INTERNATIONAL COMMITTEE ON SOIL MOISTURE AND TEMPERATURE REGIMES (ICOMMOTR)

Wayne H. Hudnall, whudnall@agctr.lsu.edu
Louisiana State University Agricultural Center
Agronomy Department
Baton Rouge, Louisiana
CHARGES

1. Develop a statement describing why soil climate is an appropriate soil property to be included in Soil Taxonomy. This conceptual statement will serve as the guide to evaluate ICOMMOTR proposals.

2. Propose standard procedures for measuring soil moisture and temperature as well as a standard site condition. Provide guidance on correlation of other conditions to the standard. Also, consider methods for measuring moisture in Vertisols.

3. Test the use of measurements at fixed points at standard depths to replace the concept of the moisture control section.
4. Define moisture and temperature regimes separately from one another, including seasonal concepts (moist/dry and warm/cool seasons). Utilize combinations of the regimes to define appropriate taxa. Explore the use of near-surface measures of moisture and temperature for further defining some taxa, such as the very cold soils and very dry soils.

5. Plan a correlation tour, to be conducted in 3 to 5 years, that will address the most pressing problems.
BASIC CONCEPTS

• The proposed system is much simpler than the current system.

• The categories of soil temperature and soil moisture should be independent.

• Soil moisture is to be measured in the same manner as soil temperature - an energy measurement - soil matric potential (-tension) is a measure of energy.
• Soil moisture is to be measured in the same manner as soil temperature - an energy measurement - soil matric potential (-tension) is a measure of energy.

• Eliminate soil moisture control section and replace it with two point (depth) measurement. (20 and 75 cm)
Soil temperature at 50 cm lags behind air temperature. This lag is commonly around a month, but can be as long as two months. The length of lag depends on the thermal conductivity and heat capacity of the soil and atmospheric and vegetative factors. Soil thermal conductivity and heat capacity, in turn, are highly dependent on the soil water content. Currently, Soil Taxonomy uses the months of June, July and August to define mean summer soil temperature and December, January and February for mean winter soil temperature in the Northern Hemisphere.
• Would it be better to use the three warmest and three coldest months to define summer and winter?

• Basing mean summer and winter soil temperatures on the three warmest and three coldest months would probably change the classification of some soils from iso to non-iso soil temperature regimes.
• Should there be an additional group of classes similar to iso-temperature regimes for soils that have large differences between mean summer soil temperature and mean winter soil temperature?

• Where and how should soil temperature and moisture be measured? Vegetated or bare soil conditions?
• There is some support for the addition of two new soil temperature regimes for areas where the mean annual soil temperature (MAST) is greater than or equal to 28°C. These would be called the megathermic and the isomegathemic soil temperature regimes. The isomegathemic regime would be restricted to soils with a difference between the mean summer and mean winter soil temperatures of less than 5°C.

• Is there a need for this from a soil management standpoint? From a soil genesis standpoint?
RECOMMENDATIONS

1. Eliminate the soil moisture control section. Make determinations of soil water matric potential at a single depth between 75 and 100 cm. Determinations of soil matric potential at 10 cm also should be made in case they are needed to separate intergrades, particularly in drier climates.

2. Base soil moisture regimes on mean seasonal and annual soil matric potentials determined at a single depth between 75 and 100 cm. Soil matric potential at 10 cm may also be needed to separate intergrades, particularly in drier climates.
3. Eliminate the linkage of soil moisture regimes to soil temperature. Use seasonal and annual soil water states, analogous to soil temperature. Allow ustic to occur in cryic and pergelic soil temperature regimes. Eliminate reference of xeric to a Mediterranean climate. Allow xeric to represent a seasonal variation in soil water state only.

4. Make xeric a special case of ustic; i.e., all xeric soils are also ustic. Perhaps a similar subgroup of ustic is needed for other seasonal variations in soil water state such as occurs in monsoon climates.
5. Eliminate cracking as soil moisture regime criteria in Vertisols. Use the same criteria for all orders. Elimination of the soil moisture control section and basing determinations on soil water matric potential at a single depth (25 or 75 cm) should make this possible.
Do we scratch what we have and start over or use some existing data and modify it to fit our needs?

Plant hardiness zones
QUESTIONS AND/OR COMMENTS