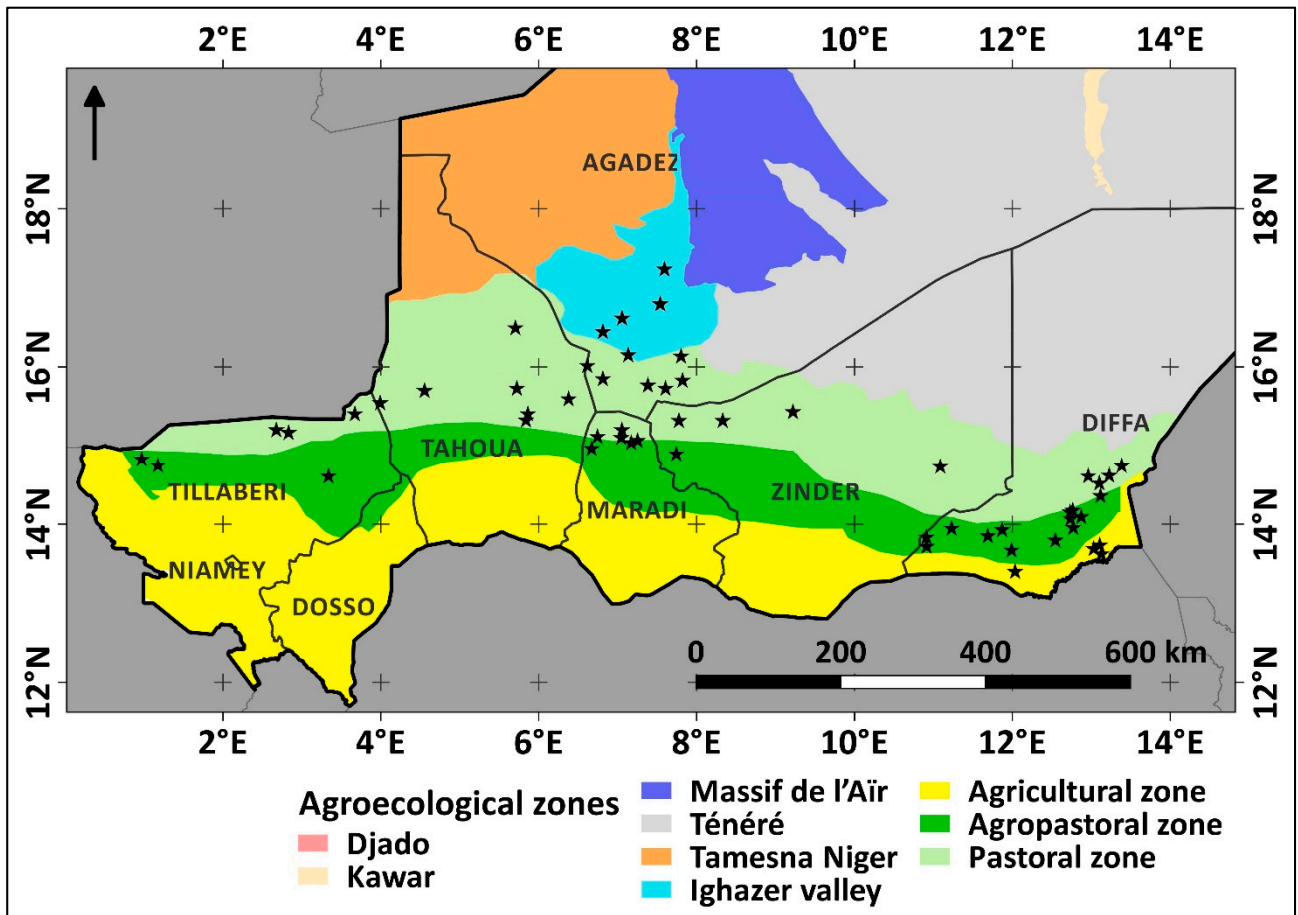**Figure S1.** Agroecological zones of Niger (shape file provided by the Ministry of Livestock in Niger). Sample sites are indicated with black stars and administrative regions with dark grey lines.

