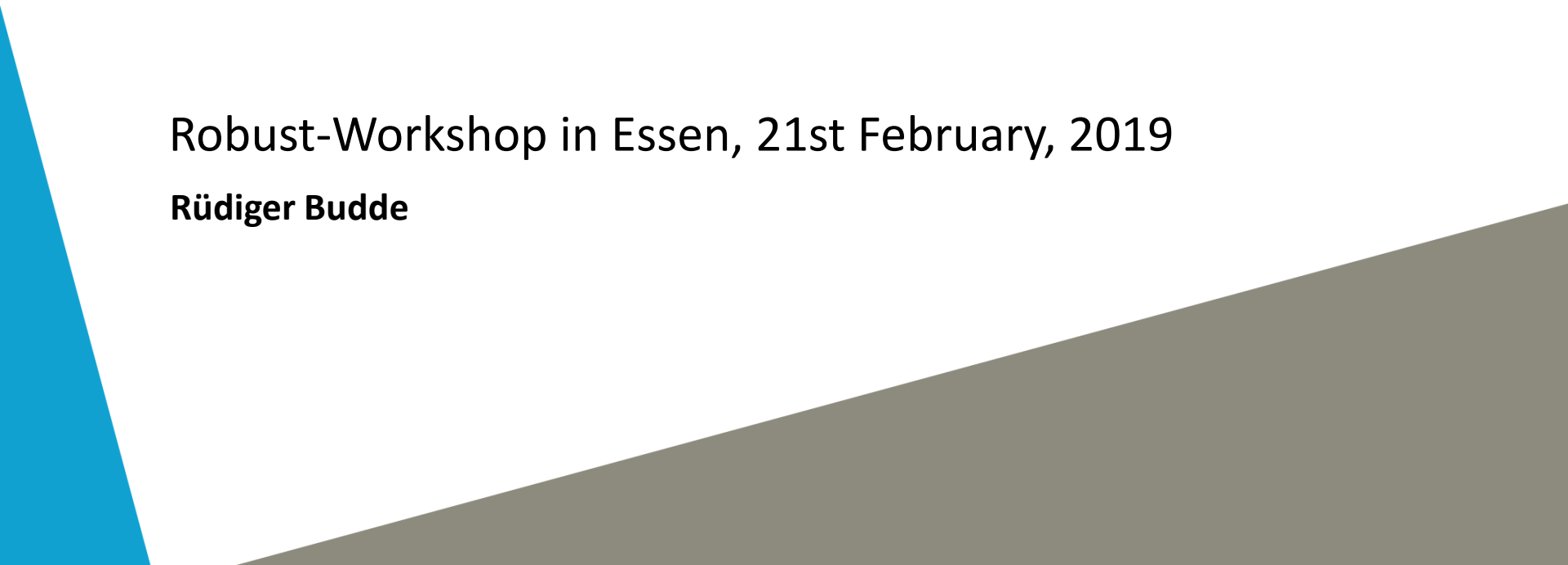




Regional data and their implications in empirical statistics

Robust-Workshop in Essen, 21st February, 2019

Rüdiger Budde

The bottom of the slide is decorated with large, abstract geometric shapes. A blue triangle is on the left, and a grey trapezoid is on the right, both pointing towards the bottom right corner.



General Remarks

Differences between national and spatial statistics

Reference	National Statistics	Spatial Statistics
Contentwise		No difference
Temporal		nodifference
Spatial	Constant area	Varies (different approaches) • Administrative regions (they can vary over time) • Analytical regions • Homogeneous regions • Geogrefenceable

Formal Definition

- European Union proposes a spatial classification according to population densities for intra-European spatial comparisons
- 3 categories:
 - **rural area** with less than 300 inhabitants per km²,
 - **peri-urban area** with more than 300 and up to 1500 inhabitants/km²,
 - **metropolitan area** with more than 1500 inhabitants/km².
- This demarcation is initially taken as a basis. It seems somewhat too rough for detailed analyses, so that the individual groups can be considered more differentiated if necessary.

