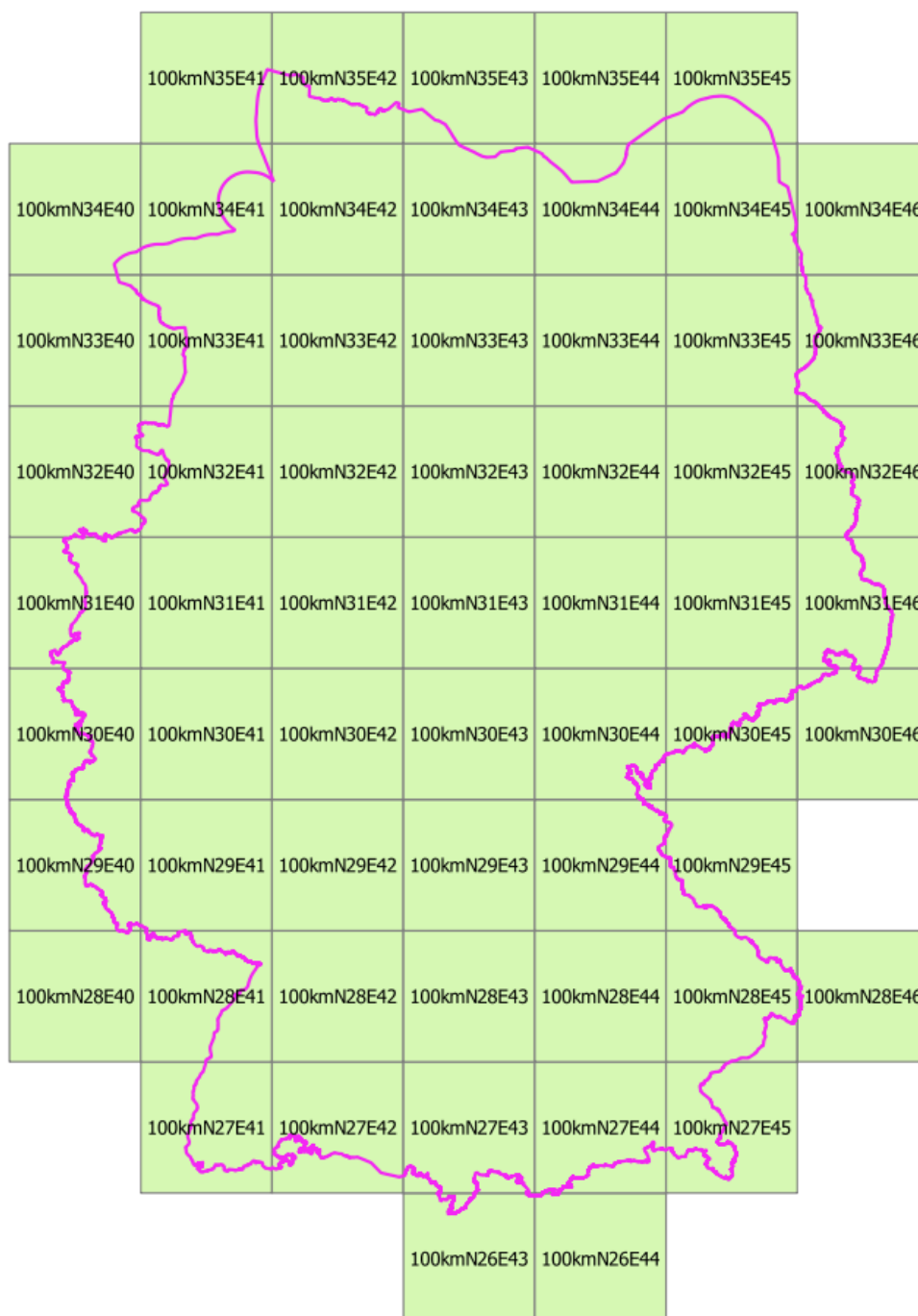# Geographical Grids for Germany

GeoGitter

Status of the documentation: 12.11.2020

Contents

1 Data stock overview

Product : GeoGitter

With the subproducts:

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- DE_Grid_ETRS89-UTM32_250m
- DE_Grid_ETRS89-UTM32_500m
- DE_Grid_ETRS89-UTM32_1km
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- DE_Grid_ETRS89-LAEA_100km

Content : Geographical grids of variuos tile sizes for presentation and analysis of statistical issues.

