How to demonstrate representativeness of field studies using GIS

An Example with common vole in grassland in Germany

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Introduction

The representativeness and transferability of field studies is often questioned by authorities. However, the new revised EFSA guidance on the risk assessment for birds and mammals (2023) gives no method or measure on how do to prove that a study is representative or that its results can be transferred to another area. Geographic information systems (GIS) can be used to show that a study location is representative for a wider area. Here, we give an example using the common vole in grassland in Germany and compare climate conditions, the proportion of grassland and the structure of the agricultural landscape in a study area in central Germany.

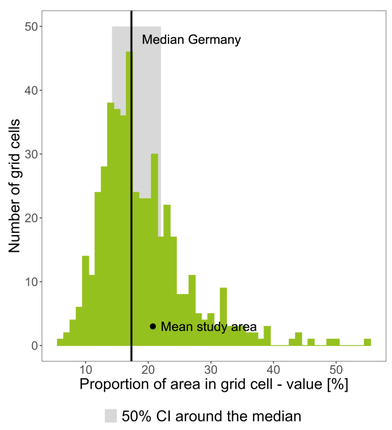
Method

Representativeness was defined as degree of deviation from the median for each parameter. For each parameter, the mean of the study area, consisting of four grid cells, was compared to the 50% confidence interval around the median of the whole of Germany. The parameters were calculated for 25 km grid cells overlaying the country and the study area. Only complete grid cells were considered in the calculations.

As the study area, a region at the FNU Research Centre, North of Frankfurt a. M. (Germany), was selected.

