

Comparative taxonomy between the Australian Soil Classification System and the USDA Soil Taxonomy at the great group level

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Soil classification as a world exercise consists of predominantly isolated organizations, creating locally meaningful categories for regional soils. This process has inevitably created a recognized disconnect between classification systems, and a push for a more universal classification has been proposed. To that end, numerical methods are explored. As a way of standardization between systems, soil taxa at the great group level from two separate regions and soil classification systems, Australia and The United States of America are represented by soil profile descriptions (SPDs) comprising 23 properties at 18 depth intervals. No individual SPD is allocated to both systems. Taxa centroids from Soil Taxonomy (ST) and the Australian Soil Classification (ASC) are calculated via principal component analysis and projected into a property space and compared. The taxonomic distance within and between ASC taxa and ST taxa are obtained. Convex hulls of each soil order of both systems are created and the associations each taxon has with other individuals in the same taxon discussed, as well as the variance. It is determined that ASC orders have smaller overall dispersion compared with Soil Taxonomy and there is a greater probability of an ASC great group associating with another ASC great group of the same order. The influence of each property to the overall taxonomic distances is explored. This analysis opens the way for possibility of comparing convex hulls of similar groups within the differing taxonomies. It is determined that the soil properties that are of greatest influence in the comparison of SPD's are base saturation, organic carbon percentage, presence of exchangeable ions such as Mg, and CEC. Using taxonomic distances between SPD's allows objective comparisons of soil profiles and could pave the way for a more universal classification method.