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SOIL DIGITAL MAPPING WITH REDUCED SOIL SAMPLES UNDER AGRO-SILVO-PASTORAL SYSTEMS

Alexandre Carlos*[1], Nunes Jorge[1], Cortez Nuno[2]

[1]Universidade de Évora ~ D. Geociências and ICAAM ~ Evora ~ Portugal [2]Instituto Superior de Agronomia ~ D. C. Ambiente ~ Lisboa ~ Portugal

Soil depth (SD), clay content (SCC) and soil organic carbon (SOC) determine land use systems response but are quite expensive to be mapped in high definition. This study uses proximal sensing, tree canopy influence and cokriging to explore soil sampling reduction in soil digital mapping for low income land use systems. It applies to 5.34 ha of "montado" in central-south of Portugal with rolling morphology and mostly Regosols, Cambisols and Leptosols. Soil probing followed stratified random sampling of areas outside (OC) and under tree canopy (UC), giving 70, 79 and 64 points for SD, SCC(0-50 cm) and SOC(0-30 cm). Soil was surveyed with Dualem1 for ECa. Correlation between ECa, SD, SCC and SOC were 0.687, 0.586 and 0.448. SOC averages differ significantly for UC and OC (83 Mg/ha and 41 Mg/ha). Cokriging with ECa as auxiliary variable was performed for subsamples (N=32, 16, 8 and 4) and results were validated with complementary subsamples (N=32). Completely random and stratified subsampling were applied (slope position and tree canopy influence for SOC). Averaging seven replicas, CK reduced RRMSE (Root Mean Square Error/mean) by less than 0.05 relatively to OK. However, CK allows just a limited increase in RRMSE (<0.05) for SD and SOC when soil subsamples are reduced to N=8, if SD is stratified by slope position and SOC predicted by stratified CK (UC and OC). The same limited increase in RRMSE applies to CK of SCC with soil subsamples as small as N=4 if subsamples are stratified by slope position.