 0.02 | 1.89 ± 0.10 | 0.77 ± 0.04 | 0.64 ± 0.06 | 0.04 ± 0.02 | 1.83 ± 0.17 |
| Random | 1500 | pH.in.CaCl2 | 0.80 ± 0.02 | 0.59 ± 0.02 | 0.02 ± 0.01 | 1.97 ± 0.07 | 0.79 ± 0.03 | 0.61 ± 0.05 | 0.04 ± 0.02 | 1.92 ± 0.16 |
| KS | 1500 | pH.in.CaCl2 | 0.80\* | 0.61\* | 0.01\* | 1.90\* | 0.76\* | 0.65\* | -0.03\* | 1.79\* |
| cLHS | 1500 | pH.in.CaCl2 | 0.81 ± 0.01 | 0.58 ± 0.01 | 0.02 ± 0.01 | 1.98 ± 0.03 | 0.80 ± 0.03 | 0.59 ± 0.04 | 0.04 ± 0.02 | 1.96 ± 0.14 |
| KM | 1500 | pH.in.CaCl2 | 0.80 ± 0.02 | 0.59 ± 0.02 | 0.02 ± 0.01 | 1.97 ± 0.06 | 0.79 ± 0.02 | 0.62 ± 0.04 | 0.03 ± 0.03 | 1.88 ± 0.12 |
| Random | 2000 | pH.in.CaCl2 | 0.81 ± 0.01 | 0.58 ± 0.01 | 0.02 ± 0.01 | 2.00 ± 0.03 | 0.81 ± 0.02 | 0.57 ± 0.03 | 0.04 ± 0.02 | 2.02 ± 0.12 |
| KS | 2000 | pH.in.CaCl2 | 0.80\* | 0.60\* | 0.02\* | 1.94\* | 0.80\* | 0.60\* | 0.04\* | 1.94\* |
| cLHS | 2000 | pH.in.CaCl2 | 0.81 ± 0.01 | 0.58 ± 0.01 | 0.02 ± 0.01 | 2.00 ± 0.03 | 0.81 ± 0.03 | 0.58 ± 0.04 | 0.04 ± 0.02 | 2.02 ± 0.15 |
| KM | 2000 | pH.in.CaCl2 | 0.81 ± 0.01 | 0.58 ± 0.01 | 0.02 ± 0.01 | 1.99 ± 0.04 | 0.79 ± 0.04 | 0.61 ± 0.06 | 0.04 ± 0.02 | 1.90 ± 0.17 |
| Random | 3000 | pH.in.CaCl2 | 0.81 ± 0.00 | 0.57 ± 0.00 | 0.02 ± 0.01 | 2.03 ± 0.02 | 0.83 ± 0.02 | 0.55 ± 0.04 | 0.03 ± 0.02 | 2.10 ± 0.15 |
| KS | 3000 | pH.in.CaCl2 | 0.80\* | 0.59\* | 0.02\* | 1.98\* | 0.84\* | 0.53\* | -0.01\* | 2.18\* |
| cLHS | 3000 | pH.in.CaCl2 | 0.81 ± 0.00 | 0.58 ± 0.01 | 0.02 ± 0.01 | 2.01 ± 0.02 | 0.83 ± 0.02 | 0.55 ± 0.04 | 0.03 ± 0.02 | 2.10 ± 0.14 |
| KM | 3000 | pH.in.CaCl2 | 0.81 ± 0.01 | 0.58 ± 0.02 | 0.02 ± 0.01 | 1.99 ± 0.06 | 0.73 ± 0.10 | 0.71 ± 0.15 | 0.03 ± 0.02 | 1.69 ± 0.31 |
| Random | 50 | Organic Carbon | 0.29 ± 0.07 | 17.50 ± 2.22 | -0.67 ± 2.03 | 0.43 ± 0.05 | 0.24 ± 0.11 | 18.54 ± 3.25 | -2.28 ± 2.90 | 0.41 ± 0.05 |
| KS | 50 | Organic Carbon | 0.35\* | 16.39\* | 5.96\* | 0.45\* | 0.19\* | 17.61\* | 5.10\* | 0.42\* |
| cLHS | 50 | Organic Carbon | 0.29 ± 0.07 | 17.34 ± 4.43 | -0.46 ± 1.84 | 0.44 ± 0.06 | 0.24 ± 0.08 | 18.34 ± 2.44 | -1.81 ± 2.77 | 0.41 ± 0.05 |
| KM | 50 | Organic Carbon | 0.29 ± 0.08 | 16.38 ± 1.37 | -0.21 ± 2.04 | 0.45 ± 0.03 | 0.22 ± 0.08 | 18.00 ± 2.01 | -1.68 ± 2.65 | 0.42 ± 0.04 |
| Random | 100 | Organic Carbon | 0.39 ± 0.06 | 15.64 ± 1.56 | 0.21 ± 1.39 | 0.48 ± 0.04 | 0.31 ± 0.09 | 16.90 ± 2.19 | -1.07 ± 1.98 | 0.44 ± 0.05 |
| KS | 100 | Organic Carbon | 0.32\* | 17.01\* | 6.89\* | 0.44\* | 0.26\* | 17.54\* | 6.70\* | 0.42\* |
| cLHS | 100 | Organic Carbon | 0.40 ± 0.08 | 15.69 ± 3.02 | -0.36 ± 1.53 | 0.48 ± 0.06 | 0.29 ± 0.09 | 17.13 ± 1.60 | -2.00 ± 2.22 | 0.44 ± 0.04 |
| KM | 100 | Organic Carbon | 0.40 ± 0.07 | 15.03 ± 1.42 | 0.43 ± 1.53 | 0.50 ± 0.04 | 0.28 ± 0.09 | 17.35 ± 2.24 | -0.94 ± 2.06 | 0.43 ± 0.05 |
| Random | 150 | Organic Carbon | 0.44 ± 0.07 | 14.86 ± 2.66 | 0.30 ± 1.09 | 0.51 ± 0.05 | 0.35 ± 0.09 | 16.23 ± 2.06 | -0.95 ± 1.47 | 0.46 ± 0.05 |
| KS | 150 | Organic Carbon | 0.44\* | 14.57\* | 3.59\* | 0.51\* | 0.10\* | 19.34\* | -0.92\* | 0.38\* |
| cLHS | 150 | Organic Carbon | 0.43 ± 0.09 | 15.28 ± 3.06 | 0.05 ± 1.13 | 0.50 ± 0.07 | 0.36 ± 0.08 | 15.73 ± 1.50 | -1.02 ± 1.48 | 0.47 ± 0.04 |
| KM | 150 | Organic Carbon | 0.46 ± 0.07 | 14.06 ± 0.84 | 0.12 ± 1.10 | 0.53 ± 0.03 | 0.36 ± 0.10 | 15.72 ± 1.75 | -1.13 ± 1.40 | 0.48 ± 0.05 |
| Random | 200 | Organic Carbon | 0.47 ± 0.07 | 14.32 ± 2.11 | 0.21 ± 1.09 | 0.52 ± 0.05 | 0.37 ± 0.08 | 16.02 ± 2.02 | -1.19 ± 1.39 | 0.47 ± 0.05 |
| KS | 200 | Organic Carbon | 0.45\* | 14.60\* | 4.25\* | 0.51\* | 0.14\* | 19.81\* | 3.18\* | 0.37\* |
| cLHS | 200 | Organic Carbon | 0.47 ± 0.04 | 14.06 ± 0.76 | -0.02 ± 0.94 | 0.53 ± 0.03 | 0.38 ± 0.08 | 15.69 ± 1.77 | -0.97 ± 1.32 | 0.48 ± 0.05 |
| KM | 200 | Organic Carbon | 0.49 ± 0.06 | 13.54 ± 1.12 | 0.13 ± 0.98 | 0.55 ± 0.04 | 0.34 ± 0.10 | 15.90 ± 1.55 | -1.42 ± 1.31 | 0.47 ± 0.05 |
| Random | 250 | Organic Carbon | 0.48 ± 0.06 | 13.98 ± 2.22 | 0.06 ± 0.91 | 0.54 ± 0.05 | 0.39 ± 0.09 | 15.59 ± 1.68 | -1.23 ± 1.53 | 0.48 ± 0.05 |
| KS | 250 | Organic Carbon | 0.48\* | 14.10\* | 3.56\* | 0.52\* | 0.33\* | 15.39\* | -0.03\* | 0.48\* |
| cLHS | 250 | Organic Carbon | 0.48 ± 0.07 | 14.15 ± 2.33 | 0.01 ± 0.94 | 0.53 ± 0.06 | 0.38 ± 0.09 | 15.58 ± 1.53 | -1.01 ± 1.32 | 0.48 ± 0.05 |
| KM | 250 | Organic Carbon | 0.52 ± 0.04 | 13.25 ± 0.75 | 0.26 ± 0.76 | 0.56 ± 0.03 | 0.38 ± 0.08 | 15.55 ± 1.33 | -0.79 ± 1.36 | 0.48 ± 0.04 |
| Random | 300 | Organic Carbon | 0.49 ± 0.08 | 14.09 ± 2.80 | 0.05 ± 0.79 | 0.54 ± 0.06 | 0.41 ± 0.08 | 14.92 ± 1.18 | -1.39 ± 1.03 | 0.50 ± 0.04 |
