# PROCEEDINGS

# THE INTERNATIONAL HUMIC SUBSTANCES SOCIETY

# TWENTIETH ANNIVERSARY CONFERENCE

# HUMIC SUBSTANCES: NATURE'S MOST VERSATILE MATERIALS

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## 53. A GENERAL DESCRIPTION OF THE CONTRIBUTION OF ORGANIC CARBON TO SOIL WATER HOLDING CAPACITY

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The effect of organic matter on the water holding characteristics of soil was described with a continuous energy function and the silt and clay content. The General Energy Model for Limited Systems (GEMLS) was applied to data from the US national soil inventory (> 100,000 entries). Data were plotted for subsets of about 100 ± 20 observations over very narrow clay, silt, and organic matter content ranges. Because of an apparent matrix transition effect, two complementary GEMLS functions were used to describe the water content at –33kPa and –1500 kPa suction. Systematic evaluation of the data set provided 6 parameters that maximized the $R^2$, minimized error mean squared terms, and effected homogenous and uniformly distributed residuals for each subset. The energy coefficients of clay were linearly related to silt content and silt and clay interaction terms were obtained. The subsequent energy coefficient was a complex function of soil organic carbon. Two of the model parameters appear to be constants. The $R^2$ values for C contents < 2 % often exceeded 0.9. The final product is a continuous function capable of predicting the water holding content of soil as a function of its physical separates. A evaluation of the effect of a change in organic carbon content in the 0.35 to 2.35 % range shows that organic carbon contributes a 5 to >10 % change in the available water holding capacity change depending on the silt and clay content.