

Appendix S1: Supplementary Results

Landcover map bias

Table 1: Biases and mean absolute errors (MAE) in cropland maps relative to the 2011 reference map for each aggregation scale calculated over the entire country, for the union of agricultural regions ($\text{cropland} > 0$), and as density independent means, wherein the mean bias/MAE values for each of 20 cropland cover classes (representing 5% increments of cover 0% to 100% defined by the reference map) were calculated and then averaged.

Region	Metric	Map	1 km	5 km	10 km	25 km	50 km	100 km
Country	Bias	SA-LC	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5
Country	Bias	GlobCover	2.0	2.0	2.0	2.0	2.0	2.0
Country	Bias	MODIS	2.5	2.5	2.5	2.5	2.5	2.5
Country	Bias	GeoWiki	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
Country	MAE	SA-LC	3.3	2.9	2.8	2.7	2.6	2.6
Country	MAE	GlobCover	11.3	9.4	8.8	8.2	7.6	7.2
Country	MAE	MODIS	7.8	6.5	6.1	5.6	5.0	4.6
Country	MAE	GeoWiki	6.3	4.5	3.9	3.2	2.6	2.2
Agricultural	Bias	SA-LC	-9.1	-4.4	-3.3	-2.9	-2.7	-2.6
Agricultural	Bias	GlobCover	3.7	2.8	2.5	2.2	2.1	2.1
Agricultural	Bias	MODIS	7.1	4.1	3.4	2.9	2.7	2.6
Agricultural	Bias	GeoWiki	-2.0	-1.0	-0.8	-0.7	-0.6	-0.6
Agricultural	MAE	SA-LC	11.1	5.0	3.7	3.0	2.8	2.6
Agricultural	MAE	GlobCover	20.5	12.8	10.7	9.0	8.1	7.3
Agricultural	MAE	MODIS	22.7	10.8	8.2	6.3	5.4	4.7
Agricultural	MAE	GeoWiki	19.2	7.8	5.3	3.7	2.9	2.3
Density independent	Bias	SA-LC	-8.6	-7.6	-7.7	-7.0	-6.5	-5.6
Density independent	Bias	GlobCover	33.6	33.5	30.9	27.9	23.8	14.4
Density independent	Bias	MODIS	20.9	13.9	11.0	8.1	7.7	7.1
Density independent	Bias	GeoWiki	4.3	-1.1	-1.8	-2.3	-0.1	-0.6
Density independent	MAE	SA-LC	11.4	8.4	8.1	7.2	6.6	5.6
Density independent	MAE	GlobCover	37.1	35.8	32.9	29.7	25.8	16.9
Density independent	MAE	MODIS	31.5	22.3	19.4	16.9	14.7	11.2
Density independent	MAE	GeoWiki	23.2	12.1	9.9	8.1	6.2	3.8

Table 2: Biases and mean absolute errors (MAE) in cropland maps relative to the 2007 reference map for each aggregation scale calculated over the entire country, for the union of agricultural regions, and as density independent means, wherein the mean bias/MAE values for each of 20 cropland cover classes (representing 5% increments of cover 0% to 100% defined by the reference map) were calculated and then averaged.

Region	Metric	Map	1 km	5 km	10 km	25 km	50 km	100 km
Country	Bias	SA-LC	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9
Country	Bias	GlobCover	1.7	1.7	1.7	1.7	1.7	1.7
Country	Bias	MODIS	2.2	2.2	2.2	2.2	2.2	2.2
Country	Bias	GeoWiki	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9
Country	MAE	SA-LC	3.0	2.9	2.9	2.9	2.9	2.9
Country	MAE	GlobCover	11.3	9.4	8.9	8.2	7.7	7.2
Country	MAE	MODIS	7.7	6.4	6.0	5.5	5.0	4.6
Country	MAE	GeoWiki	6.2	4.4	3.8	3.1	2.6	2.2
Agricultural	Bias	SA-LC	-9.9	-4.9	-3.8	-3.3	-3.1	-2.9
Agricultural	Bias	GlobCover	3.1	2.3	2.0	1.9	1.8	1.7
Agricultural	Bias	MODIS	6.4	3.6	2.9	2.5	2.3	2.2
Agricultural	Bias	GeoWiki	-2.8	-1.6	-1.2	-1.0	-1.0	-0.9
Agricultural	MAE	SA-LC	10.4	5.0	3.9	3.3	3.1	3.0
Agricultural	MAE	GlobCover	20.6	12.8	10.7	9.1	8.1	7.4
Agricultural	MAE	MODIS	22.6	10.6	8.0	6.2	5.3	4.7
Agricultural	MAE	GeoWiki	19.2	7.7	5.2	3.6	2.8	2.2
Density independent	Bias	SA-LC	-9.9	-8.5	-8.4	-7.4	-7.0	-6.6
Density independent	Bias	GlobCover	33.8	33.8	31.2	27.4	21.6	14.8
Density independent	Bias	MODIS	20.8	13.3	10.5	6.9	6.9	7.0
Density independent	Bias	GeoWiki	3.8	-1.8	-2.5	-2.9	-0.9	-1.5
Density independent	MAE	SA-LC	10.5	8.6	8.4	7.5	7.0	6.6
Density independent	MAE	GlobCover	37.4	36.1	33.2	29.3	24.0	17.4
Density independent	MAE	MODIS	31.7	22.2	19.5	17.2	14.5	11.6
Density independent	MAE	GeoWiki	23.3	12.0	9.8	8.2	5.9	4.0