| KS | 300 | Organic Carbon | 0.47\* | 14.02\* | 2.61\* | 0.53\* | 0.26\* | 16.34\* | -1.67\* | 0.45\* |
| cLHS | 300 | Organic Carbon | 0.49 ± 0.07 | 13.78 ± 2.00 | -0.10 ± 0.65 | 0.54 ± 0.05 | 0.40 ± 0.08 | 15.30 ± 1.39 | -1.17 ± 1.14 | 0.49 ± 0.04 |
| KM | 300 | Organic Carbon | 0.50 ± 0.07 | 13.52 ± 1.48 | 0.14 ± 0.78 | 0.55 ± 0.05 | 0.39 ± 0.08 | 15.21 ± 1.19 | -1.09 ± 1.10 | 0.49 ± 0.04 |
| Random | 400 | Organic Carbon | 0.50 ± 0.08 | 13.77 ± 2.15 | -0.04 ± 0.64 | 0.55 ± 0.06 | 0.43 ± 0.06 | 14.65 ± 0.97 | -1.45 ± 0.83 | 0.51 ± 0.03 |
| KS | 400 | Organic Carbon | 0.48\* | 13.81\* | 2.30\* | 0.54\* | 0.22\* | 16.84\* | -0.77\* | 0.44\* |
| cLHS | 400 | Organic Carbon | 0.51 ± 0.05 | 13.33 ± 1.14 | -0.12 ± 0.61 | 0.56 ± 0.04 | 0.44 ± 0.06 | 14.49 ± 1.00 | -1.50 ± 0.87 | 0.51 ± 0.04 |
| KM | 400 | Organic Carbon | 0.53 ± 0.02 | 12.92 ± 0.31 | 0.18 ± 0.67 | 0.57 ± 0.01 | 0.44 ± 0.07 | 14.52 ± 1.07 | -1.25 ± 0.98 | 0.51 ± 0.04 |
| Random | 500 | Organic Carbon | 0.51 ± 0.09 | 13.68 ± 2.63 | -0.13 ± 0.56 | 0.55 ± 0.06 | 0.45 ± 0.06 | 14.36 ± 0.97 | -1.53 ± 0.86 | 0.52 ± 0.03 |
| KS | 500 | Organic Carbon | 0.49\* | 13.79\* | 3.06\* | 0.54\* | 0.31\* | 18.17\* | 5.12\* | 0.41\* |
| cLHS | 500 | Organic Carbon | 0.52 ± 0.06 | 13.23 ± 1.45 | -0.23 ± 0.59 | 0.56 ± 0.04 | 0.46 ± 0.07 | 14.30 ± 1.21 | -1.38 ± 0.92 | 0.52 ± 0.04 |
| KM | 500 | Organic Carbon | 0.54 ± 0.02 | 12.79 ± 0.33 | 0.08 ± 0.53 | 0.58 ± 0.01 | 0.46 ± 0.06 | 14.22 ± 1.01 | -1.34 ± 0.92 | 0.52 ± 0.04 |
| Random | 1000 | Organic Carbon | 0.56 ± 0.02 | 12.47 ± 0.33 | -0.32 ± 0.37 | 0.59 ± 0.01 | 0.51 ± 0.05 | 13.46 ± 0.86 | -1.42 ± 0.57 | 0.55 ± 0.04 |
| KS | 1000 | Organic Carbon | 0.54\* | 12.90\* | 1.44\* | 0.57\* | 0.46\* | 13.88\* | 1.56\* | 0.53\* |
| cLHS | 1000 | Organic Carbon | 0.57 ± 0.01 | 12.32 ± 0.18 | -0.33 ± 0.31 | 0.60 ± 0.01 | 0.50 ± 0.05 | 13.59 ± 0.80 | -1.60 ± 0.41 | 0.55 ± 0.03 |
| KM | 1000 | Organic Carbon | 0.57 ± 0.01 | 12.31 ± 0.17 | -0.13 ± 0.32 | 0.60 ± 0.01 | 0.51 ± 0.05 | 13.44 ± 0.86 | -1.46 ± 0.58 | 0.55 ± 0.03 |
| Random | 1500 | Organic Carbon | 0.58 ± 0.01 | 12.19 ± 0.13 | -0.29 ± 0.27 | 0.61 ± 0.01 | 0.53 ± 0.04 | 13.05 ± 0.65 | -1.49 ± 0.50 | 0.57 ± 0.03 |
| KS | 1500 | Organic Carbon | 0.56\* | 12.47\* | 0.84\* | 0.59\* | 0.58\* | 12.19\* | 0.42\* | 0.61\* |
| cLHS | 1500 | Organic Carbon | 0.58 ± 0.01 | 12.18 ± 0.11 | -0.25 ± 0.27 | 0.61 ± 0.01 | 0.54 ± 0.05 | 13.03 ± 0.72 | -1.45 ± 0.47 | 0.57 ± 0.03 |
| KM | 1500 | Organic Carbon | 0.58 ± 0.01 | 12.20 ± 0.16 | -0.22 ± 0.36 | 0.61 ± 0.01 | 0.52 ± 0.05 | 13.24 ± 0.91 | -1.49 ± 0.54 | 0.56 ± 0.04 |
| Random | 2000 | Organic Carbon | 0.59 ± 0.01 | 12.06 ± 0.10 | -0.30 ± 0.19 | 0.61 ± 0.00 | 0.54 ± 0.04 | 12.95 ± 0.64 | -1.47 ± 0.47 | 0.57 ± 0.03 |
| KS | 2000 | Organic Carbon | 0.58\* | 12.19\* | 0.67\* | 0.61\* | 0.55\* | 12.76\* | -0.21\* | 0.58\* |
| cLHS | 2000 | Organic Carbon | 0.59 ± 0.01 | 12.06 ± 0.10 | -0.39 ± 0.19 | 0.61 ± 0.00 | 0.55 ± 0.04 | 12.83 ± 0.62 | -1.61 ± 0.49 | 0.58 ± 0.03 |
| KM | 2000 | Organic Carbon | 0.58 ± 0.01 | 12.21 ± 0.19 | -0.29 ± 0.38 | 0.61 ± 0.01 | 0.53 ± 0.04 | 13.15 ± 0.69 | -1.35 ± 0.47 | 0.56 ± 0.03 |
| Random | 3000 | Organic Carbon | 0.59 ± 0.00 | 11.96 ± 0.07 | -0.34 ± 0.13 | 0.62 ± 0.00 | 0.58 ± 0.03 | 12.30 ± 0.46 | -1.51 ± 0.38 | 0.60 ± 0.02 |
| KS | 3000 | Organic Carbon | 0.60\* | 11.91\* | 0.48\* | 0.62\* | 0.67\* | 10.75\* | -0.30\* | 0.69\* |
| cLHS | 3000 | Organic Carbon | 0.59 ± 0.00 | 11.98 ± 0.06 | -0.20 ± 0.14 | 0.62 ± 0.00 | 0.58 ± 0.04 | 12.36 ± 0.57 | -1.45 ± 0.36 | 0.60 ± 0.03 |
| KM | 3000 | Organic Carbon | 0.58 ± 0.02 | 12.30 ± 0.45 | -0.37 ± 0.34 | 0.60 ± 0.02 | 0.46 ± 0.09 | 14.77 ± 2.08 | -1.13 ± 0.51 | 0.51 ± 0.07 |
| Random | 50 | Cation Exchange Capacity | 0.31 ± 0.11 | 9.52 ± 1.78 | 0.02 ± 1.02 | 0.50 ± 0.08 | 0.21 ± 0.11 | 9.75 ± 1.20 | -0.70 ± 1.50 | 0.48 ± 0.05 |
| KS | 50 | Cation Exchange Capacity | 0.40\* | 8.19\* | 2.61\* | 0.57\* | 0.28\* | 8.98\* | 2.99\* | 0.52\* |
| cLHS | 50 | Cation Exchange Capacity | 0.29 ± 0.08 | 9.58 ± 1.94 | -0.32 ± 1.05 | 0.50 ± 0.07 | 0.23 ± 0.08 | 9.23 ± 0.85 | -0.50 ± 1.26 | 0.51 ± 0.04 |
| KM | 50 | Cation Exchange Capacity | 0.28 ± 0.09 | 8.77 ± 0.71 | 0.21 ± 1.11 | 0.53 ± 0.04 | 0.21 ± 0.10 | 9.41 ± 1.09 | -0.60 ± 1.24 | 0.50 ± 0.05 |
| Random | 100 | Cation Exchange Capacity | 0.42 ± 0.09 | 8.26 ± 1.38 | -0.07 ± 0.76 | 0.57 ± 0.07 | 0.35 ± 0.09 | 8.47 ± 1.26 | -0.55 ± 1.04 | 0.56 ± 0.06 |
| KS | 100 | Cation Exchange Capacity | 0.46\* | 8.16\* | 3.07\* | 0.57\* | 0.34\* | 8.20\* | 1.47\* | 0.57\* |