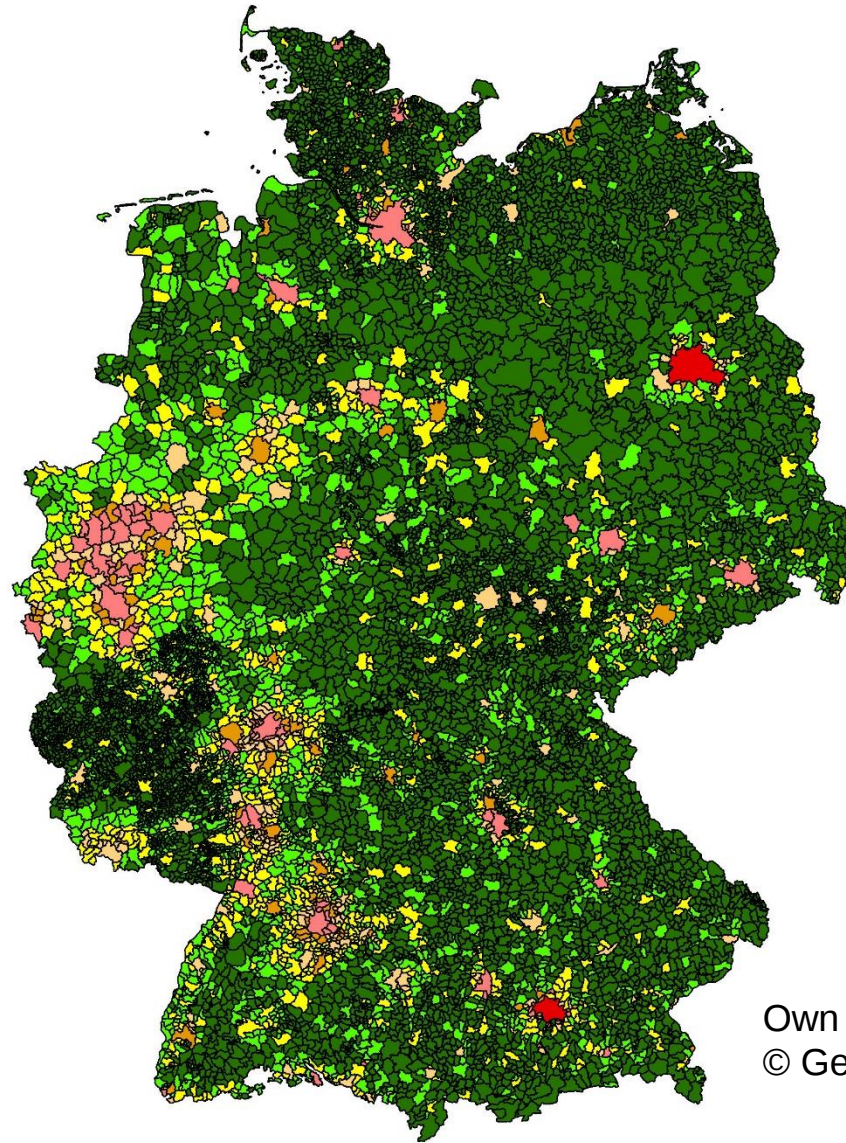
European Union: Degree of urbanisation classification – 2011;
revision 2018



