Book of Abstracts

Wageningen Soil Conference 2015

'Soil Science in a Changing World'

Editors:
B. Jansen
S.D. Keesstra
G. Mol
J. Wallinga
A.M. Zaal

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Editors: Saskia Keesstra[1], Gerben Mol[2], Anne Zaal[3], Jakob Wallinga[4], Boris Jansen[5]

[1] Wageningen University, Soil Physics and Land Management group, PO Box 47, 6700 AA Wageningen, The Netherlands
[2] Alterra Wageningen UR, Team Soil, Water and Land use, PO Box 47, 6700 AA Wageningen, The Netherlands
[3] Wageningen UR, Soil cluster, PO Box 47, 6700 AA Wageningen, The Netherlands
[4] Wageningen University, Soil Geography and Landscape group, PO Box 47, 6700 AA Wageningen, The Netherlands
[5] Universiteit van Amsterdam, Institute for Biodiversity and Ecosystem Dynamics (IBED), P.O. Box 94248, 1090 GE Amsterdam, The Netherlands

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DIGITAL MAPPING OF SOIL NUTRIENTS FOR THE REPUBLICS OF BURUNDI AND RWANDA

RUIPÉREZ GONZÁLEZ, MARÍA[1] (MARIA.RUIPEREZGONZALEZ@WUR.NL); KEMPEN, BAS[1]; BINDRABAN, PREM S.[2]; WOLTERS, SANDRA[1]; HICINTUKA, CYRILLE[3]; NIBASUMBA, MARCIEN[4]; NZOHABONAYO, ZACHARIE[5]; WENDT, J.[6]; NDUWIMANA, OSCAR[5]; VEERKAMP, J.[7]

[1] ISRIC – World Soil Information, Wageningen, The Netherlands
[2] VFRC, Washington D.C., USA
[3] ISABU – Institute des Sciences Agronomiques du Burundi, Bujumbura, Burundi
[4] Mininistère de l'Agriculture et de l'Elevage, Bujumbura, Burundi
[5] IFDC, Bujumbura, Burundi
[6] IFDC – East and Southern Africa Division, Nairobi, Kenya
[7] IFDC, Kigali, Rwanda

Lack of awareness of various soil fertility constraints, including soil acidity and nutrient deficiencies, is a major limitation to developing sound liming and fertilizer recommendations in sub-Saharan Africa, including Burundi and Rwanda. Detailed maps of soil nutrient concentrations and soil acidity can help to alleviate to identify areas with soil fertility constraints. This information can be used to better target fertilizer applications for a more balanced provision of crop nutrition. For this purpose, maps of primary (P, K), secondary (Ca, Mg, S) and micronutrients (Cu, Zn, B), as well as pH, soil acidity (Al+H), effective CEC and organic matter were generated for the 0-20 cm soil layer by means of digital soil mapping using random forest models at a 250 m spatial resolution. The models were calibrated with over 1000 field observations on soil fertility parameters for each country. Over 100 environmental GIS data layers were used as covariates in the models. These included land cover, soil, climatic maps and MODIS satellite imagery. Prediction accuracy was quantified with 10-fold cross-validation and prediction uncertainty was quantified by the 90% prediction interval. For Burundi, the models explained between 12% (K) and 49% (organic matter) of the variation in the observed data. For the micronutrients, the explained variation was 39% for Cu and B, and 20% for Zn. For Rwanda, the models explained between 21% (K) and 46% (Ca) of the variation. The explained variation for Cu was 41%, for B 39%, and for Zn 25%. Covariates related to climate and terrain proved to be the most effective predictors. The soil maps present a significant update of the currently available nutrient maps and can support soil fertility management programs, including better targeted fertilizer and lime recommendations, regional quantification of requirement amounts of balanced fertilizers for agro-dealers, and information for policy decision making.