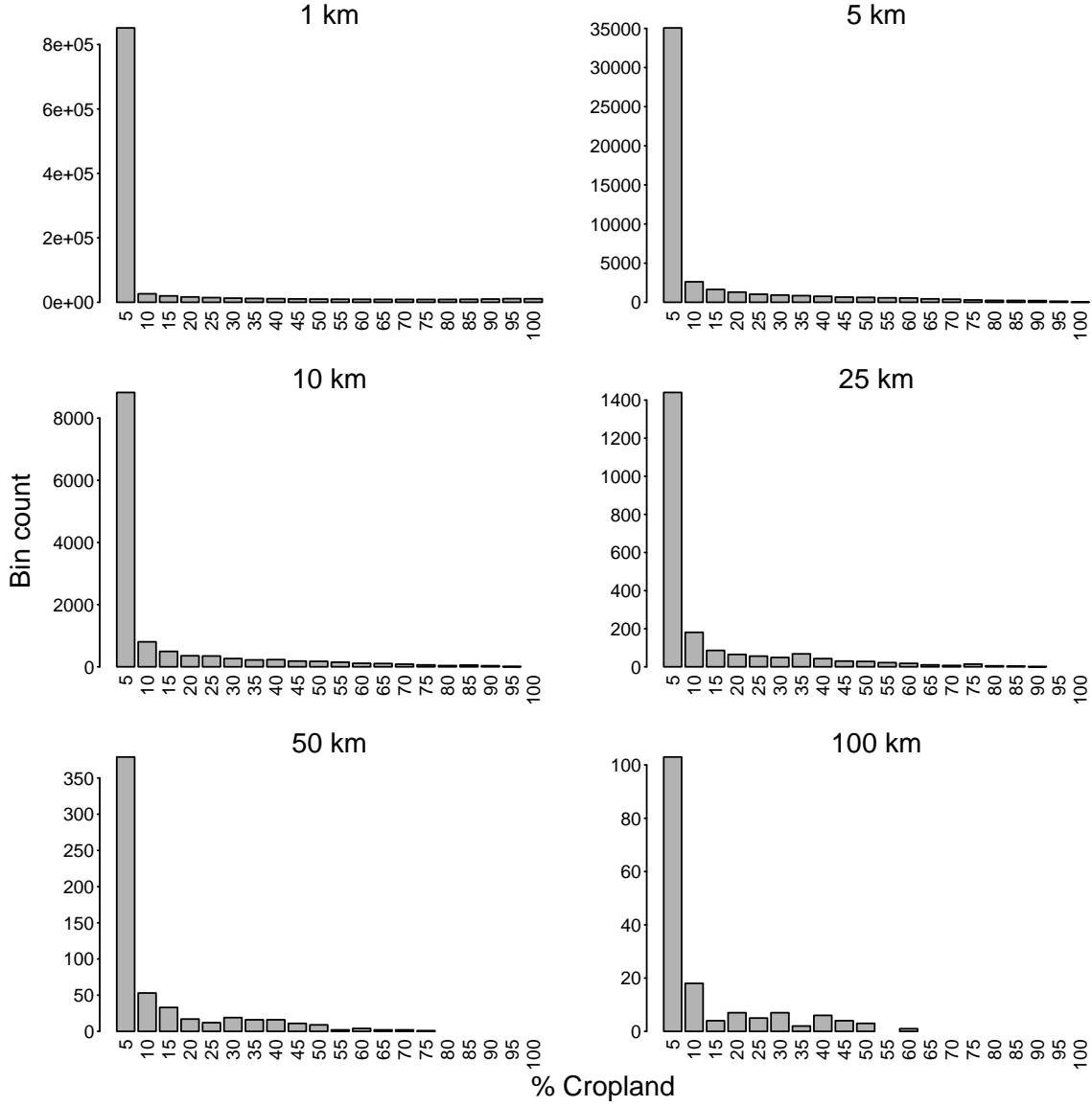


Figure 1: Number of cells within each cropland density bin at each scale of aggregation, where bins represent 5% increment of cropland cover from 0 to 100% (values on x-axis provide the upper limit of each bin).