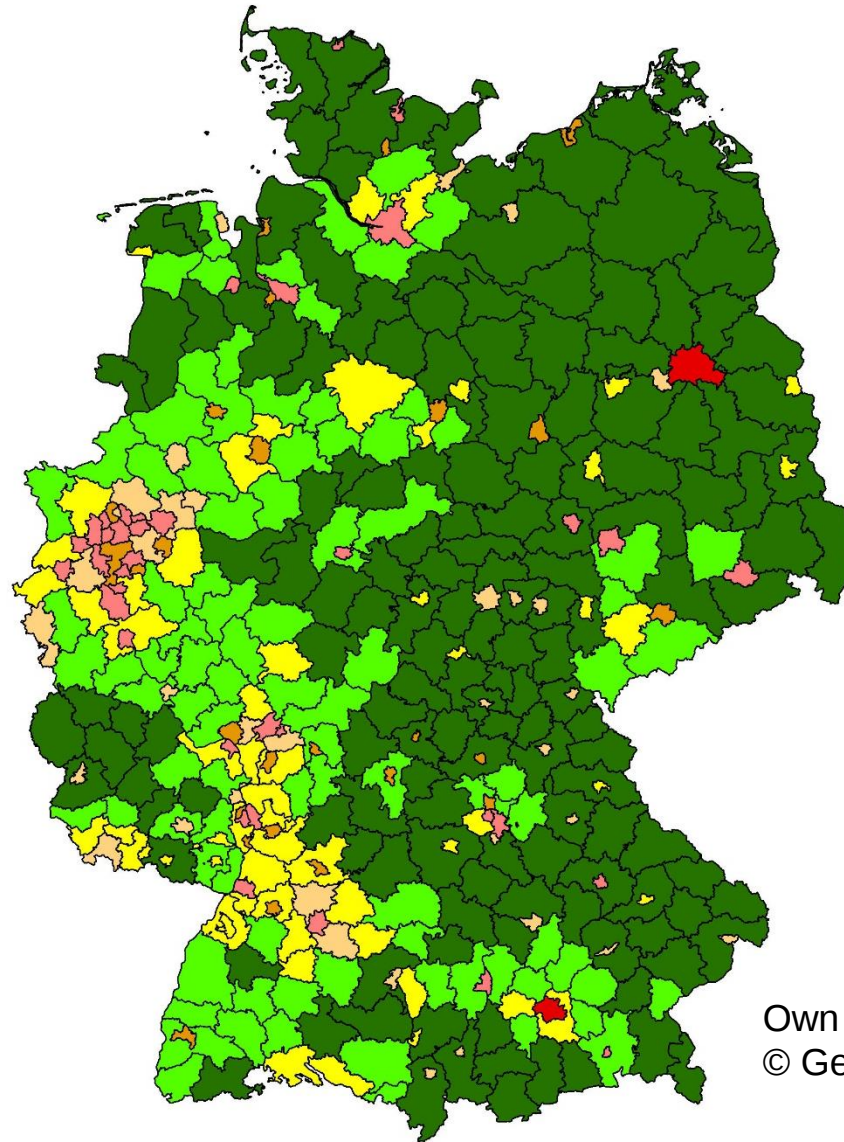
Example applied to different spatial structures