Area : Federal Republic of Germany

Spatial structuring : INSPIRE tile system

Georeferencing : - National reference system
  UTM in Zone 32
  Ellipsoid GRS80, Datum ETRS89

- INSPIRE reference system
  LAEA, Lambert Azimuthal Equal Area projection
  Ellipsoid GRS80, Datum ETRS89

Source : - VG25 state for land area
- Basis-DLM Water bodies for all surface water bodies (as of 01.09.2019)
- VG25 Municipalities for AGS (as of 31.12.2019)

Resolution : 100 m, 250 m, 500 m, 1 km, 5 km, 10 km, 100 km

Data formats : CSV, Shape, Geopackage

Data supply : Download

2   Description of the contents of the data stock

2.1   Motivation

The use of regular grid cells as carrier of semantic information is an established method for presenting and analyzing statistic issues. Due to the equal distribution and uniform size of the grid cells, statistical issues can be evaluated **time-stably** and **comparably**.

As example, figures 1 and 2 show the population density of Spain on the basis of administrative units compared to grid cells of the size 1 km².
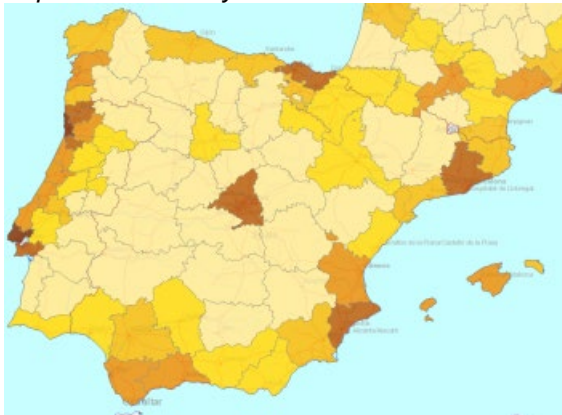
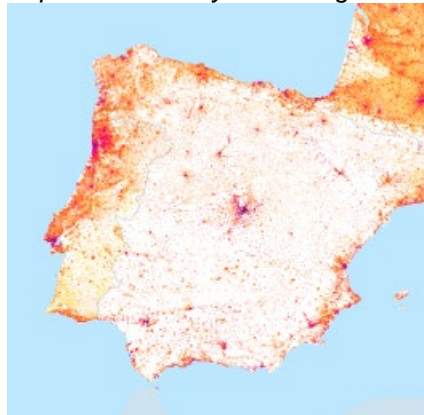*Population desnsity on NUTS3 level*

Population density in 1 km² grid

figure 1

figure 2

Source: http://ec.europa.eu/eurostat/statistics-explained/index.php/Population_grids

2.2   INSPIRE – Geographical Grid Systems

The European initiative for establishing a spatial data infrastructure *INSPIRE* defines in the document *D2.8.I.2 Data Specification on Geographical Grid Systems – Technical Guidelines* Europe-wide uniform *Geographical grids*. The used georeference system is an essential parameter for this. INSPIRE differentiates:

- Equal Area Grids – based on the ETRS89-LAEA (EPSG:3035)
- Zoned Geographic Grids – based on the ETRS89-GRS80 (EPSG::4258)

For the area of Germany, *Equal Area Grids* are of interest. According to INSPIRE, they form a hierarchi-cal system with grid resolutions of 1 m, 10 m, 100 m, 1 km, 10 km, 100 km.

Zoned Geographic Grids are models with equal cell size height, but with a scaling of the cell size width in six levels between 0° and 90° of latitude in order to compensate for distortions in the geographical coordinates and for approximately maintaining squared cells with metric approach. Germany lies in two zones (factor 1 until 50° and 2 from 50°).