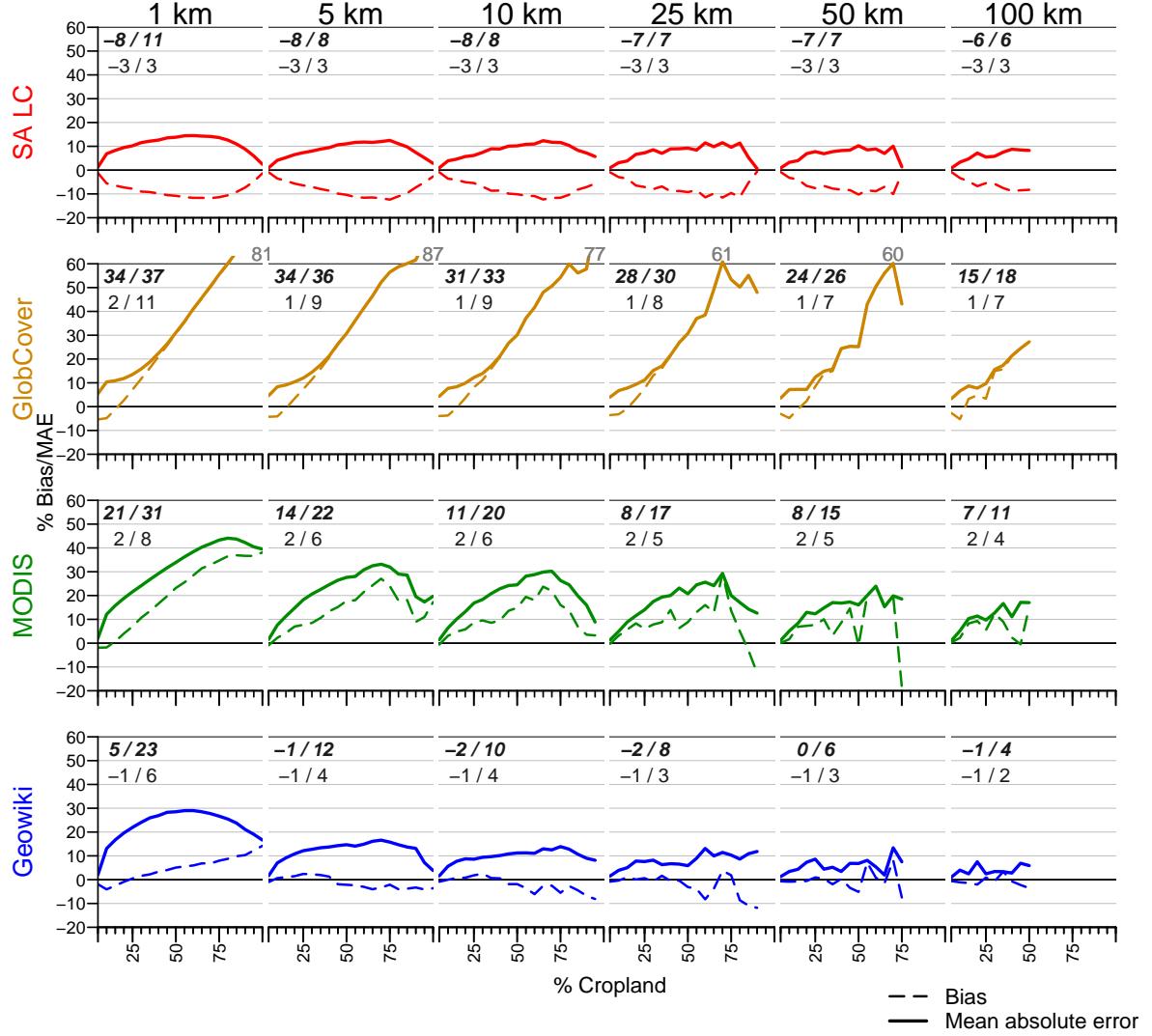


Figure 2: Biases and mean absolute errors (MAE) for each of the cropland maps as a function of cropland density (calculated using the 2011 reference maps) and aggregation scales. Rows present biases by map product, columns by aggregation scale. Dash lines indicate bias at each level of cropland density, calculated in bins spanning 5% of density (e.g. 0-5% cropland cover, 5-10%, etc.), while solid lines indicate the mean absolute error. The black numbers in each plot area present the overall means of bias/MAE for each sensor-scale combination. The bin-wise and overall mean statistics were calculated from pooled map errors calculated from differences between the 2007 reference map and each cropland map (including all three variants—high, medium, and low—of the MODIS and GlobCover-derived cropland maps), and the 2011 reference map and each cropland map.

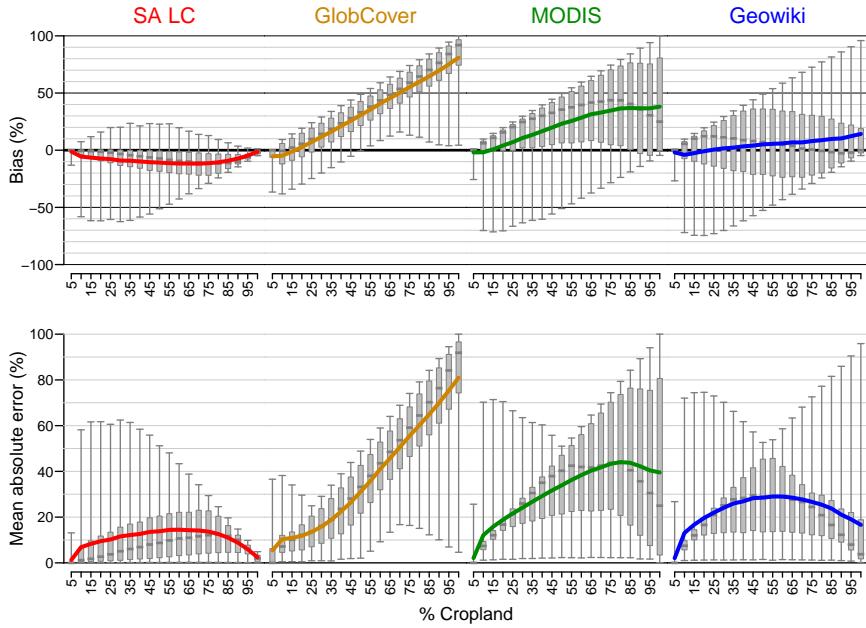


Figure 3: Biases and mean absolute errors (MAE) for each of the cropland maps at 1 km resolution, as a function of cropland density. Colored lines (color-coded to map product name) show the bias/MAE at each level of cropland density, calculated in bins spanning 5% (e.g. 0-5% cropland cover, 5-10%, etc.). Box plots show the variability of bias in each bin (whiskers = 2.5 and 97.5 percentiles, box the inter-quartile, and grey bar in box the median). Biases are presented in the top row, and MAEs in the bottom row. Statistics were calculated from pooled map errors calculated from differences between the 2007 reference map and each cropland map (including all three variants—high, medium, and low—of the MODIS and GlobCover-derived cropland maps), and the 2011 reference map and each cropland map.

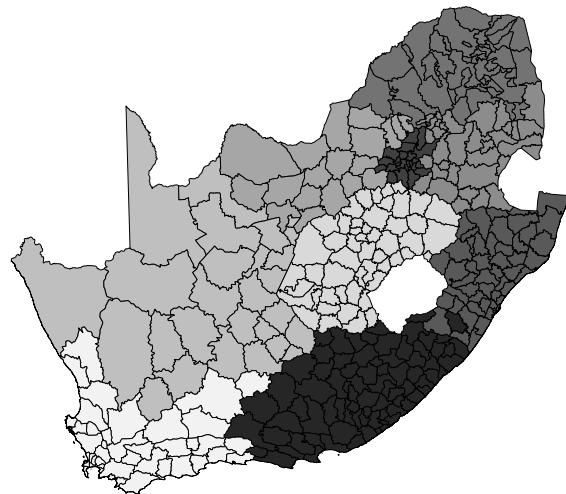


Figure 4: South Africa's magisterial districts.

Carbon bias

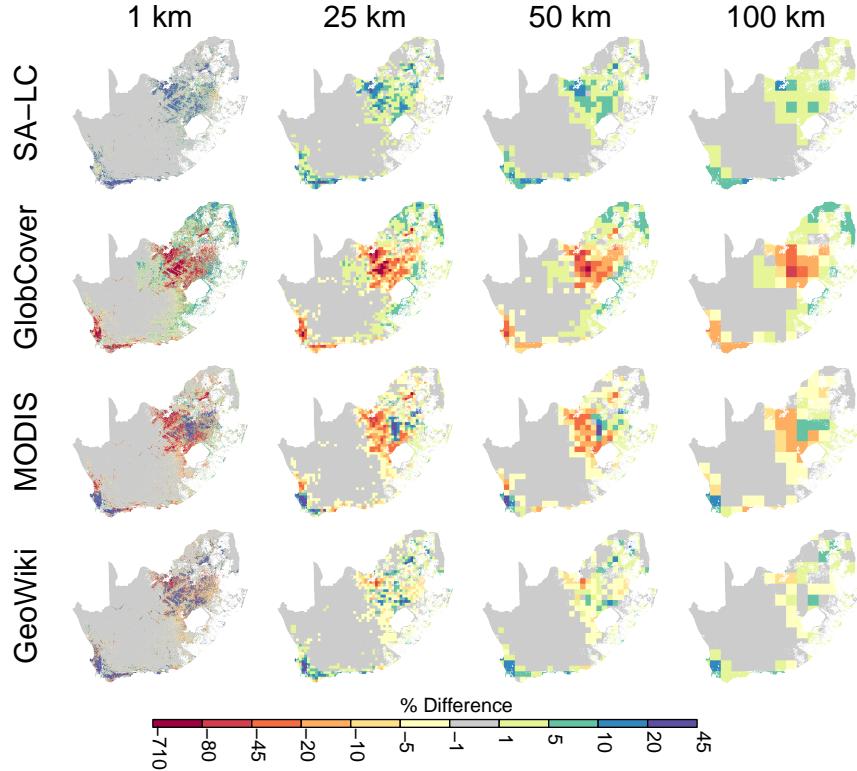


Figure 5: Spatial patterns of error (averaged across four different possible cover types adjacent to cropland) in carbon stock estimates.