Used spatial reference

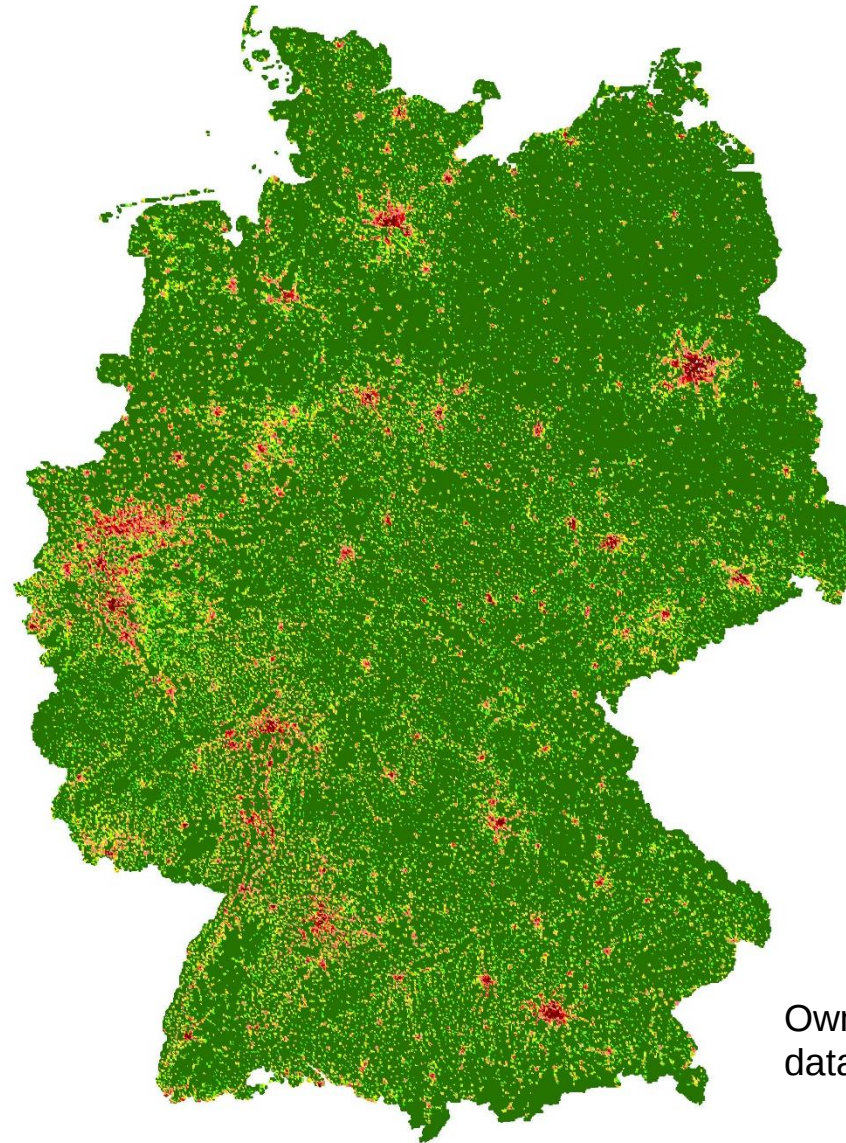
rural	$x \geq 300$	
	$150 > x \geq 300$	
peri urban	$300 > x \geq 700$	
	$700 > x \geq 1100$	
	$1100 > x \geq 1500$	
metropolitan	$1500 > x \geq 3600$	
	$3600 > x \geq 6000$	
	$6000 < x$	



Own calculations based on
© GeoBasis-DE / BKG 2013.

