

ICOMANTH

An International Committee for Anthropogenic Soils

Summary Report

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Introduction

- All documents are available at the ICOMANTH web site:
<http://clic.cses.vt.edu/ICOMANTH/>
- ICOMANTH formed in 1995, is nearing retirement.
- The term “Anthropogenic” soils has been objected to and often replaced with “human-altered and human-transported” soils.

The Needs:

- Urban users demanded soil survey information
- Urban soils all classified as Orthents, not enough specificity
- Most mine soils classified the same as un-mined Orthents
- Arents consisted of both deep-plowed, urban and dredged spoil
- Human-created irregular carbon decrease allocated the same as Fluvents
- Manufactured materials not in the System
- Hard to identify which parts of the soil are transported
- Inconsistent methods for describing altered soils
- May help identify human health hazard areas

Background

- Circular letter 1 (August-1995) – Established committee charges, and posed basic questions about “anthropogenic” soils.
- Circular Letter 2 (August, 1997) – Discussed types of human activities and human-modified materials, a history of the ways that human-altered or human-transported soils occur in Soil Taxonomy, and posed new questions.
- Circular letter 3 (January, 1998) – Compiled responses to the questions from Circular 2 and asked 10 more questions in anticipation of the International Tour of NV and CA in 1998. Used trip for testing of concepts from the international community.

Background (continued)

- Circular letter 4 (July, 2003) – Distribution of Version 1.0 of the Anthropogenic Soils CD-ROM, discussed possible additions and changes to Soil Taxonomy, answered commonly-asked questions, and posed new questions.
- Circular letter 5 (March, 2005) – Announced distribution of Version 2.0 of the Anthropogenic Soils CD-ROM; and
- Proposed changes to the USDA-NRCS soil survey system. The USDA-NRCS system is defined here to include Soil Taxonomy, Keys to Soil Taxonomy, the Soil Survey Manual, NASIS, the National Soil Survey Handbook , and the Field Book for Describing and Sampling Soils (Ver. 2).

Circular Letter 6

- Circular letter 6 (June, 2006) – Provided examples of applications of the proposed changes from letter 5, and the rationale. Almost all were adopted and implemented under the direction of Craig Ditzler, USDA-NRCS, Lincoln, NE.
- The purpose was to allow for consistency in describing human-altered and human-transported (HAHT) soils.
- Proposed New Terms for Human-altered and –transported Soils:
 - Defined Human-transported Materials (HTM)
 - Defined constructional landforms
 - Anthropogenic features (now microfeatures)
 - Manufactured layers and material types ...

Circular Letters 6 (continued)

- Artifacts
 - Types
 - Sizes
 - Abundance
 - Rupture resistance
- Added artifacts as a type of coarse fragment
- Added “artifacts” and “manufactured layers” as terms in lieu of texture

Circular Letters 6 (continued)

- Horizon names:
 - Prefix – caret ^ used to identify horizons formed in human-transported material (HTM)
 - master horizon – M for manufactured layer (asphalt, concrete, geotextile, plastic, rubber) used as a root-limiting subsurface layer. The upper surface is a contact.
 - Suffix – u for the presence of artifacts

Review of ICOMANTH History

- Components of adding HAHT soils:
 - Identify the subject
 - Define types of HAHT soils
 - Identify the user needs
 - Begin to survey (NYC)
 - Tour the subject (NV, CA), later NYC
 - Invite international comment
 - Questions and answers
 - Literature review
 - Proposals for use in making descriptions, database entries, new series and mapping

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Circular letter 7

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Introduction

- Between 2006 and 2011, the terms and methods were tested in the field, and modified. The terms were added to the Soil Survey System and are now in the literature.
- Added in Ch. 17 and 18 - Keys to Soil Taxonomy, 11th Ed.
- Soil series were proposed and surveys made.
- Soils in Urban, Industrial, Traffic, Mining and Military Areas (SUITMA), an IUSS Working Group held a meeting in NYC in 2009.
- After testing, it was time to add taxa for human-altered and human-transported (HAHT) soils.

Background

- Major Questions unresolved:
 - Should taxa be added as a new order, suborders, or lower?
 - Can HAHT materials be recognized consistently and defined as differentiae?
 - Can HAHT soils be allocated consistently?
 - Should we survey contaminated and landfill soils?
 - Should we separate soils according to orders in WRB?
 - Will we have to split existing series and remap areas?

Solutions Proposed – Taxa Levels

- Adding taxa at a high level makes it more difficult to propose new soil series, and proliferates empty placeholder taxa. For example, we have no Inceptisols that identify a plaggen or anthropic epipedon, but we have Anthrepts, Plagganthrepts and Haplanthrepts in case.
- Adding soils at the subgroup and family level allows easy formation of series, identifies properties critical to producing interpretive maps, and can be used in any existing subgroup or great group without adding taxa above.

Solutions Proposed – Consistently Identifying (allocating) HAHT Soils From Less Altered Soils

- Defining artifacts, HAM, HTM, manufactured layers and contacts as root-limiting layers in Chapter 3 allows them to be used as diagnostic criteria.
- Redefining the epipedons allows them to be consistent and prevent overlapping properties with anthropic and plaggen. The P limits were not needed, but artifacts or other evidence of human-alteration are.
- Defining HTM as a type of mantle allows consistent identification of buried soils. These three now all have defined limits. (proposed to make the limit 50 cm).