Table 3: Percent differences in total carbon stock estimates calculated from the reference maps and from each of the four cropland maps. Differences are evaluated for total carbon estimates either at the country scale or over just the agricultural regions (cropland >0.05%), using the carbon densities of 5 different cover types to provide the values for the non-agricultural portions of each pixel (cover types indicated by column names).

Region	Map	Forest	Secondary	Shrubland	Grassland	Sparse
Country	SA-LC	2.6	2.5	2.5	0.1	-2.1
Country	GlobCover	-2.1	-2.0	-2.0	-0.1	1.7
Country	MODIS	-2.6	-2.5	-2.5	-0.1	2.1
Country	GeoWiki	0.6	0.5	0.5	0.0	-0.5
Agricultural	SA-LC	-2.0	-2.7	-2.8	-10.6	-14.9
Agricultural	GlobCover	-161.9	-156.3	-155.5	-95.9	-63.6
Agricultural	MODIS	-1.6	-0.8	-0.7	8.4	13.3
Agricultural	GeoWiki	7.7	7.3	7.2	2.9	0.5

Table 4: Biases and mean absolute errors for each of the cropland maps across aggregation scales and each possible landcover type sharing the pixel with cropland. Three variants of the bias/accuracy values are provided, indicated by the: Region column: 1) weighted by reference cropland density (Density weighted); 2) across the entire country (Country); 3) for agricultural areas only (Agricultural, i.e. >0.05% cropland).

Region	Metric	Map	Cover	1 km	5 km	10 km	25 km	50 km	100 km
Agricultural	Bias	GeoWiki	All	-5.6	0.8	0.8	0.5	0.4	0.4
Agricultural	Bias	GlobCover	All	-23.9	-8.5	-6.5	-4.7	-3.6	-2.7
Agricultural	Bias	MODIS	All	-22.1	-5.3	-3.9	-2.9	-2.4	-1.9
Agricultural	Bias	SA-LC	All	7.2	4.0	3.2	2.6	2.2	1.9
Agricultural	Bias	GeoWiki	Forest	-11.9	1.9	1.7	1.2	0.9	0.8
Agricultural	Bias	GlobCover	Forest	-51.9	-16.6	-12.5	-9.0	-6.9	-5.3
Agricultural	Bias	MODIS	Forest	-47.8	-10.9	-7.9	-6.0	-5.1	-4.2
Agricultural	Bias	SA-LC	Forest	15.6	8.6	7.0	5.5	4.8	4.2
Agricultural	Bias	GeoWiki	Secondary	-6.9	1.6	1.5	1.1	0.8	0.8
Agricultural	Bias	GlobCover	Secondary	-34.2	-13.2	-10.3	-7.8	-6.1	-4.7
Agricultural	Bias	MODIS	Secondary	-33.3	-9.4	-7.0	-5.5	-4.7	-3.9
Agricultural	Bias	SA-LC	Secondary	13.5	7.6	6.2	5.0	4.4	3.9
Agricultural	Bias	GeoWiki	Shrubland	-6.5	1.6	1.4	1.1	0.8	0.8
Agricultural	Bias	GlobCover	Shrubland	-32.6	-12.8	-10.0	-7.6	-6.0	-4.7
Agricultural	Bias	MODIS	Shrubland	-31.9	-9.2	-6.9	-5.4	-4.7	-3.9
Agricultural	Bias	SA-LC	Shrubland	13.2	7.5	6.1	5.0	4.4	3.8
Agricultural	Bias	GeoWiki	Grassland	0.1	0.1	0.0	0.0	0.0	0.0
Agricultural	Bias	GlobCover	Grassland	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1
Agricultural	Bias	MODIS	Grassland	-0.3	-0.2	-0.2	-0.1	-0.1	-0.1
Agricultural	Bias	SA-LC	Grassland	0.3	0.2	0.2	0.1	0.1	0.1
Agricultural	Bias	GeoWiki	Sparse	-2.8	-1.0	-0.8	-0.8	-0.7	-0.6
Agricultural	Bias	GlobCover	Sparse	-0.7	0.4	0.6	0.9	1.0	1.1
Agricultural	Bias	MODIS	Sparse	2.9	2.9	2.8	2.7	2.6	2.5
Agricultural	Bias	SA-LC	Sparse	-6.7	-3.8	-3.3	-2.9	-2.8	-2.5
Agricultural	MAE	GeoWiki	All	26.8	9.4	6.5	4.5	3.4	2.4
Agricultural	MAE	GlobCover	All	36.7	17.0	14.0	11.5	9.6	8.0
Agricultural	MAE	MODIS	All	37.8	13.8	10.8	8.4	6.7	5.5
Agricultural	MAE	SA-LC	All	13.6	6.3	4.9	3.9	3.4	3.0
Agricultural	MAE	GeoWiki	Forest	45.9	14.3	9.8	6.6	4.8	3.4
Agricultural	MAE	GlobCover	Forest	68.8	27.5	22.0	17.4	14.2	11.6
Agricultural	MAE	MODIS	Forest	69.1	21.7	16.6	12.6	9.9	7.9
Agricultural	MAE	SA-LC	Forest	22.1	9.6	7.5	5.8	4.9	4.3
Agricultural	MAE	GeoWiki	Secondary	36.8	12.8	8.8	6.0	4.4	3.2
Agricultural	MAE	GlobCover	Secondary	50.2	23.5	19.3	15.6	13.0	10.7

