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## ABSTRACT BOOK

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## 4. Soil health in achieving the Sustainable Development Goals 4.12 133530 - Soil degradation control, remediation and reclamation

### AN APPROACH FOR DETERMINING THE MINIMUM DATA SET FOR SOIL CONTAMINATION ASSESSMENT: AN APPLICATION IN A FORMER OUTDOOR SHOOTING RANGE (OSR) IN SOUTHERN ITALY

C. PERRECA <sup>1</sup>, G. BUTTAFUOCO <sup>2</sup>, F. TERRIBILE <sup>1,3</sup>, S. VINGIANI <sup>1,3</sup>

<sup>1</sup> University Federico II of Naples, Department of Agricultural Sciences, Portici(NA), ITALY

<sup>2</sup> National Research Council of Italy, Institute for Agriculture and Forestry Systems in the Mediterranean, Rende (CS), ITALY

<sup>3</sup> University Federico II of Naples, CRISP, Interdepartmental Research Centre on the Earth Critical Zone, Portici(NA), ITALY

Outdoor shooting ranges (OSRs) are recreational facilities attracting the interest of several millions of people worldwide, but if after the end of activities the land is used for recreational or agricultural purposes, soil contamination can pose a serious threat to human health. In this framework, a research study funded by the Italian Ministry of University and Research (MUR) was carried out in soils of an OSR of 38500 m<sup>2</sup> in southern Italy and aimed to determine the minimum data set for soil contamination. Different soil proximal sensing and laboratory data were collected, but this study was focused on three potentially toxic elements (PTEs), including As, Pb, and Sb measured by portable X-ray fluorescence spectrometer (pXRF) in soil samples (0-15 and 15-30 cm-depth) at 174 nodes of a regular grid (15 x 15 m) and apparent soil electrical conductivity (ECa) measured by electro-magnetic induction (EMI) along parallel transects 15 m apart. Since ECa was a more densely measured covariate than ECa, was used as external drift to improve the PTEs predictions. The PTEs data set was randomly split into a calculation (80%) and validation (20%) set to assess the effect of the number of samples on the predictive performance of the PTEs, four calculation subsets with sample size varying from 35 to 139 were created. Each subset selection was replicated three times to evaluate the robustness of the approach. PTEs data were submitted to an isometric log-ratio (ilr) transformation because As, Pb, and Sb are compositional data and, therefore, parts of a whole that constitute the soil and are not free to vary independently of the others. Kriging with external drift (KED) was used to incorporate the densely sampled ECa secondary data. The accuracy of prediction was assessed by the mean error, the root mean square error of prediction (RMSEP) and the ratio of the interquartile distance (RPIQ).

**Keywords:** soil contamination,,potentially toxic elements,proximal sensing,multivariate analysis,compositional data