| cLHS | 100 | Cation Exchange Capacity | 0.43 ± 0.09 | 8.11 ± 1.22 | -0.21 ± 0.68 | 0.58 ± 0.06 | 0.34 ± 0.11 | 8.60 ± 1.23 | -0.52 ± 0.79 | 0.55 ± 0.07 |
| KM | 100 | Cation Exchange Capacity | 0.45 ± 0.09 | 7.53 ± 0.66 | 0.20 ± 0.71 | 0.62 ± 0.05 | 0.37 ± 0.08 | 8.14 ± 0.68 | -0.43 ± 0.91 | 0.58 ± 0.04 |
| Random | 150 | Cation Exchange Capacity | 0.48 ± 0.10 | 8.06 ± 2.81 | -0.05 ± 0.60 | 0.61 ± 0.11 | 0.41 ± 0.09 | 8.02 ± 0.93 | -0.17 ± 0.78 | 0.59 ± 0.06 |
| KS | 150 | Cation Exchange Capacity | 0.57\* | 6.86\* | 1.99\* | 0.68\* | 0.41\* | 7.72\* | 1.12\* | 0.60\* |
| cLHS | 150 | Cation Exchange Capacity | 0.50 ± 0.06 | 7.26 ± 0.52 | -0.15 ± 0.49 | 0.64 ± 0.04 | 0.43 ± 0.10 | 7.80 ± 0.98 | -0.49 ± 0.73 | 0.60 ± 0.07 |
| KM | 150 | Cation Exchange Capacity | 0.52 ± 0.07 | 6.95 ± 0.46 | 0.05 ± 0.51 | 0.67 ± 0.04 | 0.44 ± 0.07 | 7.59 ± 0.58 | -0.47 ± 0.71 | 0.62 ± 0.04 |
| Random | 200 | Cation Exchange Capacity | 0.51 ± 0.08 | 7.34 ± 1.21 | -0.11 ± 0.55 | 0.65 ± 0.08 | 0.43 ± 0.09 | 7.79 ± 0.88 | -0.38 ± 0.75 | 0.60 ± 0.06 |
| KS | 200 | Cation Exchange Capacity | 0.58\* | 6.80\* | 1.72\* | 0.68\* | 0.40\* | 7.83\* | 0.71\* | 0.59\* |
| cLHS | 200 | Cation Exchange Capacity | 0.51 ± 0.10 | 7.53 ± 2.22 | -0.15 ± 0.45 | 0.64 ± 0.09 | 0.45 ± 0.09 | 7.59 ± 0.77 | -0.32 ± 0.55 | 0.62 ± 0.06 |
| KM | 200 | Cation Exchange Capacity | 0.54 ± 0.06 | 6.83 ± 0.56 | 0.01 ± 0.37 | 0.68 ± 0.05 | 0.47 ± 0.09 | 7.40 ± 0.68 | -0.46 ± 0.48 | 0.63 ± 0.06 |
| Random | 250 | Cation Exchange Capacity | 0.54 ± 0.08 | 7.02 ± 1.15 | -0.14 ± 0.45 | 0.67 ± 0.08 | 0.45 ± 0.10 | 7.58 ± 0.94 | -0.35 ± 0.60 | 0.62 ± 0.07 |
| KS | 250 | Cation Exchange Capacity | 0.59\* | 6.64\* | 1.07\* | 0.70\* | 0.52\* | 7.05\* | -0.23\* | 0.66\* |
| cLHS | 250 | Cation Exchange Capacity | 0.55 ± 0.07 | 6.85 ± 0.86 | -0.16 ± 0.50 | 0.69 ± 0.07 | 0.46 ± 0.11 | 7.48 ± 0.83 | -0.44 ± 0.58 | 0.63 ± 0.07 |
| KM | 250 | Cation Exchange Capacity | 0.57 ± 0.05 | 6.62 ± 0.47 | -0.01 ± 0.30 | 0.71 ± 0.04 | 0.47 ± 0.10 | 7.39 ± 0.79 | -0.41 ± 0.68 | 0.64 ± 0.07 |
| Random | 300 | Cation Exchange Capacity | 0.54 ± 0.08 | 7.02 ± 1.20 | -0.12 ± 0.37 | 0.68 ± 0.09 | 0.49 ± 0.09 | 7.29 ± 0.72 | -0.33 ± 0.49 | 0.64 ± 0.06 |
| KS | 300 | Cation Exchange Capacity | 0.58\* | 6.67\* | 1.16\* | 0.70\* | 0.47\* | 7.51\* | -1.33\* | 0.62\* |
| cLHS | 300 | Cation Exchange Capacity | 0.55 ± 0.08 | 6.95 ± 1.71 | -0.13 ± 0.36 | 0.69 ± 0.08 | 0.46 ± 0.10 | 7.58 ± 0.99 | -0.36 ± 0.51 | 0.62 ± 0.07 |
| KM | 300 | Cation Exchange Capacity | 0.59 ± 0.03 | 6.43 ± 0.26 | 0.00 ± 0.36 | 0.72 ± 0.03 | 0.44 ± 0.09 | 7.53 ± 0.72 | -0.49 ± 0.46 | 0.62 ± 0.06 |
| Random | 400 | Cation Exchange Capacity | 0.58 ± 0.06 | 6.60 ± 0.77 | -0.16 ± 0.33 | 0.71 ± 0.06 | 0.49 ± 0.08 | 7.25 ± 0.74 | -0.34 ± 0.39 | 0.65 ± 0.06 |
| KS | 400 | Cation Exchange Capacity | 0.60\* | 6.55\* | 1.11\* | 0.71\* | 0.39\* | 7.77\* | 0.06\* | 0.60\* |
| cLHS | 400 | Cation Exchange Capacity | 0.57 ± 0.09 | 6.73 ± 1.35 | -0.23 ± 0.27 | 0.71 ± 0.08 | 0.50 ± 0.07 | 7.14 ± 0.58 | -0.51 ± 0.36 | 0.66 ± 0.05 |
| KM | 400 | Cation Exchange Capacity | 0.60 ± 0.04 | 6.32 ± 0.30 | 0.05 ± 0.26 | 0.74 ± 0.03 | 0.49 ± 0.06 | 7.20 ± 0.47 | -0.36 ± 0.35 | 0.65 ± 0.04 |
| Random | 500 | Cation Exchange Capacity | 0.59 ± 0.05 | 6.43 ± 0.55 | -0.21 ± 0.29 | 0.73 ± 0.05 | 0.50 ± 0.07 | 7.17 ± 0.64 | -0.39 ± 0.38 | 0.65 ± 0.05 |
| KS | 500 | Cation Exchange Capacity | 0.60\* | 6.56\* | 1.37\* | 0.71\* | 0.46\* | 7.42\* | 0.96\* | 0.63\* |
| cLHS | 500 | Cation Exchange Capacity | 0.60 ± 0.05 | 6.35 ± 0.51 | -0.17 ± 0.26 | 0.74 ± 0.05 | 0.51 ± 0.08 | 7.07 ± 0.63 | -0.41 ± 0.37 | 0.66 ± 0.06 |
| KM | 500 | Cation Exchange Capacity | 0.62 ± 0.03 | 6.17 ± 0.30 | -0.02 ± 0.22 | 0.75 ± 0.03 | 0.48 ± 0.08 | 7.30 ± 0.71 | -0.47 ± 0.34 | 0.64 ± 0.06 |
| Random | 1000 | Cation Exchange Capacity | 0.64 ± 0.02 | 5.95 ± 0.20 | -0.20 ± 0.18 | 0.78 ± 0.03 | 0.54 ± 0.06 | 6.79 ± 0.49 | -0.44 ± 0.27 | 0.69 ± 0.05 |
| KS | 1000 | Cation Exchange Capacity | 0.64\* | 6.07\* | 0.60\* | 0.77\* | 0.43\* | 7.58\* | -0.96\* | 0.61\* |
| cLHS | 1000 | Cation Exchange Capacity | 0.65 ± 0.02 | 5.88 ± 0.19 | -0.20 ± 0.14 | 0.79 ± 0.02 | 0.55 ± 0.06 | 6.73 ± 0.46 | -0.48 ± 0.26 | 0.69 ± 0.05 |
| KM | 1000 | Cation Exchange Capacity | 0.65 ± 0.03 | 5.93 ± 0.27 | -0.12 ± 0.15 | 0.79 ± 0.03 | 0.54 ± 0.05 | 6.83 ± 0.37 | -0.44 ± 0.26 | 0.68 ± 0.04 |
| Random | 1500 | Cation Exchange Capacity | 0.67 ± 0.01 | 5.75 ± 0.10 | -0.20 ± 0.12 | 0.81 ± 0.01 | 0.57 ± 0.04 | 6.59 ± 0.33 | -0.48 ± 0.23 | 0.71 ± 0.03 |