Agricultural	MAE	MODIS	Secondary	52.3	19.1	14.9	11.4	9.1	7.3
Agricultural	MAE	SA-LC	Secondary	18.7	8.6	6.7	5.3	4.5	4.0
Agricultural	MAE	GeoWiki	Shrubland	35.8	12.6	8.7	6.0	4.4	3.2
Agricultural	MAE	GlobCover	Shrubland	48.5	23.0	19.0	15.4	12.8	10.6
Agricultural	MAE	MODIS	Shrubland	50.7	18.8	14.7	11.3	9.0	7.2
Agricultural	MAE	SA-LC	Shrubland	18.3	8.4	6.6	5.2	4.5	3.9
Agricultural	MAE	GeoWiki	Grassland	0.8	0.3	0.3	0.2	0.1	0.1
Agricultural	MAE	GlobCover	Grassland	0.8	0.6	0.5	0.4	0.4	0.3
Agricultural	MAE	MODIS	Grassland	0.9	0.5	0.4	0.3	0.3	0.2
Agricultural	MAE	SA-LC	Grassland	0.5	0.2	0.2	0.2	0.1	0.1
Agricultural	MAE	GeoWiki	Sparse	14.7	6.9	5.2	3.8	3.0	2.3
Agricultural	MAE	GlobCover	Sparse	15.3	10.5	9.4	8.5	7.7	6.8
Agricultural	MAE	MODIS	Sparse	16.2	9.0	7.6	6.3	5.4	4.6
Agricultural	MAE	SA-LC	Sparse	8.6	4.4	3.7	3.1	2.9	2.6
Country	Bias	GeoWiki	All	-1.7	0.4	0.4	0.3	0.2	0.3
Country	Bias	GlobCover	All	-12.6	-5.6	-4.5	-3.4	-2.7	-2.2
Country	Bias	MODIS	All	-7.3	-2.8	-2.3	-1.9	-1.7	-1.5
Country	Bias	SA-LC	All	2.1	2.0	1.8	1.7	1.5	1.5
Country	Bias	GeoWiki	Forest	-3.7	0.9	0.9	0.8	0.6	0.6
Country	Bias	GlobCover	Forest	-27.3	-10.9	-8.7	-6.5	-5.2	-4.3
Country	Bias	MODIS	Forest	-15.8	-5.7	-4.6	-4.0	-3.6	-3.2
Country	Bias	SA-LC	Forest	4.5	4.2	3.9	3.6	3.3	3.2
Country	Bias	GeoWiki	Secondary	-2.1	0.8	0.8	0.7	0.5	0.6
Country	Bias	GlobCover	Secondary	-18.0	-8.7	-7.1	-5.6	-4.6	-3.8
Country	Bias	MODIS	Secondary	-11.0	-4.9	-4.1	-3.6	-3.3	-3.0
Country	Bias	SA-LC	Secondary	3.9	3.7	3.5	3.3	3.1	3.0
Country	Bias	GeoWiki	Shrubland	-2.0	0.8	0.8	0.7	0.5	0.6
Country	Bias	GlobCover	Shrubland	-17.1	-8.4	-7.0	-5.5	-4.5	-3.8
Country	Bias	MODIS	Shrubland	-10.6	-4.8	-4.1	-3.5	-3.2	-2.9
Country	Bias	SA-LC	Shrubland	3.8	3.6	3.5	3.2	3.0	2.9
Country	Bias	GeoWiki	Grassland	0.0	0.0	0.0	0.0	0.0	0.0
Country	Bias	GlobCover	Grassland	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Country	Bias	MODIS	Grassland	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Country	Bias	SA-LC	Grassland	0.1	0.1	0.1	0.1	0.1	0.1
Country	Bias	GeoWiki	Sparse	-0.9	-0.5	-0.5	-0.5	-0.5	-0.5
Country	Bias	GlobCover	Sparse	-0.4	0.3	0.4	0.6	0.8	0.9
Country	Bias	MODIS	Sparse	0.9	1.5	1.6	1.8	1.8	1.9
Country	Bias	SA-LC	Sparse	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
Country	MAE	GeoWiki	All	8.3	4.6	3.7	3.0	2.3	1.9
Country	MAE	GlobCover	All	19.3	11.2	9.8	8.3	7.2	6.5
Country	MAE	MODIS	All	12.5	7.2	6.4	5.5	4.7	4.1
Country	MAE	SA-LC	All	3.9	3.0	2.8	2.5	2.4	2.3

Country	MAE	GeoWiki	Forest	14.3	7.0	5.6	4.3	3.3	2.6
Country	MAE	GlobCover	Forest	36.2	18.1	15.3	12.6	10.7	9.3
Country	MAE	MODIS	Forest	22.9	11.4	9.8	8.2	6.9	5.9
Country	MAE	SA-LC	Forest	6.3	4.7	4.2	3.8	3.4	3.3
Country	MAE	GeoWiki	Secondary	11.5	6.3	5.0	3.9	3.1	2.4
Country	MAE	GlobCover	Secondary	26.4	15.5	13.4	11.3	9.8	8.6
Country	MAE	MODIS	Secondary	17.3	10.0	8.7	7.4	6.3	5.5
Country	MAE	SA-LC	Secondary	5.3	4.2	3.8	3.4	3.2	3.0
Country	MAE	GeoWiki	Shrubland	11.2	6.2	5.0	3.9	3.0	2.4
Country	MAE	GlobCover	Shrubland	25.5	15.2	13.2	11.2	9.7	8.5
Country	MAE	MODIS	Shrubland	16.8	9.8	8.6	7.3	6.2	5.4
Country	MAE	SA-LC	Shrubland	5.2	4.1	3.8	3.4	3.1	3.0
Country	MAE	GeoWiki	Grassland	0.2	0.2	0.1	0.1	0.1	0.1
Country	MAE	GlobCover	Grassland	0.4	0.4	0.3	0.3	0.3	0.3
Country	MAE	MODIS	Grassland	0.3	0.2	0.2	0.2	0.2	0.2
Country	MAE	SA-LC	Grassland	0.1	0.1	0.1	0.1	0.1	0.1
Country	MAE	GeoWiki	Sparse	4.6	3.4	3.0	2.5	2.1	1.7
Country	MAE	GlobCover	Sparse	8.0	6.9	6.6	6.2	5.8	5.5
Country	MAE	MODIS	Sparse	5.4	4.7	4.5	4.1	3.8	3.5
Country	MAE	SA-LC	Sparse	2.5	2.2	2.1	2.0	2.0	2.0
Density	Bias	SA-LC	All	10.9	9.6	8.2	6.5	5.0	4.2
Density	Bias	GlobCover	All	-123.4	-47.6	-35.9	-24.8	-17.4	-12.3
Density	Bias	MODIS	All	-66.0	-17.6	-12.0	-8.3	-6.2	-4.1
Density	Bias	GeoWiki	All	-20.4	2.1	2.3	1.3	0.3	0.5
Density	Bias	SA-LC	Forest	22.7	19.7	16.9	13.3	10.4	9.0
Density	Bias	GlobCover	Forest	-276.2	-98.3	-73.3	-50.2	-35.5	-25.4
Density	Bias	MODIS	Forest	-146.5	-36.1	-24.5	-17.0	-12.9	-8.8
Density	Bias	GeoWiki	Forest	-46.1	4.3	4.6	2.7	0.6	1.0
Density	Bias	SA-LC	Secondary	18.4	16.7	14.6	11.8	9.5	8.2
Density	Bias	GlobCover	Secondary	-186.3	-79.3	-61.2	-43.8	-31.7	-23.2
Density	Bias	MODIS	Secondary	-101.0	-30.6	-21.5	-15.2	-11.7	-8.0
Density	Bias	GeoWiki	Secondary	-30.5	3.4	3.7	2.2	0.6	0.9
Density	Bias	SA-LC	Shrubland	17.9	16.4	14.3	11.6	9.4	8.1
Density	Bias	GlobCover	Shrubland	-178.2	-77.1	-59.8	-42.9	-31.2	-22.9
Density	Bias	MODIS	Shrubland	-96.8	-29.9	-21.1	-15.0	-11.5	-7.9
Density	Bias	GeoWiki	Shrubland	-29.2	3.3	3.6	2.2	0.6	0.9
Density	Bias	SA-LC	Grassland	0.3	0.3	0.3	0.3	0.2	0.2
Density	Bias	GlobCover	Grassland	-1.9	-1.2	-1.1	-0.9	-0.8	-0.6
Density	Bias	MODIS	Grassland	-1.1	-0.6	-0.5	-0.4	-0.3	-0.2
Density	Bias	GeoWiki	Grassland	-0.3	0.0	0.1	0.0	0.0	0.0
Density	Bias	SA-LC	Sparse	-4.6	-5.2	-5.1	-4.8	-4.6	-4.4
Density	Bias	GlobCover	Sparse	25.4	18.1	16.1	13.9	12.2	10.5

