Book of Abstracts

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‘Soil Science in a Changing World’

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MAPPING OF FERTILIZER RECOMMENDATIONS FOR MAJOR CROPS IN WEST AFRICA

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Site-specific fertilizer recommendations for major food crops in West Africa have been updated and mapped by ISRIC in collaboration with the International Fertilizer Development Centre (IFDC) and experts from the NARs of Benin, Burkina Faso and Ghana. The project served as a proof of concept and was carried out within the context of the West Africa Fertilizer Program (USAID WAFP) which *has been implemented over last five years in collaboration with* the Economic Community of West African States *(ECOWAS).* A tiered approach was applied which makes use of the soil property maps for Africa (SoilGrids) including the recently released maps of all macro, meso and most micro nutrients. The maps at a resolution of 250m were produced using soil analytical data from over 60,000 sample locations. In the first tier, QUEFTS was parameterised using georeferenced fertilizer trial data compiled from three countries and used to calculate and map crop nutrient uptake- and use efficiencies and corresponding fertilizer recommendations targeting spatially variable yield levels for millet, sorghum, maize, rice and cassava. These first tier maps were added to regional covariates to model and map the fertilizer recommendations, which had been interpreted and reported from the fertilizer trial data, in the second tier using machine learning. The site-specific fertilizer recommendations were spatially aggregated according to agro-ecological zones and nutrient clusters and these aggregates were expressed by probability distributions to quantify the (un)certainty of obtaining targeted crop responses. Herewith this (un)certainty is made function of mainly the spatial variability of soil nutrient contents. However the trial data show that this uncertainty, and response in general, is predominantly determined by the spatial as well as temporal variability of the nutrient gap, as limited by water supply. This latter variability is emperically not well modelled with QUEFTS and is insuffiently well reflected in the maps used for defining target yields. The proof of concept provides an operational framework for progressive and collaborative updating and upscaling of fertilizer recommendations across the region, adding value to additional adequate soil-crop data. The framework is preferably further improved by modelling of the nutrient gap.