| KS | 1500 | Cation Exchange Capacity | 0.66\* | 5.92\* | 0.30\* | 0.79\* | 0.56\* | 6.65\* | -0.52\* | 0.70\* |
| cLHS | 1500 | Cation Exchange Capacity | 0.67 ± 0.01 | 5.73 ± 0.08 | -0.19 ± 0.12 | 0.81 ± 0.01 | 0.58 ± 0.05 | 6.53 ± 0.38 | -0.51 ± 0.22 | 0.71 ± 0.04 |
| KM | 1500 | Cation Exchange Capacity | 0.66 ± 0.02 | 5.77 ± 0.14 | -0.17 ± 0.16 | 0.81 ± 0.02 | 0.56 ± 0.05 | 6.66 ± 0.40 | -0.48 ± 0.24 | 0.70 ± 0.04 |
| Random | 2000 | Cation Exchange Capacity | 0.67 ± 0.01 | 5.69 ± 0.06 | -0.19 ± 0.10 | 0.82 ± 0.01 | 0.58 ± 0.04 | 6.47 ± 0.34 | -0.52 ± 0.25 | 0.72 ± 0.04 |
| KS | 2000 | Cation Exchange Capacity | 0.67\* | 5.79\* | 0.31\* | 0.80\* | 0.58\* | 6.45\* | 0.13\* | 0.72\* |
| cLHS | 2000 | Cation Exchange Capacity | 0.67 ± 0.01 | 5.69 ± 0.06 | -0.24 ± 0.10 | 0.82 ± 0.01 | 0.59 ± 0.04 | 6.39 ± 0.31 | -0.56 ± 0.18 | 0.73 ± 0.04 |
| KM | 2000 | Cation Exchange Capacity | 0.67 ± 0.02 | 5.72 ± 0.15 | -0.25 ± 0.16 | 0.81 ± 0.02 | 0.56 ± 0.05 | 6.69 ± 0.44 | -0.50 ± 0.25 | 0.70 ± 0.05 |
| Random | 3000 | Cation Exchange Capacity | 0.68 ± 0.00 | 5.63 ± 0.03 | -0.20 ± 0.06 | 0.83 ± 0.00 | 0.61 ± 0.03 | 6.30 ± 0.27 | -0.50 ± 0.17 | 0.74 ± 0.03 |
| KS | 3000 | Cation Exchange Capacity | 0.68\* | 5.66\* | 0.11\* | 0.82\* | 0.62\* | 6.16\* | -0.51\* | 0.76\* |
| cLHS | 3000 | Cation Exchange Capacity | 0.68 ± 0.00 | 5.64 ± 0.03 | -0.22 ± 0.06 | 0.82 ± 0.01 | 0.61 ± 0.03 | 6.25 ± 0.30 | -0.50 ± 0.19 | 0.75 ± 0.03 |
| KM | 3000 | Cation Exchange Capacity | 0.66 ± 0.04 | 5.84 ± 0.37 | -0.27 ± 0.17 | 0.80 ± 0.04 | 0.48 ± 0.12 | 7.65 ± 1.30 | -0.38 ± 0.28 | 0.62 ± 0.10 |

\*Only represents one repetition. RPIQ: Ratio of Performance to Interquartile distance, which can be calculated as RPIQ=IQ/RMSE where IQ = Q3-Q1; IQ being the interquartile distance of the validation set, Q1 the median of the first half of the validation set and Q3 the median for the second half of the validation set.

# Appendix B. Summary of model performance to predict various soil properties (clay content, sand content, total carbon, pH and cation exchange capacity) using two different regression models (Partial Least Square Regression (PLSR) and Cubist) with various sampling algorithms (Random, Kennard-Stone (KS), conditioned Latin Hypercube sampling (cLHS), k-Means(KM)) and calibration sample sizes (50-200) in the regional dataset. The results reported are averages and standard deviations from 50 repetitions.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sampling Algorithm | Calibration sample size | Soil Property | PLSR | | | | Cubist | | | |
| R2 | RMSE | bias | RPIQ | R2 | RMSE | bias | RPIQ |
| Random | 50 | clay | 0.74 ± 0.08 | 9.04 ± 1.53 | -0.03 ± 2.20 | 0.45 ± 0.07 | 0.70 ± 0.08 | 9.82 ± 1.59 | -0.35 ± 2.47 | 0.42 ± 0.06 |
| cLHS | 50 | clay | 0.73 ± 0.09 | 9.21 ± 1.54 | -0.59 ± 1.88 | 0.44 ± 0.07 | 0.69 ± 0.09 | 9.88 ± 1.63 | -0.86 ± 2.12 | 0.42 ± 0.07 |
| KM | 50 | clay | 0.71 ± 0.14 | 9.45 ± 2.27 | -1.15 ± 1.70 | 0.44 ± 0.07 | 0.67 ± 0.11 | 10.13 ± 1.80 | -1.81 ± 1.62 | 0.41 ± 0.07 |
| KS | 50 | clay | 0.78\* | 8.59\* | -1.33\* | 0.47\* | 0.71\* | 9.83\* | -0.48\* | 0.41\* |
| Random | 100 | clay | 0.73 ± 0.11 | 9.14 ± 1.94 | -0.24 ± 1.52 | 0.45 ± 0.07 | 0.72 ± 0.08 | 9.30 ± 1.41 | -0.71 ± 1.57 | 0.44 ± 0.06 |
| cLHS | 100 | clay | 0.73 ± 0.09 | 9.08 ± 1.48 | -0.41 ± 1.64 | 0.45 ± 0.06 | 0.66 ± 0.14 | 10.12 ± 2.22 | -0.80 ± 1.74 | 0.41 ± 0.07 |
| KM | 100 | clay | 0.75 ± 0.06 | 8.75 ± 1.13 | -0.05 ± 0.99 | 0.46 ± 0.05 | 0.67 ± 0.10 | 10.02 ± 1.69 | -0.41 ± 1.61 | 0.41 ± 0.06 |
| KS | 100 | clay | 0.68\* | 9.94\* | -2.16\* | 0.40\* | 0.68\* | 10.32\* | -3.47\* | 0.39\* |
| Random | 150 | clay | 0.74 ± 0.06 | 8.83 ± 1.08 | -0.31 ± 1.07 | 0.46 ± 0.05 | 0.71 ± 0.08 | 9.35 ± 1.30 | -0.15 ± 1.33 | 0.44 ± 0.05 |
| cLHS | 150 | clay | 0.75 ± 0.04 | 8.60 ± 0.71 | -0.48 ± 0.81 | 0.47 ± 0.04 | 0.73 ± 0.07 | 9.00 ± 1.09 | -0.44 ± 0.98 | 0.45 ± 0.05 |
| KM | 150 | clay | 0.74 ± 0.06 | 8.85 ± 1.00 | -0.18 ± 1.20 | 0.46 ± 0.05 | 0.65 ± 0.11 | 10.47 ± 1.78 | 0.06 ± 1.59 | 0.39 ± 0.06 |
| KS | 150 | clay | 0.75\* | 8.67\* | -0.75\* | 0.46\* | 0.70\* | 9.65\* | -2.09\* | 0.41\* |
| Random | 200 | clay | 0.75 ± 0.03 | 8.62 ± 0.51 | -0.10 ± 0.81 | 0.47 ± 0.03 | 0.72 ± 0.08 | 9.15 ± 1.19 | -0.13 ± 1.00 | 0.44 ± 0.05 |
| cLHS | 200 | clay | 0.74 ± 0.03 | 8.72 ± 0.53 | -0.47 ± 0.72 | 0.46 ± 0.03 | 0.72 ± 0.08 | 9.20 ± 1.32 | 0.00 ± 0.97 | 0.44 ± 0.06 |
