Mn\_Manganese

###Repeated\_CV

Recursive feature selection

Outer resampling method: Cross-Validated (5 fold, repeated 3 times)

Resampling performance over subset size:

Variables RMSE Rsquared MAE RMSESD RsquaredSD MAESD Selected

1 3.738 0.3060 2.766 1.941 0.3567 1.2116

2 3.548 0.4774 2.832 1.629 0.2600 1.1152

3 3.680 0.3348 2.952 1.479 0.2555 1.0086

4 3.678 0.2923 2.953 1.406 0.2720 0.9463

5 3.593 0.2977 2.951 1.404 0.2778 0.9232

6 3.604 0.3001 2.898 1.448 0.2083 0.9649

7 3.511 0.2682 2.803 1.447 0.2074 0.9490

8 3.398 0.2917 2.730 1.466 0.2128 0.9310 \*

9 3.507 0.2972 2.780 1.485 0.2082 0.9559

10 3.458 0.2334 2.750 1.500 0.1834 0.9690

11 3.477 0.2590 2.779 1.501 0.1796 0.9623

12 3.497 0.2704 2.795 1.536 0.2061 1.0004

13 3.483 0.2477 2.798 1.512 0.2482 0.9985

14 3.467 0.2617 2.783 1.502 0.2382 0.9732

15 3.492 0.2050 2.787 1.485 0.2355 0.9247

16 3.530 0.1832 2.829 1.476 0.1905 0.9089

17 3.523 0.2459 2.858 1.462 0.2251 0.9293

18 3.533 0.2353 2.837 1.448 0.2571 0.9280

19 3.459 0.2363 2.801 1.463 0.2763 0.9323

20 3.482 0.2206 2.788 1.452 0.2265 0.9162

21 3.458 0.2491 2.744 1.472 0.2711 0.9634

22 3.492 0.2175 2.785 1.425 0.2525 0.8850

23 3.522 0.2568 2.816 1.403 0.2901 0.8794

24 3.517 0.2456 2.814 1.441 0.3143 0.8944

25 3.575 0.2579 2.886 1.390 0.3117 0.8667

26 3.566 0.2660 2.856 1.407 0.3029 0.8746

27 3.594 0.2650 2.883 1.420 0.2845 0.8681

28 3.651 0.2659 2.921 1.402 0.2909 0.8945

29 3.575 0.2463 2.888 1.409 0.2836 0.8955

30 3.592 0.2105 2.876 1.413 0.2805 0.8971

31 3.586 0.2180 2.874 1.417 0.2777 0.8987

32 3.599 0.2890 2.902 1.408 0.3356 0.8931

33 3.583 0.2441 2.885 1.426 0.3042 0.9048

34 3.589 0.2706 2.886 1.416 0.2864 0.9045

35 3.593 0.2264 2.895 1.380 0.2826 0.8679

36 3.698 0.2696 2.978 1.408 0.3227 0.9183

37 3.682 0.2541 2.959 1.424 0.2824 0.9531

38 3.659 0.2629 2.920 1.425 0.3104 0.9135

39 3.647 0.1950 2.903 1.407 0.3009 0.9229

40 3.651 0.2154 2.905 1.422 0.3199 0.9335

41 3.649 0.2263 2.888 1.404 0.2912 0.9207

The top 5 variables (out of 8):

pH\_khavr, ci\_mean\_kh, ndvi\_mean\_kh, Sen\_B02\_30m\_aoi, b4\_reflectance

predictors(result\_rfe1)

[1] "pH\_khavr" "ci\_mean\_kh" "ndvi\_mean\_kh"

[4] "Sen\_B02\_30m\_aoi" "b4\_reflectance" "Twi\_kh"

[7] "bio\_15\_khavr" "b7\_reflectance"

###Repeated\_LOOCVLGOCV

Recursive feature selection

Outer resampling method: Leave-One-Out Cross-Validation

Resampling performance over subset size:

Variables RMSE Rsquared MAE Selected

1 4.579 0.068681 3.033

2 3.910 0.006999 2.833

3 3.868 0.015042 2.785

4 3.969 0.043808 2.947

5 4.028 0.090389 2.969

6 4.071 0.038090 2.996

7 3.883 0.021468 2.841

8 3.862 0.028194 2.818

9 3.870 0.020794 2.808

10 3.853 0.052370 2.799 \*

11 3.878 0.052739 2.820

12 3.891 0.049959 2.819

13 4.018 0.102956 2.914

14 4.003 0.088730 2.944

15 4.129 0.101511 3.094

16 4.038 0.103466 2.972

17 4.045 0.122295 3.007

18 4.074 0.095957 2.989

19 4.149 0.143671 3.104

20 4.137 0.169870 3.076

21 4.042 0.103455 2.973

22 4.091 0.133516 3.029

23 4.038 0.140063 2.934

24 4.003 0.104575 2.926

25 4.104 0.171175 3.064

26 4.067 0.161248 3.044

27 4.096 0.163620 3.037

28 4.050 0.124635 2.973

29 4.096 0.187113 3.068

30 4.082 0.153581 3.030

31 4.095 0.161501 3.058

32 4.060 0.172623 3.018

33 4.047 0.139091 3.018

34 4.020 0.123125 2.935

35 4.016 0.152234 2.971

36 4.020 0.135204 2.938

37 4.012 0.115560 2.983

38 4.006 0.149227 2.928

39 4.021 0.142092 2.977

40 3.958 0.093828 2.836

41 4.107 0.114911 3.054

The top 5 variables (out of 10):

pH\_khavr, ci\_mean\_kh, ndvi\_mean\_kh, b2\_reflectance, Sen\_B02\_30m\_aoi

> predictors(result\_rfe1)