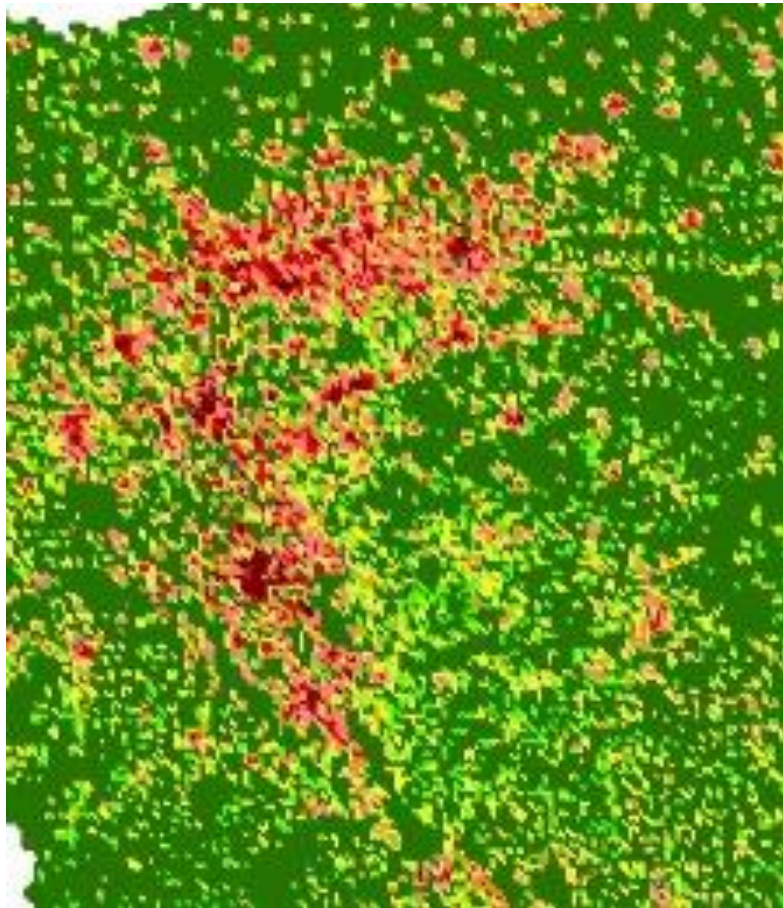


Own calculations based on
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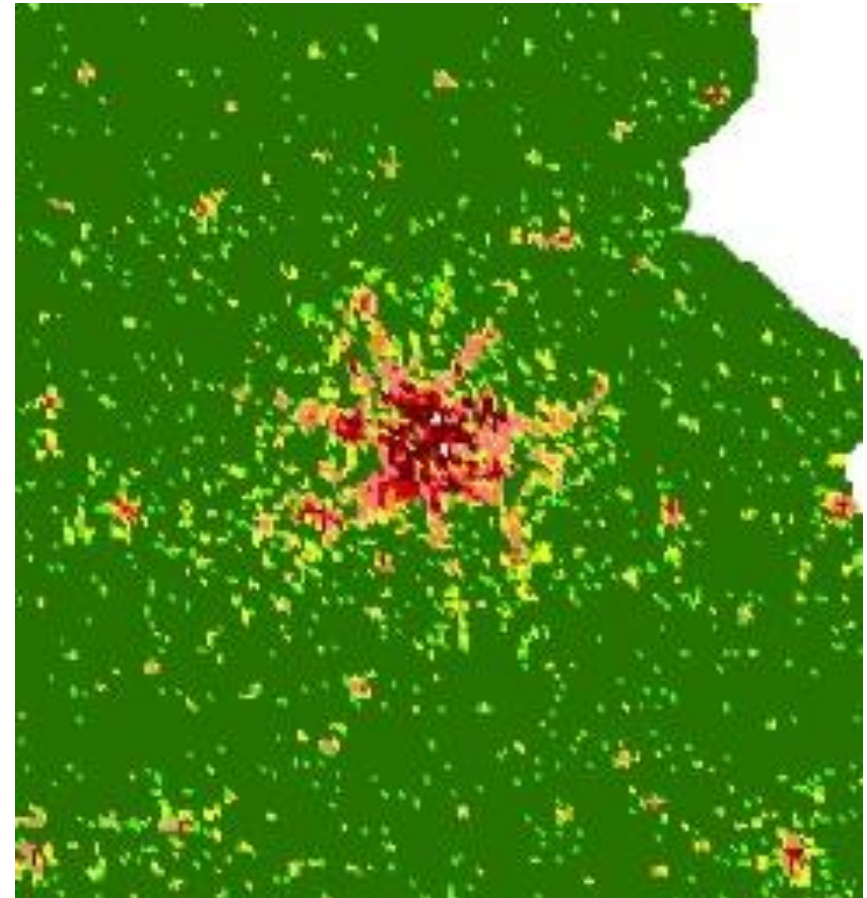


Own calculations based on
data from RWI-GEO-GRID.