Table S1. Model results for ISODATA clustering with fixed number of clusters. Note that not all clusters were covered by samples sites. The negative R^2 in the fifth column is not a typo and indicates that the model for this calibration unit explains the data worse than a horizontal line.

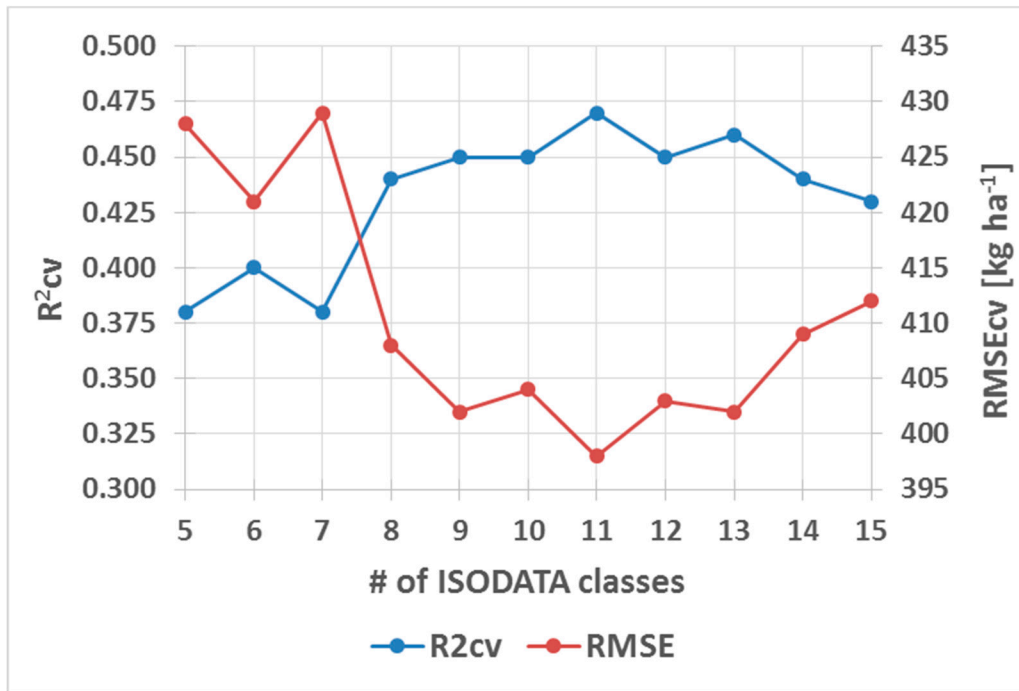| # Classes	R^2	R^2_{cv}	R^2 range	R^2_{cv} range	$RMSE_{cv}$ [kg ha^{-1}]
5 (just 4 covered)	0.41	0.38	0.28 – 0.59	0.25 – 0.54	428
6 (just 4 covered)	0.43	0.40	0.26 – 0.58	0.22 – 0.54	421
7 (just 6 covered)	0.42	0.38	0.24 – 0.68	0.17 – 0.58	429
8 (just 6 covered)	0.48	0.44	0.32 – 0.60	0.29 – 0.55	408
9 (just 7 covered)	0.50	0.45	0.36 – 0.71	0.34 – 0.67	402
10 (just 8 covered)	0.50	0.45	0.36 – 0.73	0.30 – 0.67	404
11 (just 9 covered)	0.52	0.47	0.34 – 0.73	0.25 – 0.67	398
12 (just 10 covered)	0.51	0.45	0.37 – 0.92	0.28 – 0.90	403
13 (just 11 covered)	0.51	0.46	0.27 – 0.88	0.24 – 0.86	402
14 (just 11 covered)	0.51	0.44	0.30 – 0.73	-0.51 – 0.67	409
15 (just 10 covered)	0.48	0.43	0.34 – 0.62	0.29 – 0.59	412

Figure S2. Performance of different ISODATA clustering-based stratifications with respect to R^2_{cv} and $RMSE_{cv}$.