| KM | 200 | clay | 0.68 ± 0.08 | 10.12 ± 1.63 | -0.02 ± 1.64 | 0.41 ± 0.07 | 0.60 ± 0.14 | 11.32 ± 2.50 | -0.02 ± 1.69 | 0.37 ± 0.07 |
| KS | 200 | clay | 0.75\* | 8.63\* | -0.39\* | 0.46\* | 0.78\* | 8.10\* | 0.40\* | 0.49\* |
| Random | 50 | sand | 0.69 ± 0.11 | 9.95 ± 2.23 | -1.45 ± 2.43 | 1.46 ± 0.24 | 0.69 ± 0.06 | 9.54 ± 1.10 | -0.72 ± 2.01 | 1.49 ± 0.16 |
| cLHS | 50 | sand | 0.70 ± 0.09 | 9.43 ± 1.53 | -1.37 ± 1.82 | 1.52 ± 0.20 | 0.68 ± 0.10 | 9.47 ± 1.40 | -0.65 ± 1.59 | 1.51 ± 0.20 |
| KM | 50 | sand | 0.65 ± 0.11 | 9.98 ± 1.94 | -0.61 ± 2.23 | 1.45 ± 0.23 | 0.66 ± 0.10 | 9.68 ± 1.53 | -0.16 ± 2.00 | 1.48 ± 0.20 |
| KS | 50 | sand | 0.74\* | 8.35\* | 0.58\* | 1.68\* | 0.74\* | 8.40\* | -0.63\* | 1.67\* |
| Random | 100 | sand | 0.71 ± 0.05 | 9.14 ± 1.11 | -1.70 ± 1.26 | 1.55 ± 0.16 | 0.69 ± 0.08 | 9.39 ± 1.18 | -1.20 ± 1.67 | 1.51 ± 0.17 |
| cLHS | 100 | sand | 0.72 ± 0.05 | 9.00 ± 0.83 | -1.51 ± 1.21 | 1.57 ± 0.12 | 0.69 ± 0.08 | 9.42 ± 1.22 | -1.00 ± 1.47 | 1.51 ± 0.17 |
| KM | 100 | sand | 0.70 ± 0.07 | 9.26 ± 1.15 | -1.70 ± 1.30 | 1.53 ± 0.17 | 0.64 ± 0.11 | 10.06 ± 1.62 | -1.14 ± 1.52 | 1.43 ± 0.22 |
| KS | 100 | sand | 0.74\* | 8.42\* | -0.83\* | 1.66\* | 0.72\* | 8.75\* | 1.21\* | 1.60\* |
| Random | 150 | sand | 0.72 ± 0.05 | 8.87 ± 0.79 | -1.84 ± 0.88 | 1.59 ± 0.13 | 0.68 ± 0.09 | 9.65 ± 1.42 | -1.71 ± 1.59 | 1.48 ± 0.19 |
| cLHS | 150 | sand | 0.74 ± 0.03 | 8.62 ± 0.52 | -1.87 ± 0.78 | 1.63 ± 0.09 | 0.68 ± 0.07 | 9.47 ± 1.21 | -1.55 ± 1.06 | 1.50 ± 0.17 |
| KM | 150 | sand | 0.70 ± 0.08 | 9.45 ± 1.28 | -2.38 ± 1.22 | 1.51 ± 0.19 | 0.63 ± 0.12 | 10.85 ± 2.37 | -2.30 ± 1.81 | 1.33 ± 0.22 |
| KS | 150 | sand | 0.75\* | 8.23\* | -0.84\* | 1.70\* | 0.75\* | 8.32\* | -0.06\* | 1.68\* |
| Random | 200 | sand | 0.74 ± 0.02 | 8.58 ± 0.33 | -1.98 ± 0.49 | 1.63 ± 0.06 | 0.71 ± 0.05 | 9.11 ± 0.86 | -2.00 ± 1.02 | 1.55 ± 0.14 |
| cLHS | 200 | sand | 0.74 ± 0.03 | 8.49 ± 0.37 | -1.71 ± 0.62 | 1.65 ± 0.07 | 0.71 ± 0.05 | 9.14 ± 0.84 | -1.96 ± 1.04 | 1.54 ± 0.13 |
| KM | 200 | sand | 0.62 ± 0.14 | 11.12 ± 2.34 | -1.68 ± 2.00 | 1.31 ± 0.27 | 0.53 ± 0.14 | 12.80 ± 2.91 | -2.07 ± 2.54 | 1.14 ± 0.24 |
| KS | 200 | sand | 0.77\* | 7.98\* | -1.52\* | 1.75\* | 0.76\* | 8.04\* | -1.12\* | 1.74\* |
| Random | 50 | Total Carbon | 0.63 ± 0.10 | 0.62 ± 0.17 | -0.08 ± 0.13 | 1.28 ± 0.24 | 0.62 ± 0.09 | 0.61 ± 0.12 | -0.06 ± 0.11 | 1.28 ± 0.23 |
| cLHS | 50 | Total Carbon | 0.66 ± 0.07 | 0.57 ± 0.09 | -0.07 ± 0.08 | 1.36 ± 0.19 | 0.65 ± 0.06 | 0.57 ± 0.08 | -0.05 ± 0.10 | 1.35 ± 0.18 |
| KM | 50 | Total Carbon | 0.65 ± 0.08 | 0.60 ± 0.13 | -0.10 ± 0.10 | 1.31 ± 0.23 | 0.61 ± 0.08 | 0.63 ± 0.12 | -0.07 ± 0.12 | 1.25 ± 0.20 |
| KS | 50 | Total Carbon | 0.70\* | 0.50\* | -0.12\* | 1.51\* | 0.60\* | 0.61\* | -0.03\* | 1.25\* |
| Random | 100 | Total Carbon | 0.69 ± 0.04 | 0.54 ± 0.06 | -0.04 ± 0.07 | 1.44 ± 0.16 | 0.66 ± 0.06 | 0.56 ± 0.08 | -0.05 ± 0.09 | 1.37 ± 0.18 |
| cLHS | 100 | Total Carbon | 0.69 ± 0.04 | 0.53 ± 0.06 | -0.03 ± 0.08 | 1.45 ± 0.15 | 0.68 ± 0.06 | 0.54 ± 0.06 | -0.05 ± 0.07 | 1.42 ± 0.17 |
| KM | 100 | Total Carbon | 0.69 ± 0.05 | 0.53 ± 0.06 | -0.07 ± 0.05 | 1.44 ± 0.15 | 0.66 ± 0.05 | 0.57 ± 0.06 | -0.06 ± 0.07 | 1.35 ± 0.13 |
| KS | 100 | Total Carbon | 0.73\* | 0.48\* | -0.12\* | 1.59\* | 0.67\* | 0.53\* | -0.05\* | 1.43\* |
| Random | 150 | Total Carbon | 0.71 ± 0.04 | 0.51 ± 0.04 | -0.03 ± 0.06 | 1.51 ± 0.13 | 0.69 ± 0.04 | 0.53 ± 0.05 | -0.05 ± 0.06 | 1.44 ± 0.14 |
| cLHS | 150 | Total Carbon | 0.71 ± 0.03 | 0.49 ± 0.04 | -0.01 ± 0.04 | 1.54 ± 0.11 | 0.70 ± 0.05 | 0.52 ± 0.05 | -0.03 ± 0.05 | 1.49 ± 0.15 |
| KM | 150 | Total Carbon | 0.71 ± 0.05 | 0.54 ± 0.07 | -0.03 ± 0.08 | 1.44 ± 0.17 | 0.64 ± 0.08 | 0.59 ± 0.10 | -0.05 ± 0.07 | 1.32 ± 0.21 |
| KS | 150 | Total Carbon | 0.76\* | 0.45\* | -0.06\* | 1.69\* | 0.75\* | 0.47\* | -0.06\* | 1.61\* |
| Random | 200 | Total Carbon | 0.72 ± 0.02 | 0.49 ± 0.03 | -0.01 ± 0.04 | 1.57 ± 0.09 | 0.70 ± 0.04 | 0.51 ± 0.04 | -0.03 ± 0.05 | 1.49 ± 0.13 |
| cLHS | 200 | Total Carbon | 0.73 ± 0.03 | 0.49 ± 0.03 | -0.02 ± 0.05 | 1.57 ± 0.10 | 0.70 ± 0.04 | 0.52 ± 0.04 | -0.05 ± 0.04 | 1.47 ± 0.11 |
| KM | 200 | Total Carbon | 0.72 ± 0.04 | 0.55 ± 0.07 | 0.01 ± 0.10 | 1.40 ± 0.17 | 0.59 ± 0.13 | 0.67 ± 0.19 | -0.05 ± 0.10 | 1.20 ± 0.28 |
| KS | 200 | Total Carbon | 0.74\* | 0.47\* | -0.05\* | 1.62\* | 0.72\* | 0.50\* | -0.04\* | 1.53\* |
| Random | 50 | pH.in.CaCl2 | 0.62 ± 0.08 | 0.76 ± 0.09 | -0.01 ± 0.15 | 0.93 ± 0.11 | 0.59 ± 0.09 | 0.78 ± 0.09 | -0.04 ± 0.13 | 0.90 ± 0.10 |
