



Soil Landscapes of the United States

(SOLUS) - Mapping Soil Parent Material Terms for Educators



Sharon W. Waltman¹, Philip Schoeneberger², Douglas A. Wysocki², James A. Thompson³, and Darrell G. Schulze⁴

¹ USDA-NRCS, NSSC - Geospatial Research Unit, Morgantown, WV, ²USDA-NRCS, National Soil Survey Center (NSSC), Lincoln, NE,

³West Virginia University, Morgantown, WV, ⁴Purdue University, West Lafayette, IN

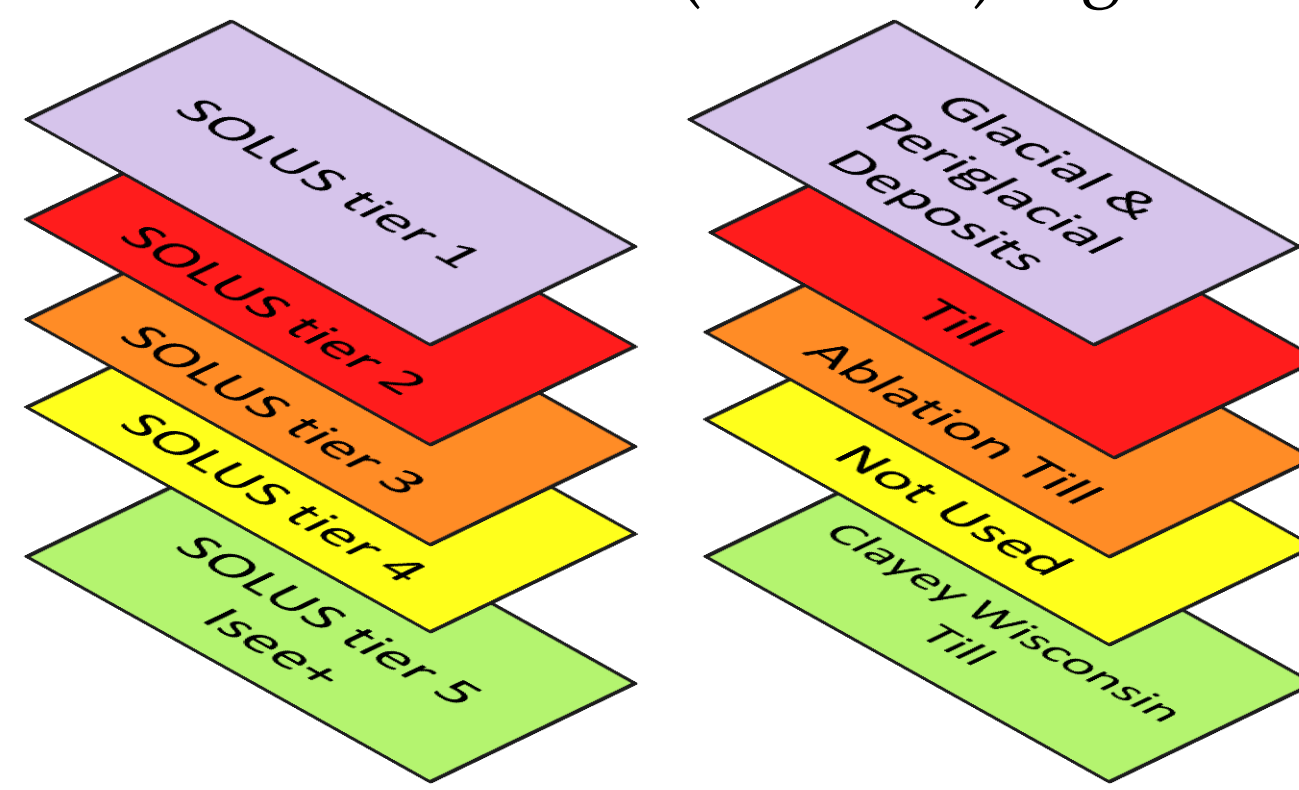
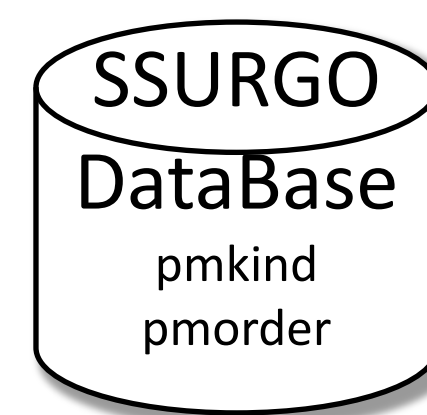
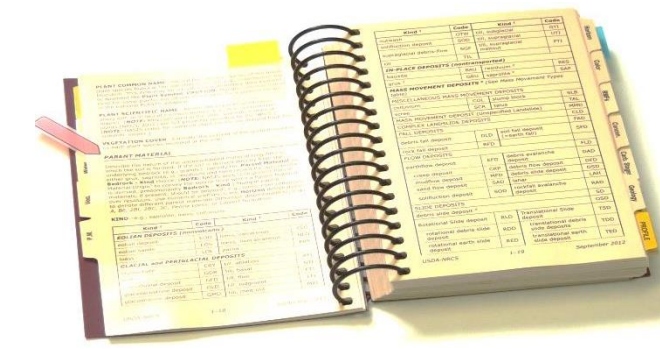
Method