Solutions- Allocating HAHT Soils

- Adding and defining a new family class for soils with substantial HAHT on top allows for consistent specificity not present in all orders through subgroups. The added specifics are needed because many HAHT soils are Entisols and they are missing diagnostic horizons that give basic information in other orders.
- Removing empty taxa above the subgroup puts allocation of HAHT soils equal across orders.
- Renaming series that are Arents and Udorthents and a few others improves the specificity while allowing us to find those HAHT soils.

Comparisons – Former Arents

Before	After
Fine-loamy, mixed, mesic Sodic Torriarents	Fine-loamy, araric , mixed, mesic Sodic Anthralitic Torriorthents
Coarse-loamy, mixed, mesic Alfic Xeroarents	Coarse-loamy, araric , mixed, mesic Anthraltic Xerorthents
Loamy-skeletal, mixed, mesic Typic Ustarents	Loamy-skeletal, wastispolic , mixed, calcareous, mesic Anthroportic Ustorthents
Fine, mixed, thermic Alfic Udarents	Fine, dredgic , mixed, acid, thermic Anthroportic Udorthents

Comparisons – Urban Soils

Before	After
Coarse-loamy, mixed, acid, mesic Typic Udorthents	Coarse-loamy, spolic , mixed, acid, mesic Anthroportic Udorthents
Loamy-skeletal, mixed, calcareous, mesic Typic Udorthents	Loamy-skeletal, spolic , mixed, calcareous mesic Anthroportic Ustorthents
Sandy or Sandy-skeletal, mixed, mesic Typic Udipsamments	Sandy or Sandy-skeletal, combustic , mixed, mesic Anthroportic Udipsamments

Solutions- Allocating HAHT Soils

- A specific set of subgroups suggested for HAHT will allow us to pull a set of HAHT soils from the OSEDs database.
- Exclusion statements now prevent irregular carbon distribution for allocating HAHT soils with Fluvents, Fluventic, Fluvaquentic, and Cumulic subgroups.
- Geomorphic properties, artifacts, and microfeatures can now be used as soil properties.

Contaminated HAHT Soils

- Should we survey contaminated and landfill soils?
- Only when the health and safety of the survey can be protected.
- The soils can be described using remote methods, sensors, and ancillary data.
- The soils should not be sampled and analyzed in the soils lab unless pre-tested for dangerous pollutants.
- Like it or not people live in, on, and grow gardens in contaminated soils. We cannot pretend they do not exist.

Classify Similar to WRB?

- The World Reference Base for Soils has a different purpose than Soil Taxonomy and is a soil legend referencing system.
- Their classes include Anthrosols and Technosols soil orders.
- The definitions do not fit into our hierarchical system for making and interpreting soil surveys.
- However, we can correlate to their orders by using the specific taxa and family classes proposed.

Split Series and Remap?

- NO. But, some series will be reallocated and renamed.

Associated Changes to NSSH

- Anthropogenic Features will be decommissioned as a broad category (NASIS data element).
- The term will be replaced by three new categories in NASIS to describe geomorphic items at the earth's surface or in shallow water.
- **Anthroscape** – A human-modified “landscape” of substantial and permanent alterations
- **Anthropogenic Landform** - A discrete, human-made “landform” on the earth's surface. Constructional and destructional (excavated)
- **Anthropogenic Microfeature** - A discrete, individual, human-derived form. Constructional, destructional, and buried

Summary of Changes

- A summary of the changes accepted and proposed by ICOMANTH to be added to the NRCS soil survey system and Soil Taxonomy include:
 - 1) Definition of human-transported materials added to Ch. 3.
 - 2) Definition of anthropogenic landscapes, landforms, and microfeatures added to Ch. 3.
 - 3) Manufactured layers and manufactured layer contact defined, added to Ch. 3.
 - 4) Definition of terms for artifacts added to NRCS soil survey system including NSSH and NASIS and Ch 3, except:
 - a) Safety categories (not accepted).
 - b) Size Categories (not accepted).
 - c) Type categories defined (not accepted, individual type described).

Specific Changes

- Proposed Action 3: Modify the definition of the anthropic epipedon to delete duplicate requirements that are the same as mollic epipedon, remove the P criteria.
- Proposed Action 4: Change the definition of the epipedons to exclude human-transported materials, anthraquic conditions, artifacts, and manuring (Plaggen) evidence.
- Proposed Action 12: Modify and move definition of Surface Mantle of New Soil Material from Chapter 1 to Chapter 3.

Specific Changes

- Proposed Action 29: Clearly define and propose a consistent set of additional extragrade subgroup formative elements for use throughout Soil Taxonomy.
 - Anthraltic (from Gr. *Anthropos*, Human and L. *alterāre*, to change).
 - Anthraquic (clearly defined anthraquic conditions).
 - Anthroportic (from Gr. *Anthropos* Human and L. *portāre* to carry) (i.e., the materials described in the Arents suborder).
 - Humic (meets the color and carbon requirements of the mollic epipedon throughout), can be used with the others above.
 - Plaggic (have an plaggen epipedon)
 - Plagghaplic (have 25 cm of material that qualifies for plaggen epipedon but not ther required 50 cm).

Discussion

- Your turn to ask questions