



OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need:

Assessing the suitability of existing resources from the Geology and Soil Science communities to supplement forensic geology interpretations of soil mineralogy (XRD and/or PLM)

Keyword(s):

Mineralogy, geology, soils

Submitting subcommittee(s):

Geological 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:

In the analysis of forensic soil evidence, identification minerals is completed for 1) comparison to soils from a known source (crime scene, alibi location), and 2) to aid in geographic attribution. In both contexts, the rarity or commonness of a mineral species within the location or region of interest can provide context to the weight of the evidence or provide an investigative lead for search efforts. In addition access to elemental chemistry of minerals (NOT the elemental chemistry of bulk rocks or soils) would be an excellent resource. The availability and reliability of reference data is useful to interpretation of soil mineralogy.

2. Key bibliographic references relating to this research need:

Smith, D.B., Cannon, W.F., Woodruff, L.G., Solano, Federico, Kilburn, J.E., and Fey, D.L., 2013, Geochemical and mineralogical data for soils of the conterminous United States: U.S. Geological Survey Data Series 801, 19 p., <https://pubs.usgs.gov/ds/801/>.

National Cooperative Soil Survey, National Cooperative Soil Survey Characterization Database, <http://ncsslabdatamart.sc.egov.usda.gov/>

National geologic map database https://ngmdb.usgs.gov/ngmdb/ngmdb_home.html

<https://www.mindat.org/>

<http://navdat.org/NavdatSearch/Set.cfm?SetParameter=rockmode&form.pkey=95508>

<http://georoc.mpch-mainz.gwdg.de/georoc/>

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

1. For geographic attribution for forensic soil evidence, better access to the available data on mineral occurrence +/- mineral abundance +/- mineral chemistry would help investigations
2. For forensic soil comparisons, better access to the available data on mineral occurrence +/- abundance +/- mineral chemistry would enable examiner to testify when observed minerals are common or rare and if they are common or rare within the area of interest

3. If existing databases can be demonstrated to be suitable for forensic applications, this would support their use by forensic soil scientists

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

The scattered (but usually high quality) mineralogical identification and chemical characterization of minerals could be of great use in support of forensic geology exams. However, these data are usually created for specific studies instead of central repository. An understanding of their suitability for use in forensic applications would provide valuable guidance to forensic geologists who are making decisions about how to use these resources.

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

Better access to a universal source of published mineralogical data might enable smaller forensics laboratory to offer better interpretation of soil examinations.

The accuracy of soil and geologic maps (both spatially and in their categorical descriptions) greatly affect the potential utility for their use in forensic geology casework.

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

III

	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.)