- Organized USDA - Soil Survey Geographic Database (SSURGO) parent material kind terms into five hierarchical tiers (called SOLUS PM tiers 1-5) to reduce complexity
- Linked five SOLUS PM tiers to gSSURGO map unit components via 119 unique *pmkind* attributes
- Assigned default values of "1" to parent material order when NULL to extend usefulness of SSURGO source
- Assembled map unit majority parent material order and kind based on representative component percentage
- Mapped SOLUS tier 1 result using gSSURGO MapUnitRaster_30m map layer for Conterminous US (CONUS) Fig. 1

- Compare resulting map layer using Major Land Resource Areas (2006) geographic concepts
- Evaluate flexible 5th SOLUS tier for meeting local educator needs (derived using Isee+ parent material legend key)
- Link SOLUS tiers 1-5 to Isee+ Web Mercator Tile Levels (web service cache layers) to geospatially contextualize parent material concepts
- Test and evaluate SOLUS parent material hierarchy as web map services in Isee+ research project
- Review and update existing SSURGO parent material geographic and attribute concepts

Next Steps

Field Book PM Groups



Results

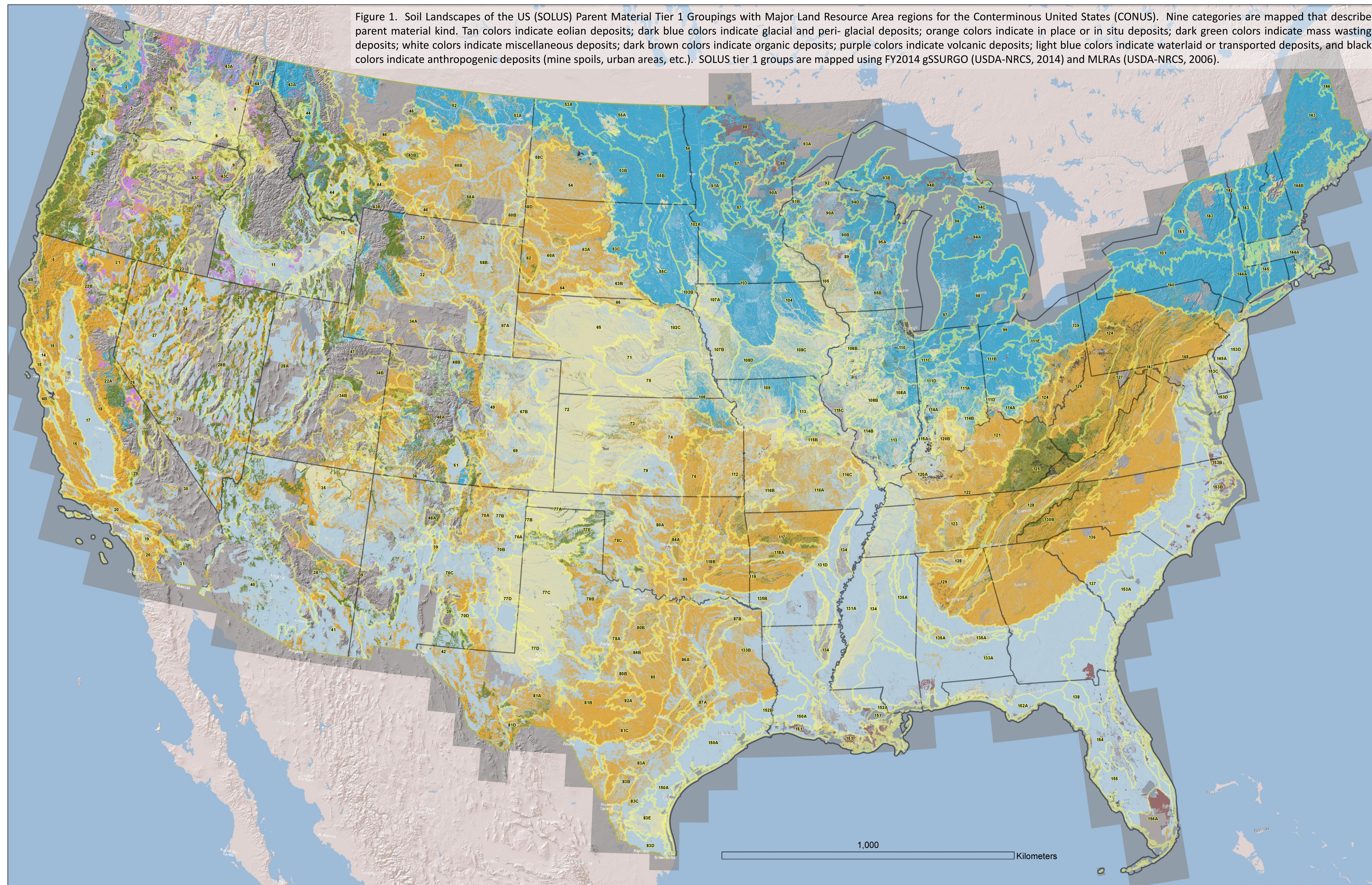


Figure 1. Soil Landscapes of the US (SOLUS) Parent Material Tier 1 Groupings with Major Land Resource Area regions for the Conterminous United States (CONUS). Nine categories are mapped that describe parent material kind. Tan colors indicate eolian deposits; dark blue colors indicate glacial and periglacial deposits; orange colors indicate in place or in situ deposits; dark green colors indicate mass wasting deposits; white colors indicate miscellaneous deposits; dark brown colors indicate organic deposits; purple colors indicate volcanic deposits; light blue colors indicate waterlaid or transported deposits, and black colors indicate anthropogenic deposits (mine spoils, urban areas, etc.). SOLUS tier 1 groups are mapped using FY2014 gSSURGO (USDA-NRCS, 2014) and MLRAs (USDA-NRCS, 2006).

