OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need: Suitability of color contrast classes for forensic soil comparisons.

Keyword(s): Soil color

Submitting subcommittee(s): Geologic Materials **Date Approved:** 07/12/2019

(If SAC review identifies additional subcommittees, add them to the box above.)

Background Information:

1. Description of research need:

The NRCS soil survey color contrast classes were adapted for the basis of color comparison thresholds for forensic soil comparisons. The threshold from faint to distinct color differences, modified with an expanded hue range for chroma under 2, are integrated into decision criterial for forensic soil comparison in the draft ASTM guide, originating from OSAC-GEO.

The quantitation of these existing and augmented color contrast thresholds by means of the DE00 metric of color could validate that these thresholds are meaningful and appropriate.

2. Key bibliographic references relating to this research need:

D.E. Beaudette, Soil Color Contrast, 2019-06-04 http://ncss-tech.github.io/AQP/aqp/color-contrast.html

Determination and Comparison of Color by Visual Observation in Forensic Soil Examination

Soil Science Division Staff, "Examination and Description of Soil Profiles," Chapter 3, In: Ditzler C., Scheffe K., Monger, H. C., editors. Soil Survey Manual, USDA Handbook 18. Washington, D.C.: Government Printing Office; 2017, p. 603.

Soil Survey Staff. Soil Color Contrast, Soil Survey Technical Note No. 2, National Soil Survey Center, Lincoln, NE. 2002.

Bigham, J. M., and Ciolkosz, E. J., editors, Soil Color, Soil Science Society of America Special Publication 31. Soil Science Society of America, Madison, WI, 1993, p 159.

Schoeneberger, P. J., Wysocki, D. A., Benham, E. C., and Soil Survey Staff. Field Book for Describing and Sampling Soils, Version 3.0, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. 2012, p. 300.

Dudley, R.J., 1975. "The use of colour in the discrimination between soils," Journal of the Forensic Science Society, Vol 15, No. 3, pp. 209-218.

Sugita, R. and Marumo, Y., "Validity of Color Examination for Forensic Soil Identification," Forensic Science International, Vol 83, 1996, pp. 201-210.

Post, D. F., Bryant, R. B., Batchily, A. K., Huete, A. R., Levine, S. J., Mays, M. D., Escadafal, R. "Correlations Between Field and Laboratory Measurements of Soil Color", ch.3 In, Soil Color, SSSA Spec. Publ. 31. SSSA, Madison, WI. 1993. pp. 35-49.

Rabenhorst, M., Thompson, J. A., Schmehling, A., and Rossi, A. M. "Reliability of Soil Color Standards," Soil Science Society of America Journal, Vol. 79 No.1, 2015, pp. 193-199.

Sánchez-Marañón, M., Huertas, R. and Melgosa, M., "Colour Variation in Standard Soil-Colour Charts," Soil Research, Vol 43, No. 7, 2005, pp. 827-837.

Kirillova, N. P., Grauer-Gray, J., Hartemink, A. E., Sileova, T. M., Artemyeva, Z. S. and Burova, E. K., "New perspectives to use Munsell color charts with electronic devices," Computers and Electronics in Agriculture, Vol 155, 2018, pp. 378-385.

Thompson, J. A., Pollio, A. R., and Turk, P. J., "Comparison of Munsell Soil Color Charts and the GLOBE Soil Color Book," Soil Science Society of America Journal, Vol 77, 2013, pp. 2089-2093.

Janssen D. W., Ruhf W. A., and Prichard, W. W., "The Use of Clay for Soil Color Comparisons," Journal of Forensic Science, Vol 28 No. 3, July 1983, pp. 773-776.

Rabenhorst, M. C., Matovich, M. M., Rossi, A. M., and Fenstermacher D. E., "Visual Assessment and Interpolation of Low Chroma Soil Colors," Soil Science Society of America Journal, Vol 78, 2014, pp. 567-570.

Marqués-Mateu Á., Moreno-Ramón H., Balasch S., and Ibáñez-Asensio S., "Quantifying the uncertainty of soil colour measurements with Munsell charts using a modified attribute agreement analysis," Catena, Vol 1, 2018, pp. 171:44-53.

3a. In what ways would the research results improve current laboratory capabilities?

This could provide objective thresholds for forensic soil color comparison.

3b. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

This evaluation would quantify the color difference among soil color standards and thus quantify the color contrast thresholds.

3c. In what ways would the research results improve services to the criminal justice system?

This would validate practices for forensic soil comparison and validate the approaches for soil color contrast used in pedology.

4. Status assessment (I, II, III, or IV): IV

	Major gap in current knowledge	Minor gap in current knowledge
No or limited current research is being conducted	I	III
Existing current research is being conducted	II	IV

This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.

Approvals:

Subcommittee

Approval date: 07/12/2019

(Approval is by majority vote of subcommittee. Once approved, forward to SAC.)

SAC

1. Does the SAC agree with the research need? Yes ☐ No ☐
2. Does the SAC agree with the status assessment? Yes ☐ No ☐

If no, what is the status assessment of the SAC: ☐

Approval date: ☐

(Approval is by majority vote of SAC. Once approved, forward to NIST for posting.)