| cLHS | 50 | pH.in.CaCl2 | 0.65 ± 0.07 | 0.76 ± 0.11 | 0.04 ± 0.16 | 0.93 ± 0.12 | 0.59 ± 0.10 | 0.78 ± 0.09 | -0.04 ± 0.14 | 0.90 ± 0.10 |
| KM | 50 | pH.in.CaCl2 | 0.63 ± 0.10 | 0.79 ± 0.13 | 0.13 ± 0.14 | 0.91 ± 0.13 | 0.57 ± 0.10 | 0.80 ± 0.11 | 0.02 ± 0.15 | 0.88 ± 0.11 |
| KS | 50 | pH.in.CaCl2 | 0.66\* | 0.70\* | 0.08\* | 0.99\* | 0.72\* | 0.62\* | -0.01\* | 1.13\* |
| Random | 100 | pH.in.CaCl2 | 0.71 ± 0.05 | 0.65 ± 0.07 | 0.04 ± 0.12 | 1.08 ± 0.11 | 0.66 ± 0.05 | 0.69 ± 0.06 | 0.02 ± 0.09 | 1.01 ± 0.08 |
| cLHS | 100 | pH.in.CaCl2 | 0.70 ± 0.05 | 0.66 ± 0.06 | 0.05 ± 0.10 | 1.05 ± 0.09 | 0.62 ± 0.11 | 0.74 ± 0.12 | 0.01 ± 0.10 | 0.96 ± 0.12 |
| KM | 100 | pH.in.CaCl2 | 0.69 ± 0.08 | 0.69 ± 0.09 | 0.10 ± 0.10 | 1.02 ± 0.12 | 0.64 ± 0.11 | 0.73 ± 0.12 | 0.08 ± 0.11 | 0.97 ± 0.12 |
| KS | 100 | pH.in.CaCl2 | 0.71\* | 0.64\* | 0.13\* | 1.09\* | 0.61\* | 0.74\* | -0.07\* | 0.95\* |
| Random | 150 | pH.in.CaCl2 | 0.76 ± 0.04 | 0.59 ± 0.06 | 0.05 ± 0.08 | 1.18 ± 0.11 | 0.70 ± 0.07 | 0.65 ± 0.08 | 0.04 ± 0.06 | 1.08 ± 0.12 |
| cLHS | 150 | pH.in.CaCl2 | 0.75 ± 0.05 | 0.60 ± 0.07 | 0.06 ± 0.08 | 1.17 ± 0.13 | 0.69 ± 0.07 | 0.65 ± 0.08 | 0.04 ± 0.08 | 1.08 ± 0.12 |
| KM | 150 | pH.in.CaCl2 | 0.71 ± 0.06 | 0.68 ± 0.09 | 0.09 ± 0.13 | 1.05 ± 0.14 | 0.63 ± 0.12 | 0.75 ± 0.14 | 0.08 ± 0.13 | 0.95 ± 0.16 |
| KS | 150 | pH.in.CaCl2 | 0.71\* | 0.64\* | 0.14\* | 1.08\* | 0.74\* | 0.60\* | 0.07\* | 1.16\* |
| Random | 200 | pH.in.CaCl2 | 0.79 ± 0.02 | 0.55 ± 0.04 | 0.04 ± 0.06 | 1.26 ± 0.08 | 0.73 ± 0.06 | 0.62 ± 0.08 | 0.04 ± 0.08 | 1.14 ± 0.13 |
| cLHS | 200 | pH.in.CaCl2 | 0.77 ± 0.03 | 0.57 ± 0.04 | 0.05 ± 0.06 | 1.22 ± 0.08 | 0.73 ± 0.04 | 0.62 ± 0.05 | 0.00 ± 0.07 | 1.13 ± 0.09 |
| KM | 200 | pH.in.CaCl2 | 0.68 ± 0.10 | 0.71 ± 0.15 | 0.11 ± 0.13 | 1.02 ± 0.19 | 0.52 ± 0.20 | 0.86 ± 0.23 | 0.07 ± 0.13 | 0.86 ± 0.22 |
| KS | 200 | pH.in.CaCl2 | 0.79\* | 0.54\* | 0.04\* | 1.28\* | 0.70\* | 0.65\* | 0.07\* | 1.07\* |
| Random | 50 | Cation Exchange Capacity | 0.77 ± 0.03 | 3.52 ± 0.25 | 0.46 ± 0.51 | 0.97 ± 0.07 | 0.74 ± 0.05 | 3.84 ± 0.43 | 0.32 ± 0.85 | 0.90 ± 0.09 |
| cLHS | 50 | Cation Exchange Capacity | 0.78 ± 0.02 | 3.57 ± 0.33 | 0.70 ± 0.52 | 0.96 ± 0.08 | 0.74 ± 0.08 | 3.83 ± 0.54 | 0.44 ± 0.68 | 0.90 ± 0.11 |
| KM | 50 | Cation Exchange Capacity | 0.78 ± 0.03 | 3.57 ± 0.36 | 0.53 ± 0.61 | 0.96 ± 0.09 | 0.73 ± 0.06 | 3.87 ± 0.48 | 0.22 ± 0.76 | 0.89 ± 0.10 |
| KS | 50 | Cation Exchange Capacity | 0.76\* | 4.51\* | 2.31\* | 0.75\* | 0.75\* | 3.97\* | 1.31\* | 0.86\* |
| Random | 100 | Cation Exchange Capacity | 0.80 ± 0.02 | 3.32 ± 0.18 | 0.63 ± 0.36 | 1.03 ± 0.06 | 0.78 ± 0.02 | 3.49 ± 0.27 | 0.60 ± 0.46 | 0.98 ± 0.07 |
| cLHS | 100 | Cation Exchange Capacity | 0.80 ± 0.02 | 3.31 ± 0.14 | 0.56 ± 0.32 | 1.03 ± 0.05 | 0.77 ± 0.04 | 3.53 ± 0.26 | 0.42 ± 0.47 | 0.97 ± 0.07 |
| KM | 100 | Cation Exchange Capacity | 0.80 ± 0.02 | 3.29 ± 0.22 | 0.61 ± 0.32 | 1.04 ± 0.07 | 0.76 ± 0.06 | 3.59 ± 0.44 | 0.59 ± 0.47 | 0.96 ± 0.10 |
| KS | 100 | Cation Exchange Capacity | 0.83\* | 3.10\* | 0.84\* | 1.10\* | 0.80\* | 3.48\* | 1.34\* | 0.98\* |
| Random | 150 | Cation Exchange Capacity | 0.81 ± 0.01 | 3.21 ± 0.13 | 0.64 ± 0.22 | 1.06 ± 0.04 | 0.79 ± 0.02 | 3.41 ± 0.21 | 0.64 ± 0.32 | 1.00 ± 0.06 |
| cLHS | 150 | Cation Exchange Capacity | 0.81 ± 0.01 | 3.21 ± 0.12 | 0.58 ± 0.21 | 1.06 ± 0.04 | 0.79 ± 0.04 | 3.40 ± 0.29 | 0.55 ± 0.38 | 1.01 ± 0.07 |
| KM | 150 | Cation Exchange Capacity | 0.80 ± 0.03 | 3.33 ± 0.26 | 0.47 ± 0.38 | 1.03 ± 0.08 | 0.75 ± 0.07 | 3.68 ± 0.54 | 0.57 ± 0.44 | 0.94 ± 0.12 |
| KS | 150 | Cation Exchange Capacity | 0.82\* | 3.16\* | 0.73\* | 1.08\* | 0.77\* | 3.51\* | 0.71\* | 0.97\* |
| Random | 200 | Cation Exchange Capacity | 0.82 ± 0.01 | 3.15 ± 0.12 | 0.61 ± 0.21 | 1.08 ± 0.04 | 0.80 ± 0.01 | 3.33 ± 0.13 | 0.62 ± 0.28 | 1.02 ± 0.04 |
| cLHS | 200 | Cation Exchange Capacity | 0.82 ± 0.01 | 3.13 ± 0.09 | 0.51 ± 0.16 | 1.09 ± 0.03 | 0.80 ± 0.02 | 3.28 ± 0.15 | 0.51 ± 0.28 | 1.04 ± 0.05 |
| KM | 200 | Cation Exchange Capacity | 0.78 ± 0.04 | 3.44 ± 0.31 | 0.38 ± 0.47 | 0.99 ± 0.09 | 0.68 ± 0.12 | 4.22 ± 0.94 | 0.54 ± 0.44 | 0.84 ± 0.16 |
| KS | 200 | Cation Exchange Capacity | 0.82\* | 3.14\* | 0.67\* | 1.08\* | 0.82\* | 3.06\* | 0.31\* | 1.11\* |

\*Only represents one repetition. RPIQ: Ratio of Performance to Interquartile distance, which can be calculated as RPIQ=IQ/RMSE where IQ = Q3-Q1; IQ being the interquartile distance of the validation set, Q1 the median of the first half of the validation set and Q3 the median for the second half of the validation set.