Figure 3. Parent Material Groupings in Field Guide for Describing Soils plus SSURGO and gSSURGO MapUnitRaster_30m map layer used as starting point for SOLUS Parent Material Tier (Schoeneberger et al. 2012) Development. Example given for Glacial & Periglacial Deposits (SOLUS tier 1), Till (SOLUS tier 2), Ablation Till (SOLUS tier 3), and Clayey Wisconsin Till (SOLUS tier 5). Note SOLUS tier 4 is not used in this case.

Figure 4. Web Mercator tile levels (0-19) associated with SOLUS parent material tier levels (1-6). SOLUS tier 1 = tile level 8 (1:4,622,324 map scale), SOLUS tier 2 = tile level 9 (1:2,311,162 map scale), SOLUS tier 3 = tile level 11 (1:288,895 map scale), SOLUS tier 4 = tile level 14 (1:36,112 map scale), and SOLUS tier 5 = tile level 5 (1:18,056). Web Mercator tile caching enables fast viewing of multiple resolution map layers via web map services.

Soil Parent Materials SOLUS tier 1

- Eolian Deposits (nonvolcanic)
- Glacial and Periglacial Deposits
- In-Place Deposits (nontransported)
- Mass Movement Deposits
- Miscellaneous Deposits
- Organic Deposits
- Volcanic Deposits (unconsolidated; eolian and mass movement)
- Waterlaid (or Transported) Deposits
- Anthropogenic Deposits

Acknowledgements

This material is based upon work supported by the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, under Award No. 2013-70003-20924. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.

References

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Soil Survey Staff. Gridded Soil Survey Geographic (gSSURGO) Database for the Conterminous United States. United States Department of Agriculture, Natural Resources Conservation Service. Available online at <http://datagateway.nrcs.usda.gov/>. January 15, 2014 (FY2014 official release).

Schoeneberger, P.J., D.A. Wysocki, E.C. Benham, and Soil Survey Staff. 2012. Field book for describing and sampling soils, Version 3.0. Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE.

