99-8 Is the Textural Classification Built on Sand?.

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Abstract:

In 1967, the Committee of the Soil Science Society of America noted that the current system of particle size boundaries arose due to geographic accident. The committee noted that there is “no narrowly defineable natural particle size boundaries that would be equally significant in all soil materials". Having three textural size ranges, i.e. sand, silt, and clay undoubtedly appears to be convenient for data presentation and textural class definition. However, it is not warranted that current sand, silt, and clay size ranges can provide the best representation of soil texture when these three size ranges are used for pedotransfer purposes. The objective of this work was to test the hypothesis that the cumulative particle size distribution and soil bulk density can be estimated more accurately if the boundaries of the sand, silt, and clay size ranges will be shifted. We used the entropy-based representation of particle size distributions to convert the three class particle size representation into particle size distributions and to define ranges of soil textural heterogeneity. Experimental data on seven size fraction contents and bulk density for 6300 predominantly coarse-texture soil samples were extracted from the USKSAT database. The predicted cumulative particle size distribution was not significantly different from the measured at 95% probability level in 25% of soils when the traditional sand, silt, and clay percentages were used for prediction, and in 85% of soils when very coarse, coarse, medium sand (fraction 1), fine and very fine sand (fraction 2) and clay and silt (fraction 3) were used. Similarly, the prediction of mean bulk density for the soils with different textural entropy resulted in the coefficient of determination of 0.001 when the traditional sand, silt, and clay percentages were used for prediction and in the coefficient of determination greater than 0.95 when very coarse, coarse, medium sand (fraction 1), fine and very fine sand (fraction 2) and clay and silt (fraction 3) were used. Overall, the textural size range selection may be more efficient in PTF development if it reflects the specifics of the task in hand and the dominant textural classes.

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