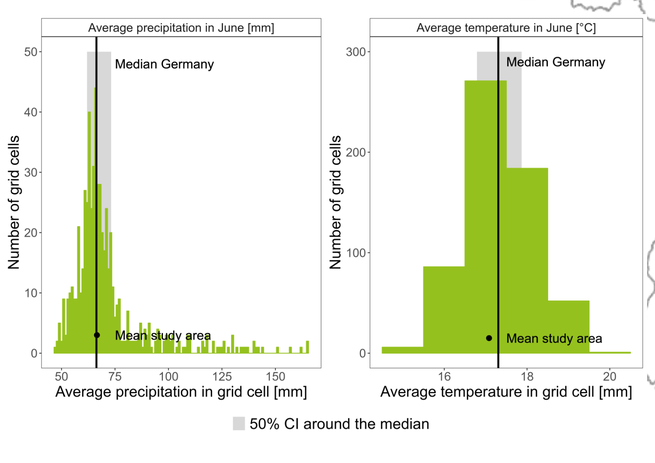
Proportion of grassland

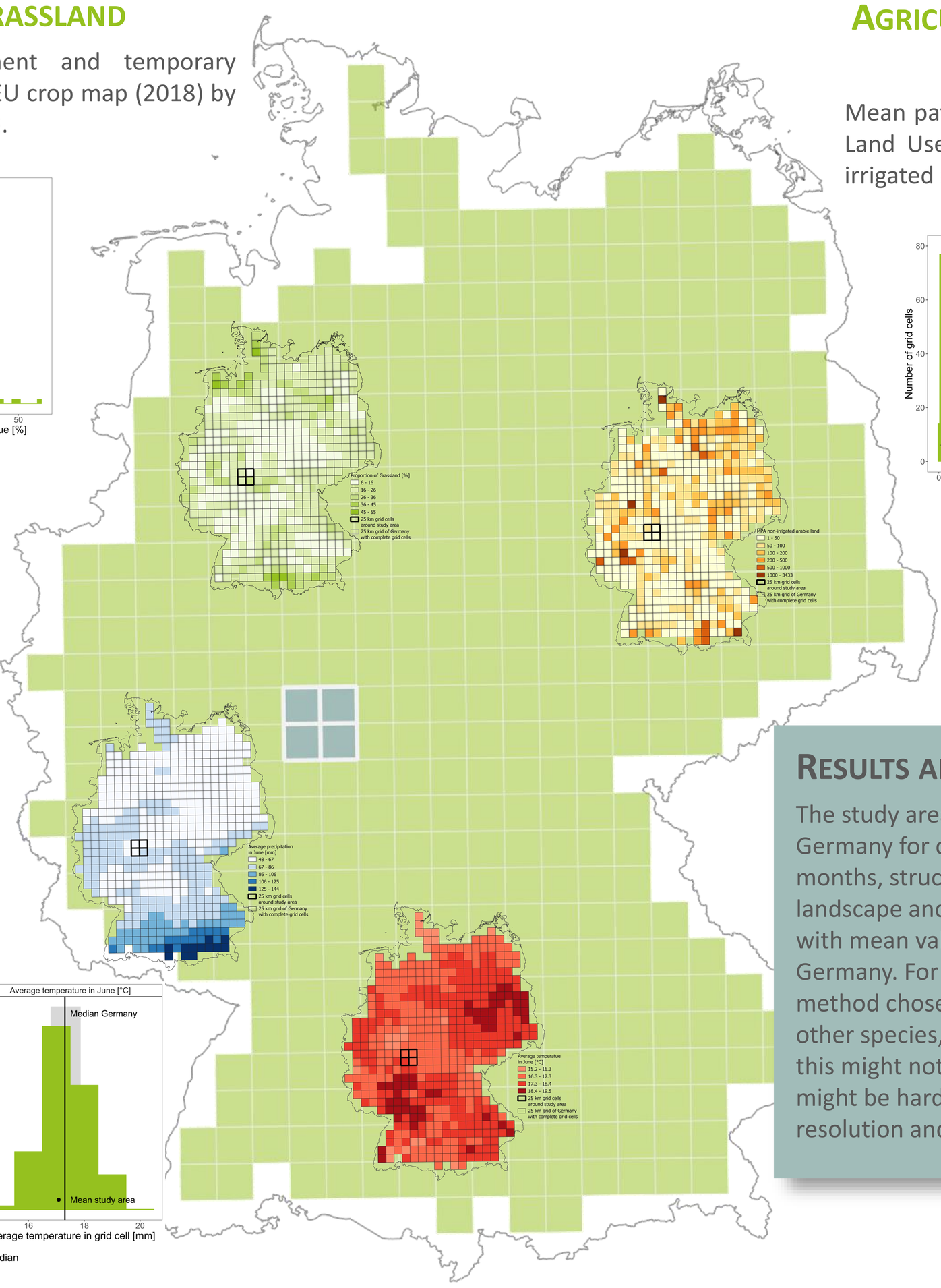
Proportion of permanent and temporary grassland based on the EU crop map (2018) by d'Andrimont et al. (2021).



Climate conditions

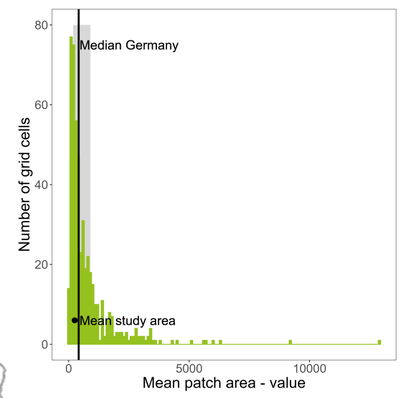
Climate conditions are represented by the average monthly precipitation and temperature of the years 2010 to 2021 calculated by using daily numbers made available by the JRC MARS Meteorological Database.





Agricultural landscape structure

Mean patch area (MPA) of CORINE Land Use Cover (2018) type non-irrigated arable land.



Results and conclusions

The study area was representative of Germany for climatic conditions in all months, structure of the agricultural landscape and proportion of grassland with mean values within the 50% CI of Germany. For this parameters, the method chosen here, worked well. For other species, crops and parameters this might not be the case, as GIS data might be hard to acquire in a sufficient resolution and quality for all countries.

Literature and data sources

d'Andrimont R, Verhegghen A, Lemoine G, Kempeneers P, Meroni M, van der Velde M (2021): From parcel to continental scale – A first European crop type map based on Sentinel-1 and LUCAS Copernicus in-situ observations. Remote Sensing of Environment, 266.

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