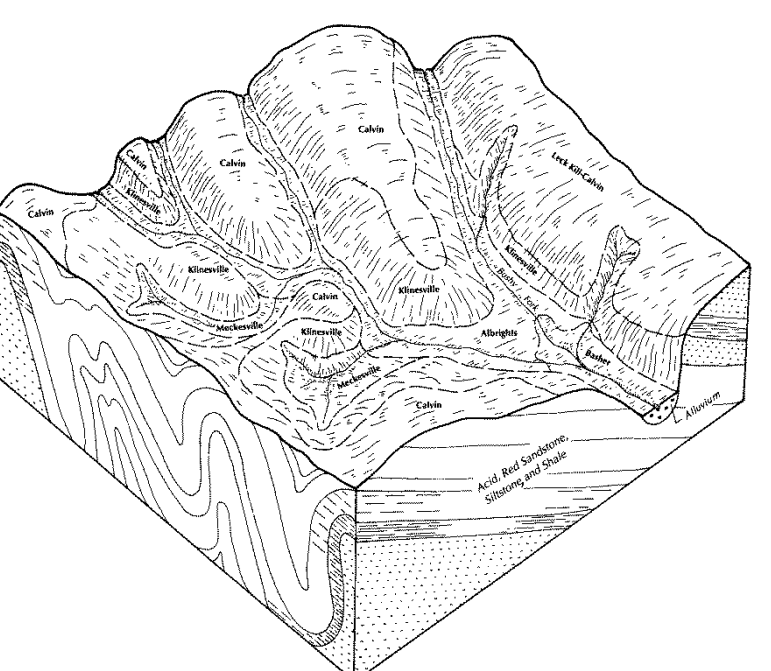
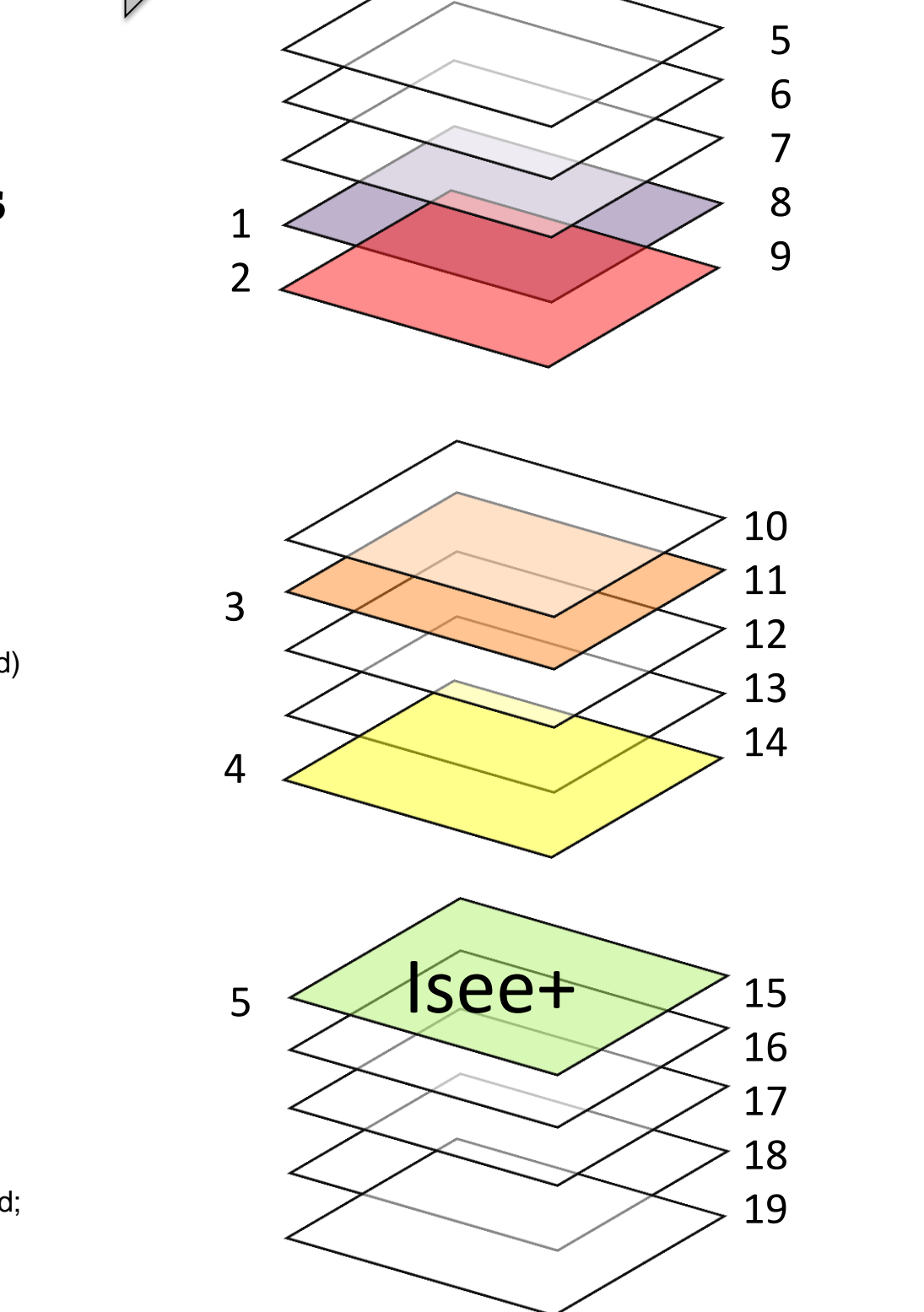
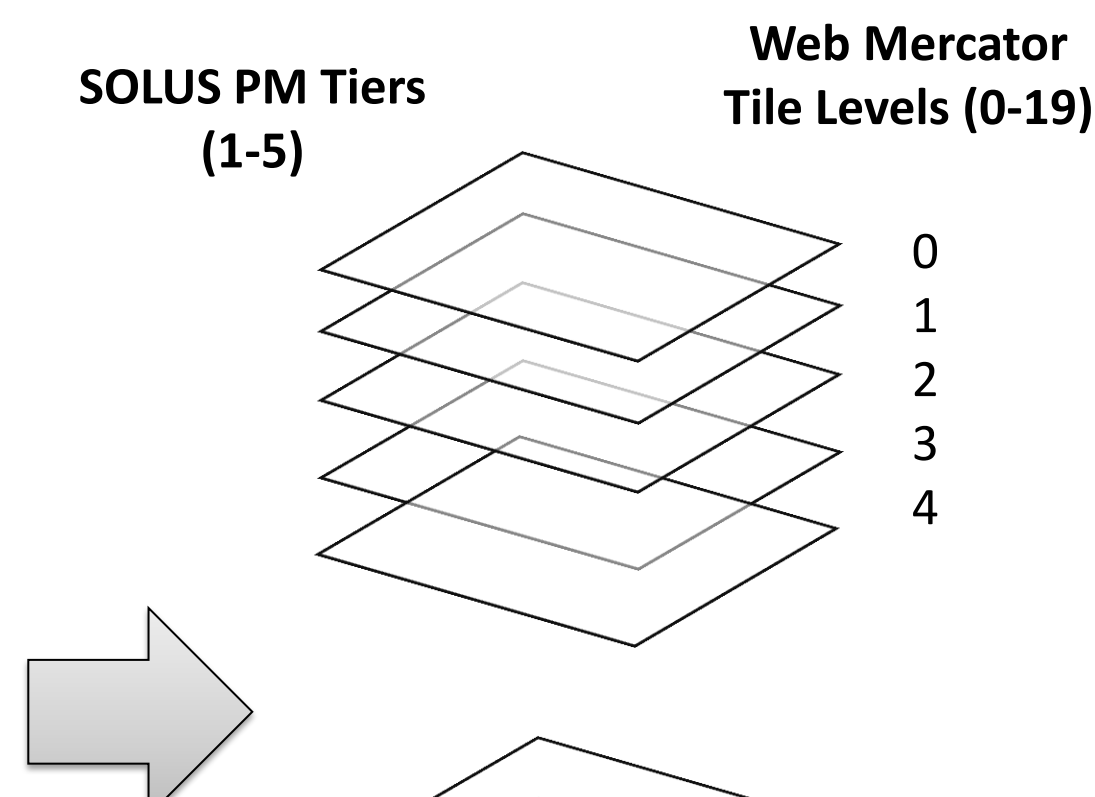


Figure 5. Hand drawn legacy 3-D soil landscape block diagrams were used to communicate soil parent material and land form concepts. These concepts need to be updated and transferred to digital soil databases.



Figure 6. Students use Isee+ on mobile device to learn about soil landscape systems starting with soil parent material concepts.