# Appendix C. Summary of model performance to predict various soil properties (clay content, sand content, pH and cation exchange capacity) using two different regression models (Partial Least Square Regression (PLSR) and Cubist) with various sampling algorithms (Random, Kennard-Stone (KS), conditioned Latin Hypercube sampling (cLHS), k-Means(KM)) and calibration sample sizes (50-200) in the local dataset. The results reported are averages and standard deviations from 50 repetitions.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sampling Algorithm | Calibration sample size | Soil Property | PLSR | | | |  | Cubist | | |
| R2 | RMSE | bias | RPIQ | R2 | RMSE | bias | RPIQ |
| Random | 50 | clay | 0.67 ± 0.07 | 8.04 ± 0.85 | 1.96 ± 1.30 | 1.02 ± 0.11 | 0.66 ± 0.07 | 8.44 ± 0.96 | 3.07 ± 1.29 | 0.97 ± 0.11 |
| KS | 50 | clay | 0.62\* | 8.41\* | 2.32\* | 0.97\* | 0.72\* | 6.93\* | 1.06\* | 1.17\* |
| CLHS | 50 | clay | 0.68 ± 0.07 | 8.02 ± 0.93 | 2.52 ± 0.94 | 1.03 ± 0.12 | 0.66 ± 0.07 | 8.45 ± 0.80 | 3.36 ± 1.00 | 0.97 ± 0.09 |
| KM | 50 | clay | 0.67 ± 0.07 | 8.02 ± 0.73 | 2.23 ± 1.17 | 1.02 ± 0.09 | 0.65 ± 0.10 | 8.58 ± 1.40 | 3.17 ± 1.19 | 0.97 ± 0.13 |
| Random | 100 | clay | 0.74 ± 0.04 | 6.99 ± 0.47 | 1.90 ± 0.59 | 1.17 ± 0.08 | 0.70 ± 0.07 | 7.75 ± 0.84 | 2.85 ± 0.78 | 1.06 ± 0.11 |
| KS | 100 | clay | 0.72\* | 7.39\* | 2.49\* | 1.10\* | 0.72\* | 7.35\* | 2.65\* | 1.10\* |
| CLHS | 100 | clay | 0.73 ± 0.05 | 7.09 ± 0.62 | 2.11 ± 0.66 | 1.16 ± 0.10 | 0.70 ± 0.07 | 7.75 ± 0.89 | 3.02 ± 0.65 | 1.06 ± 0.12 |
| KM | 100 | clay | 0.73 ± 0.04 | 7.23 ± 0.50 | 2.17 ± 0.74 | 1.13 ± 0.08 | 0.67 ± 0.08 | 8.23 ± 1.04 | 3.13 ± 0.95 | 1.00 ± 0.13 |
| Random | 150 | clay | 0.76 ± 0.02 | 6.66 ± 0.35 | 1.89 ± 0.44 | 1.22 ± 0.07 | 0.71 ± 0.08 | 7.56 ± 0.92 | 2.77 ± 0.49 | 1.09 ± 0.11 |
| KS | 150 | clay | 0.76\* | 6.76\* | 2.19\* | 1.20\* | 0.75\* | 7.15\* | 2.91\* | 1.14\* |
| CLHS | 150 | clay | 0.75 ± 0.03 | 6.82 ± 0.44 | 1.99 ± 0.31 | 1.20 ± 0.08 | 0.71 ± 0.09 | 7.63 ± 1.35 | 2.84 ± 0.62 | 1.09 ± 0.12 |
| KM | 150 | clay | 0.75 ± 0.04 | 6.90 ± 0.59 | 2.04 ± 0.75 | 1.19 ± 0.10 | 0.68 ± 0.09 | 8.03 ± 1.21 | 2.83 ± 0.93 | 1.03 ± 0.15 |
| Random | 200 | clay | 0.77 ± 0.03 | 6.53 ± 0.38 | 1.88 ± 0.31 | 1.25 ± 0.07 | 0.73 ± 0.05 | 7.34 ± 0.64 | 2.77 ± 0.45 | 1.12 ± 0.09 |
| KS | 200 | clay | 0.79\* | 6.20\* | 1.49\* | 1.31\* | 0.70\* | 7.77\* | 2.75\* | 1.05\* |
| CLHS | 200 | clay | 0.77 ± 0.02 | 6.60 ± 0.30 | 2.00 ± 0.30 | 1.23 ± 0.06 | 0.74 ± 0.05 | 7.18 ± 0.60 | 2.63 ± 0.41 | 1.14 ± 0.09 |
| KM | 200 | clay | 0.73 ± 0.06 | 7.07 ± 0.79 | 2.04 ± 0.75 | 1.16 ± 0.12 | 0.63 ± 0.15 | 8.54 ± 1.87 | 3.03 ± 1.04 | 0.99 ± 0.19 |
| Random | 50 | sand | 0.61 ± 0.10 | 9.31 ± 1.24 | -2.08 ± 1.60 | 0.56 ± 0.07 | 0.62 ± 0.09 | 9.38 ± 1.29 | -3.30 ± 1.46 | 0.55 ± 0.07 |
| KS | 50 | sand | 0.54\* | 9.55\* | -2.36\* | 0.54\* | 0.64\* | 8.40\* | -2.43\* | 0.60\* |
| CLHS | 50 | sand | 0.61 ± 0.10 | 9.29 ± 1.41 | -2.44 ± 1.36 | 0.56 ± 0.07 | 0.63 ± 0.11 | 9.22 ± 1.33 | -3.18 ± 1.45 | 0.56 ± 0.08 |
| KM | 50 | sand | 0.59 ± 0.13 | 9.48 ± 1.77 | -2.42 ± 1.81 | 0.55 ± 0.08 | 0.65 ± 0.08 | 9.05 ± 1.21 | -2.80 ± 1.71 | 0.57 ± 0.07 |
| Random | 100 | sand | 0.68 ± 0.06 | 8.04 ± 0.75 | -2.04 ± 0.89 | 0.64 ± 0.06 | 0.67 ± 0.07 | 8.28 ± 0.95 | -2.55 ± 0.95 | 0.62 ± 0.07 |
| KS | 100 | sand | 0.63\* | 9.09\* | -3.49\* | 0.56\* | 0.69\* | 8.38\* | -3.77\* | 0.61\* |
| CLHS | 100 | sand | 0.65 ± 0.07 | 8.45 ± 0.83 | -2.31 ± 0.90 | 0.61 ± 0.06 | 0.66 ± 0.09 | 8.42 ± 1.10 | -2.73 ± 0.85 | 0.61 ± 0.08 |
| KM | 100 | sand | 0.63 ± 0.07 | 8.71 ± 1.03 | -2.41 ± 1.46 | 0.59 ± 0.07 | 0.61 ± 0.11 | 9.10 ± 1.41 | -2.74 ± 1.24 | 0.57 ± 0.09 |
| Random | 150 | sand | 0.69 ± 0.04 | 7.85 ± 0.51 | -1.99 ± 0.70 | 0.65 ± 0.04 | 0.68 ± 0.08 | 8.21 ± 1.16 | -2.56 ± 0.91 | 0.63 ± 0.08 |
| KS | 150 | sand | 0.66\* | 8.52\* | -3.27\* | 0.60\* | 0.77\* | 7.03\* | -2.83\* | 0.72\* |
| CLHS | 150 | sand | 0.68 ± 0.03 | 7.94 ± 0.43 | -2.00 ± 0.46 | 0.64 ± 0.04 | 0.68 ± 0.07 | 8.06 ± 0.93 | -2.37 ± 0.78 | 0.64 ± 0.08 |
| KM | 150 | sand | 0.64 ± 0.07 | 8.51 ± 1.00 | -2.26 ± 1.52 | 0.60 ± 0.07 | 0.60 ± 0.11 | 9.22 ± 1.57 | -2.82 ± 1.57 | 0.57 ± 0.10 |
| Random | 200 | sand | 0.70 ± 0.04 | 7.61 ± 0.50 | -1.85 ± 0.48 | 0.67 ± 0.04 | 0.68 ± 0.07 | 8.05 ± 0.89 | -2.45 ± 0.73 | 0.64 ± 0.07 |
| KS | 200 | sand | 0.66\* | 8.26\* | -2.66\* | 0.62\* | 0.67\* | 8.25\* | -2.93\* | 0.62\* |
| CLHS | 200 | sand | 0.70 ± 0.03 | 7.74 ± 0.40 | -2.06 ± 0.42 | 0.66 ± 0.03 | 0.69 ± 0.07 | 8.03 ± 0.99 | -2.51 ± 0.59 | 0.64 ± 0.07 |
| KM | 200 | sand | 0.62 ± 0.09 | 8.72 ± 1.20 | -2.42 ± 1.31 | 0.59 ± 0.08 | 0.52 ± 0.19 | 10.13 ± 2.63 | -3.13 ± 1.48 | 0.53 ± 0.13 |
