High-resolution thematic soil mapping at EU level based on the combined use of LUCAS and national soil monitoring data in the framework of the EJP SOIL project

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The EJP SOIL project aims to provide the research and policy-making community with detailed and harmonised EU-wide thematic maps of agricultural soils, based on a common methodology, to improve the effectiveness of European agricultural and environmental policies, to contribute to European international reporting. Currently the national and the EU reporting are performed

independently, which results in contrasting figures on soil status. Since national soil data sharing constraints are in place, a bottom-up approach is preferred to include as much relevant data as possible. However, this can in return, generate transboundary issues.

The specific objective of the EJP SOIL mapping exercise is to set-up a digital soil mapping procedure to: i) support participants in a bottom-up approach allowing countries to produce high-resolution thematic soil maps, ii) develop soil property maps based on the national databases (SIMS) and the LUCAS Topsoil database, iii) solve the problems of transboundary issues, iv) provide spatially explicit uncertainty estimates.

To achieve this, both top-down and bottom-up mapping approaches have been applied, using the same mapping algorithm (quantile random forest) but with different input data: i) EU-level mapping, using the most predictive EU-level auxiliary variables and LUCAS point data ii) country-driven mapping, using a) EU-level auxiliary variables, using national point data (SIMS), b) EU-level auxiliary variables, using both LUCAS and national point data (SIMS), c) the best covariates among EU-level and national covariates, using LUCAS point data, d) the best covariates among EU-level and national covariates, using national point data (SIMS), e) the best covariates among EU-level and national covariates, using both LUCAS and national point data (SIMS).

The spatial resolution chosen for the mapping exercise was a 100 m grid, which implied the production of an EU-wide covariate set at 100 m in INSPIRE-compatible projection by ISRIC. Soil properties commonly observed in both LUCAS and SIMS were selected for the maps, of which the methodologically most consistent pH was mapped first. In parallel, other activities aimed at comparing and developing transfer functions among LUCAS and SIMS are carried out in the EJP SOIL WP6.

Keywords: Digital Soil Mapping, EU-wide covariates, combined monitoring datasets