In addition, INSPIRE points to national grid systems, that are established in the national standard for reference systems, i.e. for Germany in UTM, Zone 32 (EPSG:25832).

2.3   Geographical Grids for federal institutions

From the federal sector, demands were brought to the BKG to provide geographical grids. In doing this, the requirements to INSPIRE Grids and to national grid systems shall be fulfilled.

Beyond the geometry of the grids, the grid cells shall carry some basic information:
- proportion of the area Germany / abroad
- proportion of the area land / water

In addition, the high-resolution grid cells 100 m and 250 m shall be assigned to a municipality through the Official Municipality Key (AGS) of the municipality dominating as regards the area.

CSV (Excel), **Shape** and **GML** (if necessary) shall be supported as data formats. Additional to the download of data sets, also services (**WFS**) will be provided, if necessary.

2.4   Specification of the Geographical Grids

The BKG offers the following Geographical Grids for Germany:

- DE_Grid_ETRS89-UTM32_100m
- DE_Grid_ETRS89-UTM32_250m
- DE_Grid_ETRS89-UTM32_500m
- DE_Grid_ETRS89-UTM32_1km
- DE_Grid_ETRS89-UTM32_5km
- DE_Grid_ETRS89-UTM32_10km
- DE_Grid_ETRS89-UTM32_100km

- DE_Grid_ETRS89-LAEA_100m
- DE_Grid_ETRS89-LAEA_250m
- DE_Grid_ETRS89-LAEA_500m
- DE_Grid_ETRS89-LAEA _1km
- DE_Grid_ETRS89-LAEA _5km
- DE_Grid_ETRS89-LAEA _10km
- DE_Grid_ETRS89-LAEA _100km

The grid cells have the following attributes:

Attribut	Typ	Bedeutung
id	String	Identificator of the cell according to INSPIRE, example: 10kmN579E47
x_sw	Long	X-coordinate of the southwest corner, example: 470000
y_sw	Long	Y-coordinate of the southwest corner, example: 5790000
x_mp	Long	X-coordinate of the center of the cell, example: 475000
y_mp	Long	Y-coordinate of the center of the cell, example: 5795000
f_staat	Long	State area of Germany in the grid cell, example : 100000000
f_land	Long	Land area of Germany in grid cell, example : 99057470
f_wasser	Long	Water area of Germany in grid cell, example : 942530
p_staat	Double	Share of Germany in the area of grid cell in %, example: 100.00000
p_land	Double	Share of the german land area in the grid cell in %, example: 99.05747
p_wasser	Double	Share of the german water area in the grid cell in %, example: 0.94253
ags	String	Official Municipality Key (only for grids 100m and 250m), example: 09780133 if not appropriate: entry „-" (minus)

The **identificator of a cell** (id, in INSPIRE is named *cell code*) is made of:
- the size of the cell (example: 10km)
- the symbol „N" for the coordinate axis in direction „North"
- the quotient from the coordinate of the lower left corner in north direction (in meters)
  and the biggest decimal power by wich the cell size (in meters) can be divided integrally
- the symbol „E" for the coordinate axis in direction „East"
- the quotient from the coordinate of the lower left corner in east direction (in meters)
  and the biggest decimal power by wich the cell size (in meters) can be divided integrally

Annotation: According to INSPIRE, the identificator shall be free from unnecessary zeros. This means for the decimal powers as cell sizes provided by INSPIRE that the quotients are calculated from the coordinate

and the cell size. But this principle cannot be applied tot he cell sizes 250, 500 and 5000, because the quotient does not result integral numbers. In these cases, the division can only be performed by 10, 100 or 1000 in order to shorten th identificator.

In the following you find some selection examples according to the available attributes.

- cells in the area of the state border : `p_staat < 100`
- cells completely situated in water: `p_wasser = 100`
- cells with predominant land area: `p_land > 50`

2.5 Data volumes

The single data sets have the following file sizes in the formats CSV, Shape and GeoPackage.