Northrhine – Westphalia
industrial core

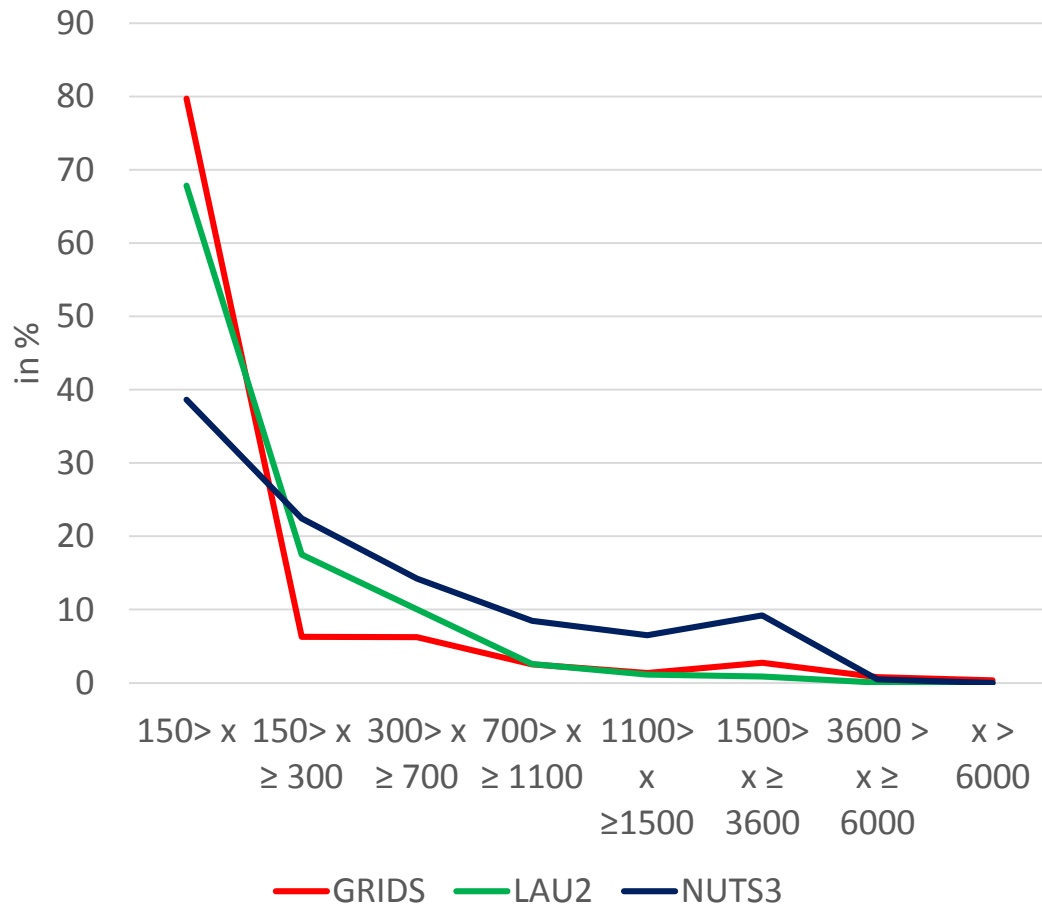


Berlin Brandenburg



Own calculations based on
data from RWI-GEO-GRID.

Spatial distributions as a function of population density



Number of spatial elements per spatial definition

GRIDS	357722
LAU2	11271
NUTS3	401

	Amount of spatial elements	Population (density)				
		min	max	mean	variance	coefficient of variance
$x \geq 150$	285196	0	150	18.9	1075.6	57.0
$150 > x \geq 300$	22464	151	300	214.9	1846.9	8.6
$300 > x \geq 700$	22330	301	700	461.3	12891.9	27.9
$700 > x \geq 1100$	9006	701	1100	878.1	12850.9	14.6
$1100 > x \geq 1500$	4899	1101	1500	1284.2	13432.6	10.5
$1500 > x \geq 3600$	9767	1501	3600	2298.5	343796.6	149.6
$3600 > x \geq 6000$	2796	3601	6000	4519.0	433176.2	95.9
$6000 > x$	1264	6002	26121	8944.4	10233373.3	1144.1
over all elements	357722	0	26121	226.7	644828.8	2844.2

The area of the individual grids is standardized to 1 sq km.

Own calculations based on RWI-GEO-GRID.

