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*"The proof of the apple is in the eating!"*

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**ABSTRACT**

# An improved method for population disaggregation based on European land monitoring services

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Top-down approaches to the production of gridded population data (such as dasymetric disaggregation) are still important as a means to produce comparable datasets at global to continental levels or in countries where bottom-up approaches are not applied yet. Top-down approaches also do not need to solve confidentiality issues and retrospective population estimates are feasible as long as suitable ancillary data are available from the past.

Here we present an improved method of disaggregation from commune level to regular 100m grid cells using CORINE Land Cover 2006 and an EU-wide map of impervious (sealed) surfaces as the ancillary data. Population density coefficients for land cover classes are first tuned by repeated estimation from a group (subset) of communes to individual communes and consequent modification of the values to reduce the overall error of the estimate. When the overall error becomes stable, the fine-tuned coefficients are used to estimate from commune level to grid cells.

The improvement of the method is based on optimization of commune subsets used in the iterative estimation algorithm of population density coefficients. A custom Python script in GIS environment was developed to create the subsets automatically (based on a user defined subset size and similarity of commune attributes), perform the iterative coefficient tuning, disaggregate the data and validate the results against reference gridded data from GEOSTAT project.

An extensive sensitivity analysis of method´s parameters performed in Austria and Slovenia confirmed that the accuracy of the estimate can be improved by meaningful design of the commune subsets and that there is no point in being confined to conventional regions (spatially contiguous and disjoint subsets). The best results were achieved using non-contiguous subsets created on the basis of other criteria such as commune population and share of built-up surface. Accuracy of the best performing model is comparable to other similar products

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(AIT grid and JRC grid) despite the fact that - unlike the presented approach - they employ additional ancillary datasets (e.g. road network, Urban Atlas).

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