Density	Bias	MODIS	Sparse	15.4	9.1	7.6	6.3	5.5	4.4
Density	Bias	GeoWiki	Sparse	4.0	-0.3	-0.6	-0.5	-0.3	-0.4
Density	MAE	SA-LC	All	19.2	12.5	10.7	8.6	6.9	6.0
Density	MAE	GlobCover	All	134.9	56.2	43.8	31.9	23.9	18.2
Density	MAE	MODIS	All	84.8	33.2	26.2	19.9	14.9	11.4
Density	MAE	GeoWiki	All	47.3	17.9	12.8	8.8	5.8	3.9
Density	MAE	SA-LC	Forest	34.8	21.0	17.5	13.6	10.6	9.1
Density	MAE	GlobCover	Forest	278.2	100.3	75.3	52.4	37.6	27.7
Density	MAE	MODIS	Forest	168.6	56.2	42.9	31.6	22.9	17.1
Density	MAE	GeoWiki	Forest	90.5	29.9	20.9	14.0	8.9	5.8
Density	MAE	SA-LC	Secondary	27.4	17.9	15.2	12.1	9.6	8.3
Density	MAE	GlobCover	Secondary	188.1	81.1	63.1	45.7	33.8	25.3
Density	MAE	MODIS	Secondary	118.9	47.6	37.3	28.1	20.8	15.7
Density	MAE	GeoWiki	Secondary	66.6	25.5	18.1	12.4	8.0	5.4
Density	MAE	SA-LC	Shrubland	26.6	17.6	14.9	11.9	9.5	8.2
Density	MAE	GlobCover	Shrubland	179.9	79.0	61.7	44.9	33.2	24.9
Density	MAE	MODIS	Shrubland	114.2	46.6	36.6	27.7	20.5	15.5
Density	MAE	GeoWiki	Shrubland	64.3	24.9	17.8	12.2	7.9	5.3
Density	MAE	SA-LC	Grassland	0.4	0.4	0.3	0.3	0.2	0.2
Density	MAE	GlobCover	Grassland	1.9	1.3	1.1	1.0	0.8	0.7
Density	MAE	MODIS	Grassland	1.4	0.9	0.8	0.7	0.6	0.5
Density	MAE	GeoWiki	Grassland	0.9	0.5	0.4	0.3	0.2	0.2
Density	MAE	SA-LC	Sparse	6.7	5.8	5.4	4.9	4.7	4.4
Density	MAE	GlobCover	Sparse	26.4	19.6	17.7	15.7	14.0	12.3
Density	MAE	MODIS	Sparse	20.7	14.9	13.3	11.5	9.7	8.3
Density	MAE	GeoWiki	Sparse	14.1	8.4	6.6	5.1	3.9	2.9

Yield and Harvested Area Bias

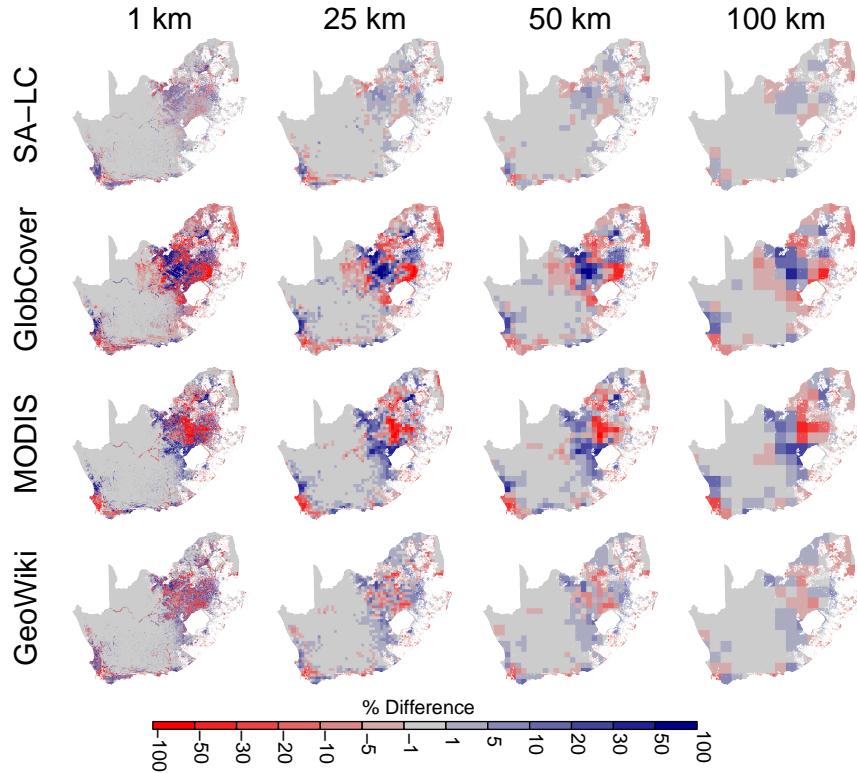


Figure 6: Errors in cropland maps adjusted using provincial cropland area statistics.

