Geophysical Research Abstracts, Vol. 7, 00980, 2005
SRef-ID: 1607-7962/gra/EGU05-A-00980
© European Geosciences Union 2005

Influence of soil structure on the shrinkage behavior and consequences for modeling approaches

X. Peng and R. Horn

Institute of Plant Nutrition and Soil Science, CAU Kiel, Olshausenstr. 40, D-24118 Kiel, Germany. (email: xh.peng@soils.uni-kiel.de)

The soil volume decreases with water loss as a function of the rate and intensity of dryness. However, the range of soil shrinkage depends on soil structure. We developed a three parameters model to portray soil shrinkage behavior and to determine the four characteristic soil shrinkage regions mathematically and approved the new model on some saline sodic soils (Filter project, Griffith, NSW,Australia), which were irrigated with waste water over up to 7 years, and some peat and moraine soils in Wacken, Germany. Proportional shrinkage is a main zone both in volume change and in water loss, followed by structural and residual shrinkage zones. The zero shrinkage defined from shrinkage limit to the dry end only covers less than 1.5% of volume change. With increasing bulk density, structural shrinkage decreases while residual and zero shrinkage ranges increase. The swelling limit point is not dependent on the bulk density. The coarser the soil, the lower the shrinkage capacity and the wider are the ranges of the zero and residual shrinkages. After applying saline sewage effluent over 5 years, aggregate strength has been improved. The stabilized soil structure reduces the volume change of structural shrinkage consequently.