	Amount of spatial elements	Population density mean	Population (inhabitants)				
			Min	max	mean	Variance / 1000	coefficient of variance
$x \geq 150$	7647	66.5	0	43902	2089.0	9920.3	4748.9
$150 > x \geq 300$	1972	208.8	142	48551	6503.1	48447.2	7449.9
$300 > x \geq 700$	1133	445.7	275	123909	14132.4	233075.2	16492.3
$700 > x \geq 1100$	292	864.5	278	311846	31314.1	1466167.9	46821.4
$1100 > x \geq 1500$	127	1270.3	1998	333451	52933.0	3982623.5	75238.9
$1500 > x \geq 3600$	97	2015.3	3094	1810438	173087.9	69487584.3	401458.3
$3600 > x \geq 6000$	3	4271.0	21378	3574830	1686836.3	2129264506.7	1262282.8
$6000 > x$	0	0.0	0	0	0.0	0.0	
over all elements	11271	181.6	0	3574830	7322.0	2335263.2	318936.9
Land register area in sq km							
			Min	max	mean	variance	coefficient of variance
$x \geq 150$	.....	.....	0.31	632.43	30.7	1544.3	50.2
$150 > x \geq 300$	.....	.....	0.71	253.95	31.2	1068.3	34.2
$300 > x \geq 700$	.....	.....	0.45	244.75	32.0	1116.5	34.9
$700 > x \geq 1100$	.....	.....	0.39	303.28	35.9	1781.7	49.6
$1100 > x \geq 1500$	.....	.....	1.67	258.82	41.7	2477.0	59.4
$1500 > x \geq 3600$	.....	.....	1.39	755.3	80.4	12393.4	154.2
$3600 > x \geq 6000$	.....	.....	5.23	891.12	402.4	134999.4	335.5
$6000 > x$	.....	.....	0	0	0.0	0.0	
over all elements	.....	.....	0.31	891.12	31.7	1622.7	51.2

Own calculations based on © GeoBasis-DE / BKG 2013.

	Amount of spatial elements	Population density	Population (inhabitants)				
		mean	min	max	mean	variance /1000	coefficient of variance
$x \geq 150$	155	102.6	48825	321391	136187.0	2969181.7	21.8
$150 > x \geq 300$	90	207.4	80961	444409	200927.3	7188792.2	35.8
$300 > x \geq 700$	57	458.8	34428	1148700	230264.1	35076309.9	152.3
$700 > x \geq 1100$	34	884.9	40707	617195	202808.4	29102652.1	143.5
$1100 > x \geq 1500$	26	1276.7	48445	484770	161989.5	9835030.9	60.7
$1500 > x \geq 3600$	37	2171.4	62672	1810438	380072.4	103772693.3	273.0
$3600 > x \geq 6000$	2	4362.5	1464301	3574830	2519565.5	1113583165.0	442.0
$6000 > x$	0	0.0	0	0	0.0	0.0	
over all elements	401	531.3	34428	3574830	205801.8	57573187.0	279.8
			Land register area in sq km				
			min	max	mean	variance	coefficient of variance
$x \geq 150$	.....	.....	433.61	5495.65	1424.8	541769.1	380.2
$150 > x \geq 300$	.....	.....	323.39	2121.81	974.5	142205.2	145.9
$300 > x \geq 700$	.....	.....	61.36	2297.13	525.7	162181.6	308.5
$700 > x \geq 1100$	.....	.....	40.02	761.32	240.6	47001.3	195.4
$1100 > x \geq 1500$	.....	.....	35.7	407.21	128.3	6720.9	52.4
$1500 > x \geq 3600$	.....	.....	37.22	755.3	171.3	17150.3	100.1
$3600 > x \geq 6000$	.....	.....	310.71	891.12	600.9	84218.9	140.2
$6000 > x$	.....	.....	0	0	0.0	0.0	
over all elements	.....	.....	35.7	5495.65	891.7	523274.5	586.8

Own calculations based on © GeoBasis-DE / BKG 2013.



Thank you for your attention!