Nationale GeoGitter ETRS89_UTM32	CSV		Shape		Geopackage	
	unkomprimiert	ZIP	unkomprimiert	ZIP	unkomprimiert	ZIP
100m	3300 GB	300 MB	-	1,2 GB	12 GB	2 GB
250m	540 MB	56 MB	5500 MB	240 MB	2 GB	360 MB
500m	122 MB	15 MB	1000 MB	50 MB	500 MB	90 MB
1km	31 MB	5 MB	250 MB	15 MB	123 MB	24 MB
5km	1500 kB	370 kB	10 MB	800 kB	5 MB	1 MB
10km	375 kB	100 kB	3 MB	200 kB	2 MB	300 kB
100km	6 kB	2 kB	40 kB	5 kB	115 kB	12 kB

INSPIRE GeoGitter ETRS89_LAEA	CSV		Shape		Geopackage	
	unkomprimiert	ZIP	unkomprimiert	ZIP	unkomprimiert	ZIP
100m	3400 GB	390 MB	-	-	12 GB	2 GB
250m	550 MB	68 MB	5500 MB	240 MB	2 GB	360 MB
500m	125 MB	18 MB	1000 MB	50 MB	500 MB	90 MB
1km	32 MB	5 MB	250 MB	15 MB	123 MB	24 MB
5km	1500 kB	380 kB	10 MB	800 kB	5 MB	1 MB
10km	390 kB	95 kB	3 MB	200 kB	2 MB	300 kB
100km	6 kB	2 kB	40 KB	5 kB	115 kB	12 kB

Due to the file sizes, for the grid resolutions 100m und 250m no Germany-wide complete Shape File can be offered. Instead, these grids are provided for the partial areas that are defined by the 100km-grids. The names of these Shape Files contain the ID of the 100km-grid,
e.g. 100kmN52E3_DE_Grid_ETRS89-UTM32_100m.shp.

2.6 Production method

2.6.1 Creation of the dataset

For the creation of the grids, two sets of geodata were generated:
- STAAT and
- WASSER

The data set STAAT is based on the layer Staat of the VG25 (harmonized administrative areas from the Basis-DLM). It was supplemented by the maritime waters (12-mile zone) from the Basis-DLM. All areas were combined and adjusted for inner gaps (sliver polygons). Finally, one polygon STAAT was generated

The dataset WASSER is based on all water body areas of the Basis-DLM.

The grid cells generated with a Java application were geometrically cut with the data sets STAAT and WASSER in order to assign values to the attributes of the grid cells.

For supplementing the grid cells 100m and 250m with the Official Municipality Key (attribute „ags"), the cells were overlayed with the municipalities of the VG25 and assigned to the AGS of the municipality predominating area.

2.6.2   Update of the dataset

The percentages of the areas of land and water bodies has been updated based on the Layer gew01_f of the dataset Basis-DLM as existed on 01.09.2019.

Based on the current dataset VG25 the attribute „ags" was updated for the grids 100m and 250m.

The original shape of the grids has been left untouched.

3   Terms of use and reference

According to the Spatial Data Access Act, this data stock is available free of charge via spatial data services for download and for online usage for commercial and non-commercial use.

The use of the spatial data and spatial data services is regulated by the Ordinance to Determine the Conditions for Use for the Provision of Spatial Data of the Federation (GeoNutzV) of 19 March 2013 (Federal Law Gazette 2013, Part I No. 14).

In particular, each user has to place the indication of source to all spatial data, metadata and spatial data services clearly visible and visually connected. Alterations, revisions, new designs or other modifications must get an alteration note in the indication of source.

Indication of source and alteration note have to be designed as follows. When displayed on a website, the indication of source has to be linked to the URL "http://www.bkg.bund.de".

© GeoBasis-DE / BKG < year of last data acquisition>

© GeoBasis-DE / BKG < year of last data acquisition> (data altered)

Example:

© GeoBasis-DE / BKG 2020

4   Data supply

For inquiries and orders, please contact us at the following address:

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