Table 5: Bias and mean absolute errors (MAE) in statistically constrained cropland maps across aggregation scales, weighted by density of cropland cover in the reference map.

Metric	Map	1 km	5 km	10 km	25 km	50 km	100 km
Bias	GeoWiki	9.7	1.1	0.6	0.4	0.5	0.1
Bias	GlobCover	34.5	18.3	14.5	10.6	7.6	4.6
Bias	MODIS	17.8	5.5	3.2	1.3	0.1	-1.3
Bias	SA-LC	6.6	2.7	2.1	1.6	1.1	0.6
Accuracy	GeoWiki	23.8	12.6	9.4	6.8	4.8	3.0
Accuracy	GlobCover	42.3	27.3	23.3	18.8	15.6	11.2
Accuracy	MODIS	33.8	21.5	18.4	15.3	12.7	10.6
Accuracy	SA-LC	11.4	6.0	4.7	3.7	2.8	1.9

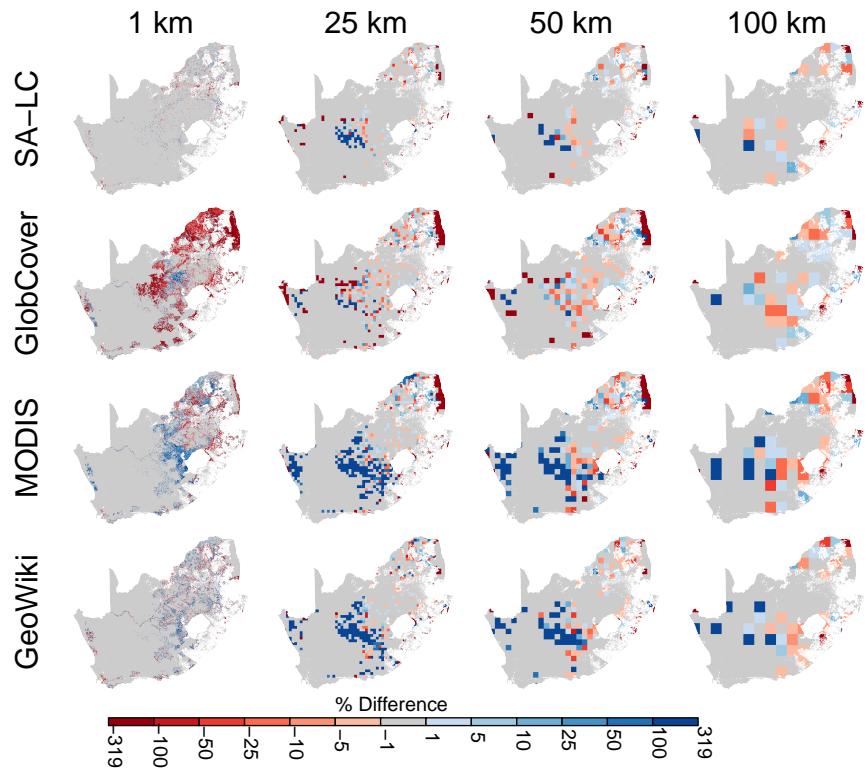


Figure 7: Errors (normalized to the reference-derived country mean) in disaggregated maize yield estimates.

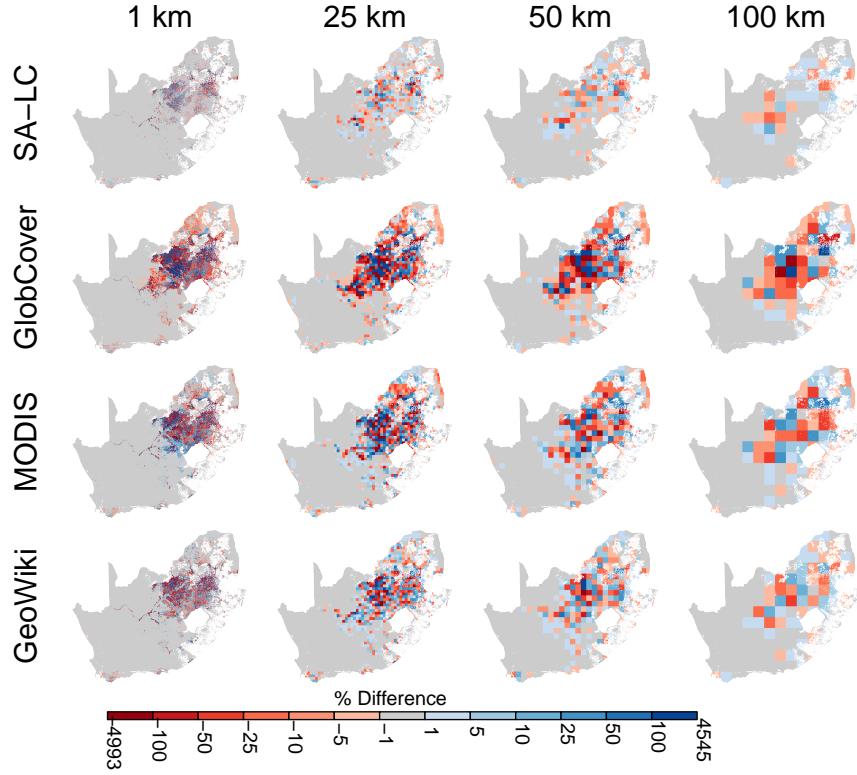


Figure 8: Errors (normalized to reference-derived country mean) production estimates calculated from disaggregated maize yield and harvested area estimates.

