SSSA 2022 Pedology Division Award on Outstanding Recent Research

Submitted by Shawn W. Salley

Each year when the annual Soil Science Society of America (SSSA) meeting rolls around, many of us look forward to learning the recipient of the prestigious SSSA-Pedology Division Award. This award recognizes an individual who has made an outstanding contribution within the last three years using newly developed methods and techniques to better understand pedological mechanisms.

This year's recipient, Christopher Baish, published a fascinating 2021 article in the *Soil Science Society of America-Journal* titled "New insights into the origin and evolution of glossic features in coarse-textured soils in northern lower Michigan (USA)" (Baish and Schaetzl, 2021). Baish is currently a Ph.D. student in the Department of Geography, Environment and Spatial Sciences at Michigan State University and completed this research as part of his master's work. Impressive—most impressive.

Interestingly, Baish's novel work on glossic material formation has only recently become possible through the applying new characterization tools that assay soil geochemistry (X-ray fluorescence) and identify discrete classes of soil texture (laser diffraction). Advances in analytical techniques and instrumentation like this have driven a renewed interest in evaluating a variety of pedogenic processes.

Glossic horizons form through the degradation of argillic horizons. They are initiated by localized redox processes which then facilitate the loss of Fe oxides. Eluviation of Fe destabilizes material in illuviation cutans, facilitating further translocation leading to strongly contrasting texture breaks. Baish's research identified the importance of redox processes at microsites in the upper Bt horizon as the destabilizing trigger for glossic horizon formation, and that loss of material follows a coarsening pathway of fine clay, to coarse clay, to fine silt. Baish and Schaetzl elegantly document this with a morphologic classification where eluvial soil material evolves throughout the degradation process from nondegraded (Bt horizon) to completely degraded (E horizon) in 5 simple steps (see figure 1).

Regarding soil geography, 17% of all soil series in the western Great Lakes region contain glossic features, making up 63% of all glossic soils in the U.S (Figure 2), but why is the glossic phenomena more prevalent here than in any other region? The role of temporary saturation is obviously important regarding initiation of argillic degradation, but is this associated with localized ecological state change dynamics? Is it conditioned by regional climate change patterns? Can we classify and map those soils near the tipping point, and thus impact management strategies?

Whatever those answers end up being, research like Baish's is important for advancing theories in soil genesis, enhancing soil classification, mapping, and understanding the management of such soils. You can access the award-winning article here (link to pdf), and if you found this interesting, the Soil Science Society of America is a scientific society that needs more folks like you.

Citations:

Baish, C.J., R. J. Schaetzl, 2021, New insights into the origin and evolution of glossic features in coarse-textured soils in northern lower Michigan (USA), SSSA-J, 85:2115–2134, DOI: 10.1002/saj2.20331.

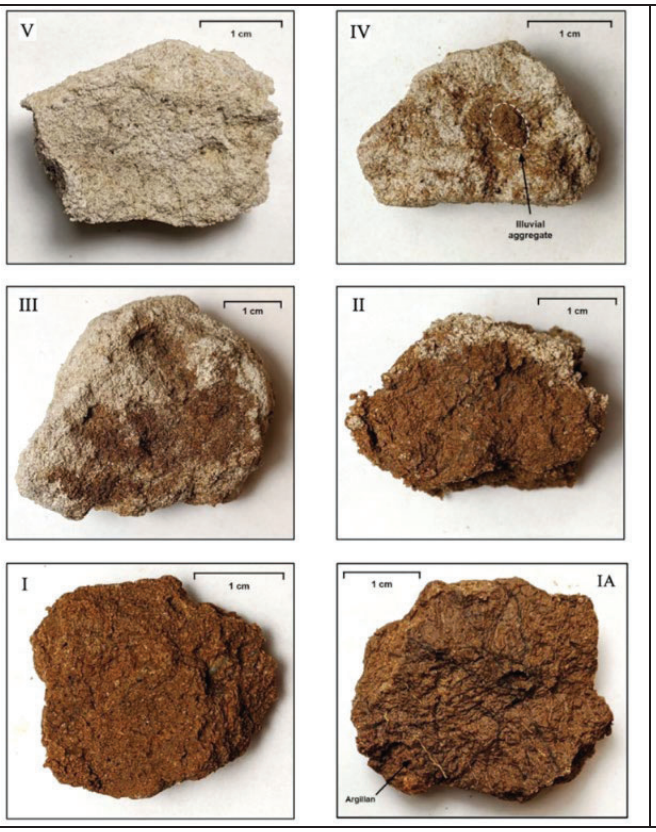

Figure 1. Examples of intact peds from glossic horizon groups representing the six groups of degradation:

(V) interior of a completely degraded ped,
(IV) interior of a strongly degraded ped,
(III) interior of a moderately degraded ped,
(II) interior of a weakly degraded ped,
(I) interior a nondegraded ped, and (IA) exterior of a nondegraded ped (showing roots proliferating on the ped face).

Photo taken from Baish and Schaetzl (2021, figure 4).

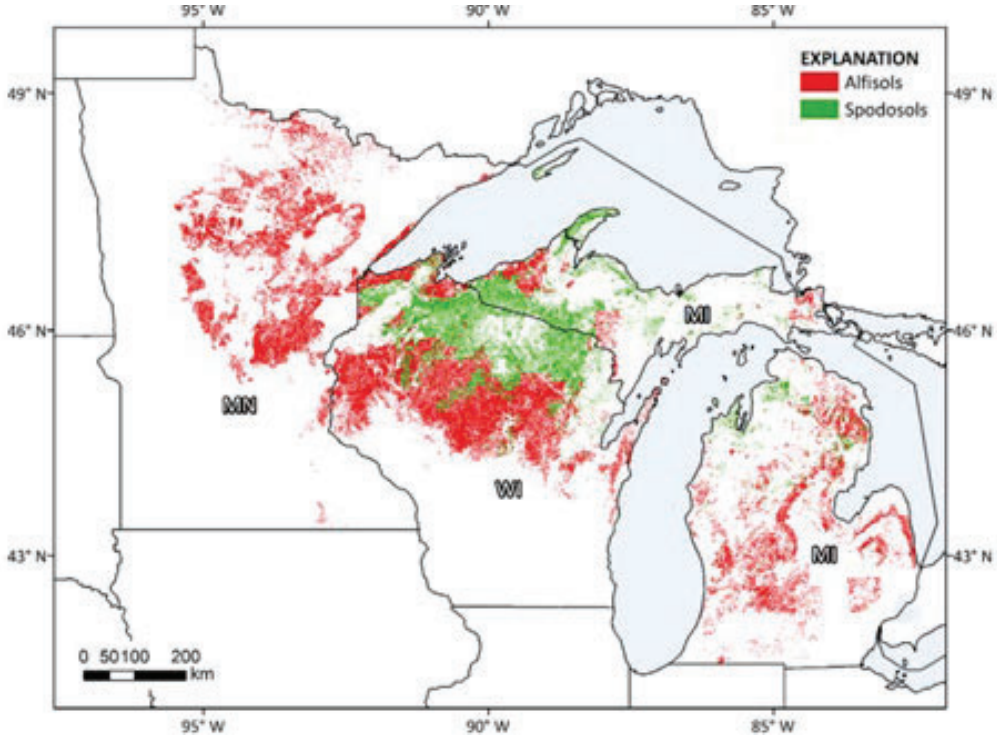

Figure 2, Distribution of soils series with glossic diagnostic features. Taken from Baish and Schaetzl (2021, figure 1).