Geophysical Research Abstracts
Vol. 15, EGU2013-8790, 2013
EGU General Assembly 2013

Relationship between apparent soil electrical conductivity (ECa) and soil attributes at an experimental parcel under pasture in a region of Galicia, Spain.

Mara de A. Marinho (1), Jorge D. Dafonte (2), Montserrat V. Armesto (2), Antonio Paz-González (3), and Juan R. Raposo (2)

(1) College of Agricultural Engineering, State University of Campinas, Campinas, Brazil (mara.marinho@feagri.unicamp.br), (2) Escuela Politécnica Superior, Universidad de Santiago de Compostela, Lugo, Spain (jorge.dafonte@usc.es), (3) Facultad de Ciencias, Universidade da Coruña, A Coruña, Spain (tucho@udc.es)

Spatial characterization of the variability of soil properties is a central point in site-specific agricultural management and precision agriculture. Geospatial measures of geophysical attributes are useful not only to rapidly characterize the spatial variability of soil properties but also for soil sampling optimization. This work reports partial results obtained at an experimental parcel under pasture located at Castro de Ribeira do Lea (Lugo/ Galicia/ Spain). An ECa automated survey was conducted in September 2011 employing an EM-38 DD (Geonics Ltd.) installed in a nonmetallic car, according to parallel lines spaced 10m one from each other and oriented at the east-west direction. The ECa values were recorded every second with a field computer and the locations were geo-referenced using a GPS. The entire survey was carried out in 1hour and 45 minutes and corrections due to differences in temperature were made. A total of 9.581 ECa registers were retained, configuring a sampling intensity of approximately 1 register per 1.5 m2. Employing the software ESAP 2.35 and the computational tool ESAP-RSSD, eighty positions were selected at the field to extract disturbed and undisturbed soil samples at two depths: 0.0-0.2m, 0.2-0.4m. Ten physical attributes (clay, silt, total sand, coarse sand and fine sand contents, soil bulk density, particle density, total porosity, soil water content, percentage of gravels) and 17 chemical attributes (soil organic matter-SOM, pH, P, K, Ca, Mg, Al, H+Al, Sum of bases-S, Cation exchange capacity-CEC, Base saturation-V%, Cd, Cr, Cu, Fe, Mn, Ni, Pb and Zn) were determined. The relationship between the geophysical variables and the soil attributes was performed using statistical and spatial analysis. There were significant correlations ($p<0.01$) between the geophysical variables and the textural attributes clay, silt, total sand and coarse sand contents. The biggest correlation (0.5623) was between ECa-V (vertical component) and clay content. Also, significant correlations ($p<0.05$) were found between the ECa-V and soil bulk density, total porosity, percentage of gravels and soil water content. Considering the chemical attributes, significant correlations ($p< 0.01$) were found between ECa-V and SOM and Cd, and between ECa-H (horizontal component) and SOM and Fe. Other significant correlations ($p<0.05$) were found between ECa-V and 6 soil chemical attributes: P, Ca, S, Fe, Ni and Pb. The biggest correlation was between ECa-V and SOM (-0.5942). In resume, clay content, SOM, Cd and Fe are the soil attributes better correlated with the observed variation of the ECa at the field. Additional analysis should be performed to compare the spatial patterns of these soil attributes and the ECa as a tool to proper define management zones in the area.

Acknowledgements: This work was funded in part by Spanish Ministry of Science and Innovation (MICINN) in the frame of project CGL2009-13700-C02. Financial support from CAPES/GOV., Brazil, is also acknowledged by Prof. M. de A. Marinho.