[1] "pH\_khavr" "ci\_mean\_kh" "ndvi\_mean\_kh"

[4] "b2\_reflectance" "Sen\_B02\_30m\_aoi" "b7\_reflectance"

[7] "Sen\_B12\_Mean\_30m\_aoi" "gndvi\_mean\_kh" "sgsi\_mean\_kh"

[10] "Sen\_B03\_Mean\_30m\_aoi"

###Repeated\_LGOCV

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| Recursive feature selection  Outer resampling method: Repeated Train/Test Splits Estimated (25 reps, 75%)  Resampling performance over subset size:  Variables RMSE Rsquared MAE RMSESD RsquaredSD MAESD Selected  1 3.821 0.4142 3.183 1.5065 0.3291 1.2485  2 3.350 0.3768 2.756 1.2896 0.2988 0.9659  3 3.201 0.4475 2.657 1.1688 0.3498 0.8503  4 3.150 0.3792 2.628 1.0585 0.3161 0.7451  5 3.144 0.3673 2.647 0.9861 0.2384 0.6562  6 3.117 0.3922 2.582 1.0638 0.3091 0.7099  7 3.090 0.3609 2.572 1.0379 0.2897 0.6740  8 3.099 0.3429 2.587 1.0039 0.2804 0.6497  9 3.057 0.4044 2.534 1.0588 0.3277 0.7303  10 3.045 0.3477 2.536 1.0098 0.2886 0.6738 \*  11 3.046 0.4074 2.568 1.0322 0.3101 0.7205  12 3.085 0.3929 2.591 1.0342 0.3289 0.7295  13 3.065 0.3819 2.574 1.0340 0.3149 0.7339  14 3.085 0.3468 2.600 1.0032 0.2636 0.7256  15 3.094 0.3688 2.591 1.0064 0.3025 0.7324  16 3.095 0.3984 2.596 1.0496 0.3033 0.7797  17 3.131 0.3360 2.644 0.9759 0.2773 0.6846  18 3.118 0.3940 2.623 1.0288 0.2682 0.7498  19 3.187 0.3471 2.689 0.9669 0.2538 0.6733  20 3.120 0.3227 2.653 0.9713 0.2676 0.6919  21 3.147 0.3254 2.689 0.9948 0.2785 0.7323  22 3.131 0.3667 2.654 0.9725 0.2615 0.7143  23 3.151 0.3340 2.701 0.9515 0.2378 0.6828  24 3.072 0.2570 2.616 0.9412 0.2461 0.6688  25 3.090 0.2879 2.637 0.9246 0.2528 0.6616  26 3.058 0.3771 2.600 0.9458 0.2917 0.6743  27 3.116 0.3422 2.642 0.9829 0.2743 0.7188  28 3.119 0.3118 2.661 0.9904 0.2467 0.7280  29 3.103 0.3442 2.645 0.9806 0.2734 0.7296  30 3.131 0.3504 2.650 0.9927 0.2831 0.7380  31 3.130 0.3556 2.664 1.0152 0.2967 0.7531  32 3.135 0.3416 2.651 1.0306 0.2606 0.7736  33 3.106 0.3269 2.619 1.0011 0.2599 0.7461  34 3.067 0.3279 2.601 0.9882 0.2857 0.7352  35 3.064 0.2975 2.600 0.9623 0.2542 0.7121  36 3.112 0.2986 2.636 0.9683 0.2498 0.7257  37 3.154 0.3274 2.673 1.0171 0.2501 0.7662  38 3.122 0.3437 2.641 1.0094 0.2333 0.7553  39 3.159 0.3440 2.676 1.0322 0.2507 0.7759  40 3.112 0.3074 2.641 0.9865 0.2098 0.7089  41 3.138 0.3379 2.653 1.0088 0.2685 0.7574  The top 5 variables (out of 10):  pH\_khavr, ci\_mean\_kh, Sen\_B02\_30m\_aoi, Sen\_B08\_Mean\_30m\_aoi, Twi\_kh  > predictors(result\_rfe1)  [1] "pH\_khavr" "ci\_mean\_kh"  [3] "Sen\_B02\_30m\_aoi" "Sen\_B08\_Mean\_30m\_aoi"  [5] "Twi\_kh" "sgsi\_mean\_kh"  [7] "ndvi\_mean\_kh" "Sen\_B12\_Mean\_30m\_aoi"  [9] "b6\_reflectance" "GNDVI\_Mean\_Sentinel\_khavr" |
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