Table 6: Biases and mean absolute errors (MAE) in disaggregated maize yield and production (calculated from disaggregated yield and harvested area estimates) maps. Values for both density-weighted and agricultural areas bias and accuracy are presented. Bias and MAE were normalized to their respective mean values calculated from reference maps.

Region	Metric	Map	Variable	1 km	5 km	10 km	25 km	50 km	100 km
Density	Bias	SA-LC	Yield	1.2	0.3	0.0	0.0	0.0	-0.3
Density	Bias	GlobCover	Yield	9.8	0.9	0.0	-0.6	-0.6	-0.6
Density	Bias	MODIS	Yield	19.6	8.9	5.7	3.0	1.5	-0.6
Density	Bias	GeoWiki	Yield	8.0	3.0	1.5	0.6	0.3	-0.6
Density	Bias	SA-LC	Production	6.9	1.6	0.5	-0.2	-0.1	-0.1
Density	Bias	GlobCover	Production	60.5	50.2	43.7	35.1	23.3	12.5
Density	Bias	MODIS	Production	21.9	6.0	1.8	-1.8	-0.9	-0.5
Density	Bias	GeoWiki	Production	12.7	-3.3	-4.6	-3.8	-0.5	-0.9
Density	MAE	SA-LC	Yield	1.2	0.3	0.3	0.3	0.6	0.9
Density	MAE	GlobCover	Yield	9.8	1.2	0.9	1.5	1.8	1.8
Density	MAE	MODIS	Yield	19.6	9.2	6.2	4.5	3.9	2.4
Density	MAE	GeoWiki	Yield	8.0	3.3	1.8	1.8	1.2	1.2
Density	MAE	SA-LC	Production	19.0	14.3	11.8	8.9	5.1	2.3

Density	MAE	GlobCover	Production	95.6	102.0	100.4	88.1	65.8	46.4
Density	MAE	MODIS	Production	66.8	62.0	58.4	46.4	25.7	14.6
Density	MAE	GeoWiki	Production	47.3	43.6	37.6	29.3	19.4	7.9
Agricultural	Bias	SA-LC	Yield	-5.1	-0.3	3.0	3.6	3.6	1.5
Agricultural	Bias	GlobCover	Yield	-58.0	-36.0	-22.3	-11.9	-8.9	-1.5
Agricultural	Bias	MODIS	Yield	5.1	21.4	29.2	26.8	20.5	11.6
Agricultural	Bias	GeoWiki	Yield	2.4	24.4	29.5	25.3	21.4	9.8
Agricultural	Bias	SA-LC	Production	0.0	-0.1	-0.1	-0.1	-0.0	0.0
Agricultural	Bias	GlobCover	Production	0.0	-0.1	0.0	0.1	0.3	0.3
Agricultural	Bias	MODIS	Production	0.0	-0.1	-0.1	-0.1	0.0	-0.1
Agricultural	Bias	GeoWiki	Production	0.0	0.1	0.0	0.0	0.1	0.1
Agricultural	MAE	SA-LC	Yield	15.5	16.7	19.9	15.8	12.2	6.8
Agricultural	MAE	GlobCover	Yield	71.7	48.2	38.1	23.5	17.3	6.2
Agricultural	MAE	MODIS	Yield	55.9	51.2	50.9	44.9	38.4	20.8
Agricultural	MAE	GeoWiki	Yield	41.1	41.1	40.5	35.1	28.6	14.6
Agricultural	MAE	SA-LC	Production	19.7	11.3	8.6	5.5	3.3	1.9
Agricultural	MAE	GlobCover	Production	55.7	55.5	52.5	42.2	28.1	17.3
Agricultural	MAE	MODIS	Production	56.0	41.3	35.6	24.9	14.1	8.4
Agricultural	MAE	GeoWiki	Production	43.7	30.2	23.5	15.3	9.3	4.0

Evapotranspiration bias

Agent allocation bias

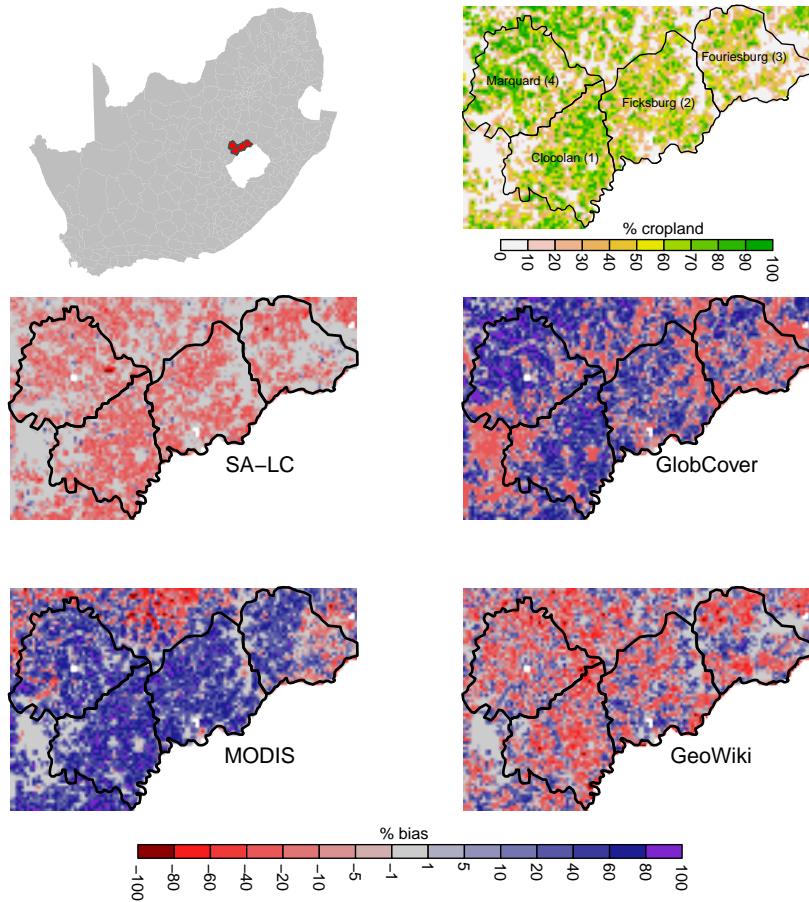


Figure 9: The location of the four selected magisterial districts (top left) used in evaluating agent allocation bias, the reference levels of cropland cover within those districts (top right), and the difference in cropland percentage between the reference and each of the four cropland maps (lower four panels).

References