| Random | 50 | pH | 0.57 ± 0.11 | 0.60 ± 0.10 | 0.04 ± 0.10 | 1.19 ± 0.17 | 0.45 ± 0.12 | 0.66 ± 0.09 | 0.00 ± 0.12 | 1.07 ± 0.14 |
| KS | 50 | pH | 0.58\* | 0.56\* | 0.00\* | 1.25\* | 0.51\* | 0.60\* | 0.02\* | 1.16\* |
| CLHS | 50 | pH | 0.58 ± 0.10 | 0.59 ± 0.09 | 0.01 ± 0.11 | 1.21 ± 0.18 | 0.46 ± 0.14 | 0.66 ± 0.10 | 0.02 ± 0.14 | 1.08 ± 0.18 |
| KM | 50 | pH | 0.60 ± 0.07 | 0.59 ± 0.09 | 0.00 ± 0.11 | 1.20 ± 0.18 | 0.48 ± 0.13 | 0.65 ± 0.14 | 0.00 ± 0.10 | 1.10 ± 0.18 |
| Random | 100 | pH | 0.65 ± 0.08 | 0.52 ± 0.07 | 0.01 ± 0.06 | 1.35 ± 0.17 | 0.63 ± 0.07 | 0.53 ± 0.05 | 0.04 ± 0.07 | 1.34 ± 0.13 |
| KS | 100 | pH | 0.66\* | 0.49\* | 0.03\* | 1.42\* | 0.58\* | 0.56\* | 0.00\* | 1.24\* |
| CLHS | 100 | pH | 0.66 ± 0.07 | 0.51 ± 0.07 | 0.03 ± 0.05 | 1.38 ± 0.17 | 0.63 ± 0.07 | 0.53 ± 0.06 | 0.02 ± 0.06 | 1.33 ± 0.15 |
| KM | 100 | pH | 0.64 ± 0.06 | 0.54 ± 0.07 | 0.02 ± 0.07 | 1.30 ± 0.16 | 0.60 ± 0.10 | 0.56 ± 0.08 | 0.03 ± 0.07 | 1.27 ± 0.17 |
| Random | 150 | pH | 0.68 ± 0.05 | 0.49 ± 0.04 | 0.01 ± 0.04 | 1.44 ± 0.12 | 0.68 ± 0.05 | 0.48 ± 0.04 | 0.04 ± 0.04 | 1.45 ± 0.13 |
| KS | 150 | pH | 0.73\* | 0.45\* | 0.04\* | 1.56\* | 0.64\* | 0.50\* | 0.02\* | 1.39\* |
| CLHS | 150 | pH | 0.71 ± 0.06 | 0.47 ± 0.06 | 0.02 ± 0.06 | 1.51 ± 0.15 | 0.69 ± 0.04 | 0.48 ± 0.04 | 0.03 ± 0.05 | 1.47 ± 0.11 |
| KM | 150 | pH | 0.65 ± 0.08 | 0.52 ± 0.07 | 0.00 ± 0.06 | 1.36 ± 0.18 | 0.60 ± 0.10 | 0.56 ± 0.09 | 0.03 ± 0.07 | 1.26 ± 0.19 |
| Random | 200 | pH | 0.72 ± 0.03 | 0.45 ± 0.03 | 0.01 ± 0.03 | 1.55 ± 0.09 | 0.72 ± 0.04 | 0.45 ± 0.04 | 0.04 ± 0.04 | 1.55 ± 0.13 |
| KS | 200 | pH | 0.76\* | 0.42\* | 0.04\* | 1.66\* | 0.73\* | 0.45\* | 0.07\* | 1.55\* |
| CLHS | 200 | pH | 0.73 ± 0.03 | 0.45 ± 0.03 | 0.01 ± 0.03 | 1.56 ± 0.09 | 0.72 ± 0.04 | 0.46 ± 0.04 | 0.05 ± 0.04 | 1.53 ± 0.11 |
| KM | 200 | pH | 0.65 ± 0.07 | 0.53 ± 0.07 | -0.03 ± 0.05 | 1.34 ± 0.17 | 0.55 ± 0.18 | 0.64 ± 0.20 | 0.00 ± 0.08 | 1.19 ± 0.32 |
| Random | 50 | Cation Exchange Capacity | 0.62 ± 0.06 | 5.96 ± 0.68 | 0.54 ± 0.86 | 0.84 ± 0.09 | 0.59 ± 0.07 | 5.95 ± 0.58 | 0.80 ± 1.00 | 0.84 ± 0.07 |
| KS | 50 | Cation Exchange Capacity | 0.59\* | 5.75\* | 0.66\* | 0.86\* | 0.65\* | 5.31\* | -0.13\* | 0.93\* |
| CLHS | 50 | Cation Exchange Capacity | 0.61 ± 0.07 | 6.04 ± 0.89 | 0.65 ± 0.97 | 0.83 ± 0.10 | 0.62 ± 0.05 | 5.72 ± 0.36 | 0.82 ± 0.86 | 0.87 ± 0.05 |
| KM | 50 | Cation Exchange Capacity | 0.62 ± 0.06 | 5.84 ± 0.63 | 0.64 ± 0.78 | 0.85 ± 0.09 | 0.60 ± 0.05 | 5.81 ± 0.44 | 0.80 ± 0.83 | 0.85 ± 0.06 |
| Random | 100 | Cation Exchange Capacity | 0.67 ± 0.04 | 5.56 ± 0.48 | 0.41 ± 0.49 | 0.89 ± 0.08 | 0.65 ± 0.05 | 5.41 ± 0.39 | 0.64 ± 0.64 | 0.92 ± 0.06 |
| KS | 100 | Cation Exchange Capacity | 0.68\* | 5.13\* | 0.80\* | 0.96\* | 0.69\* | 5.11\* | 0.78\* | 0.97\* |
| CLHS | 100 | Cation Exchange Capacity | 0.68 ± 0.04 | 5.42 ± 0.46 | 0.63 ± 0.56 | 0.92 ± 0.07 | 0.64 ± 0.08 | 5.59 ± 0.89 | 0.72 ± 0.84 | 0.90 ± 0.09 |
| KM | 100 | Cation Exchange Capacity | 0.67 ± 0.06 | 5.47 ± 0.81 | 0.28 ± 0.51 | 0.92 ± 0.11 | 0.65 ± 0.04 | 5.43 ± 0.36 | 0.54 ± 0.56 | 0.91 ± 0.06 |
| Random | 150 | Cation Exchange Capacity | 0.69 ± 0.03 | 5.37 ± 0.44 | 0.48 ± 0.39 | 0.92 ± 0.07 | 0.68 ± 0.05 | 5.19 ± 0.48 | 0.55 ± 0.45 | 0.96 ± 0.08 |
| KS | 150 | Cation Exchange Capacity | 0.70\* | 5.20\* | 1.01\* | 0.95\* | 0.64\* | 5.49\* | 0.83\* | 0.90\* |
| CLHS | 150 | Cation Exchange Capacity | 0.70 ± 0.03 | 5.28 ± 0.35 | 0.49 ± 0.42 | 0.94 ± 0.06 | 0.68 ± 0.04 | 5.14 ± 0.37 | 0.57 ± 0.47 | 0.97 ± 0.07 |
| KM | 150 | Cation Exchange Capacity | 0.66 ± 0.06 | 5.68 ± 0.78 | 0.38 ± 0.56 | 0.88 ± 0.11 | 0.64 ± 0.10 | 5.56 ± 0.99 | 0.57 ± 0.58 | 0.91 ± 0.13 |
| Random | 200 | Cation Exchange Capacity | 0.71 ± 0.02 | 5.17 ± 0.21 | 0.56 ± 0.24 | 0.96 ± 0.04 | 0.69 ± 0.03 | 5.08 ± 0.33 | 0.55 ± 0.36 | 0.98 ± 0.06 |
| KS | 200 | Cation Exchange Capacity | 0.73\* | 4.78\* | 0.54\* | 1.03\* | 0.61\* | 5.71\* | 0.28\* | 0.86\* |
| CLHS | 200 | Cation Exchange Capacity | 0.70 ± 0.02 | 5.26 ± 0.20 | 0.66 ± 0.21 | 0.94 ± 0.04 | 0.69 ± 0.04 | 5.04 ± 0.40 | 0.52 ± 0.32 | 0.99 ± 0.08 |
| KM | 200 | Cation Exchange Capacity | 0.65 ± 0.07 | 5.89 ± 0.88 | 0.57 ± 0.53 | 0.86 ± 0.12 | 0.60 ± 0.14 | 6.03 ± 1.52 | 0.61 ± 0.54 | 0.86 ± 0.16 |

\*Only represents one repetition. RPIQ: Ratio of Performance to Interquartile distance, which can be calculated as RPIQ=IQ/RMSE where IQ = Q3-Q1; IQ being the interquartile distance of the validation set, Q1 the median of the first half of the validation set and Q3 the median for the second half of the validation set.