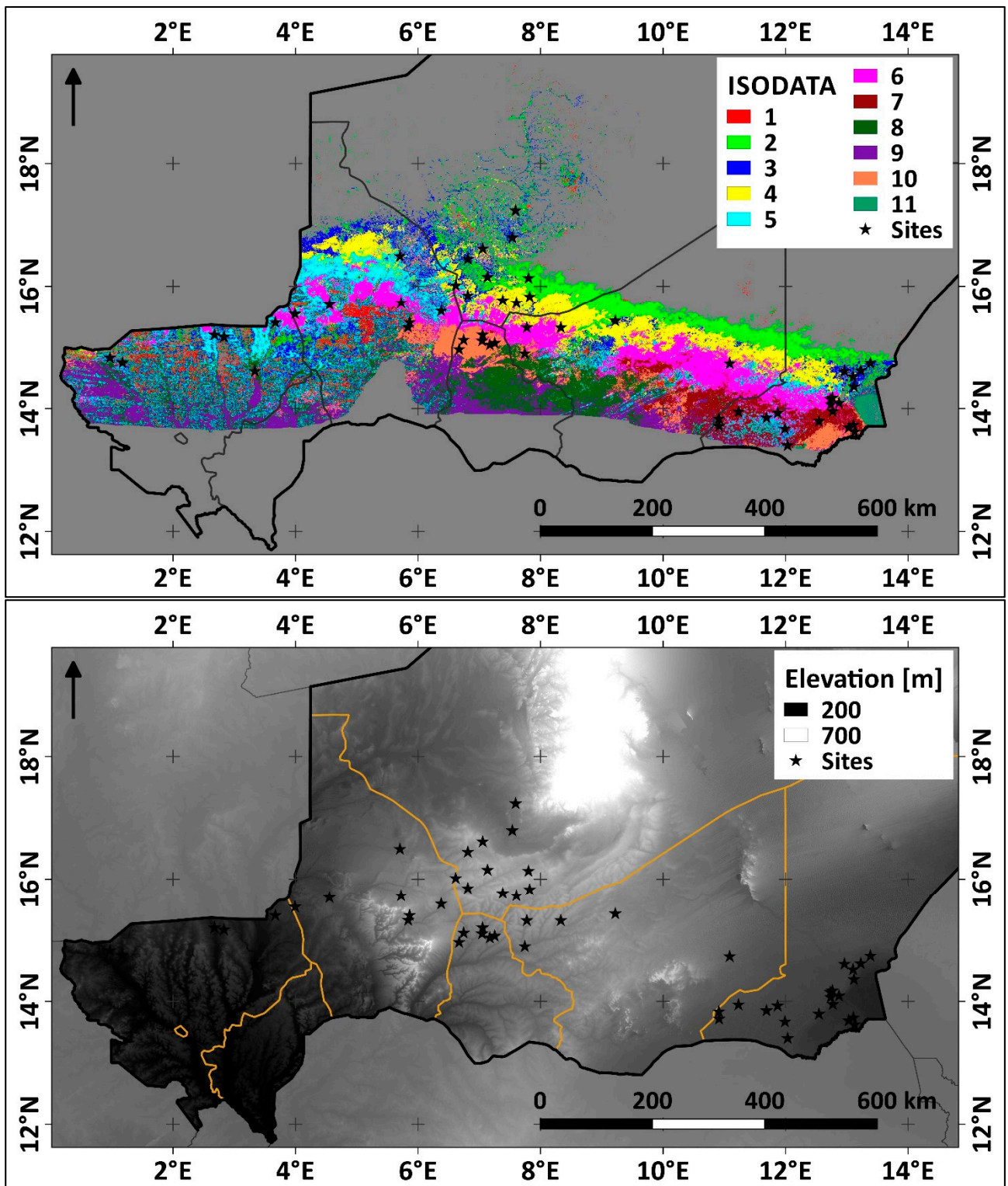
Figure S3. Results of the best performing ISODATA clustering (11 clusters, of which nine were represented by sample sites; top) compared with elevation (bottom) from SRTM data [44]. Sample sites are indicated with black stars and administrative regions with dark grey/orange lines.
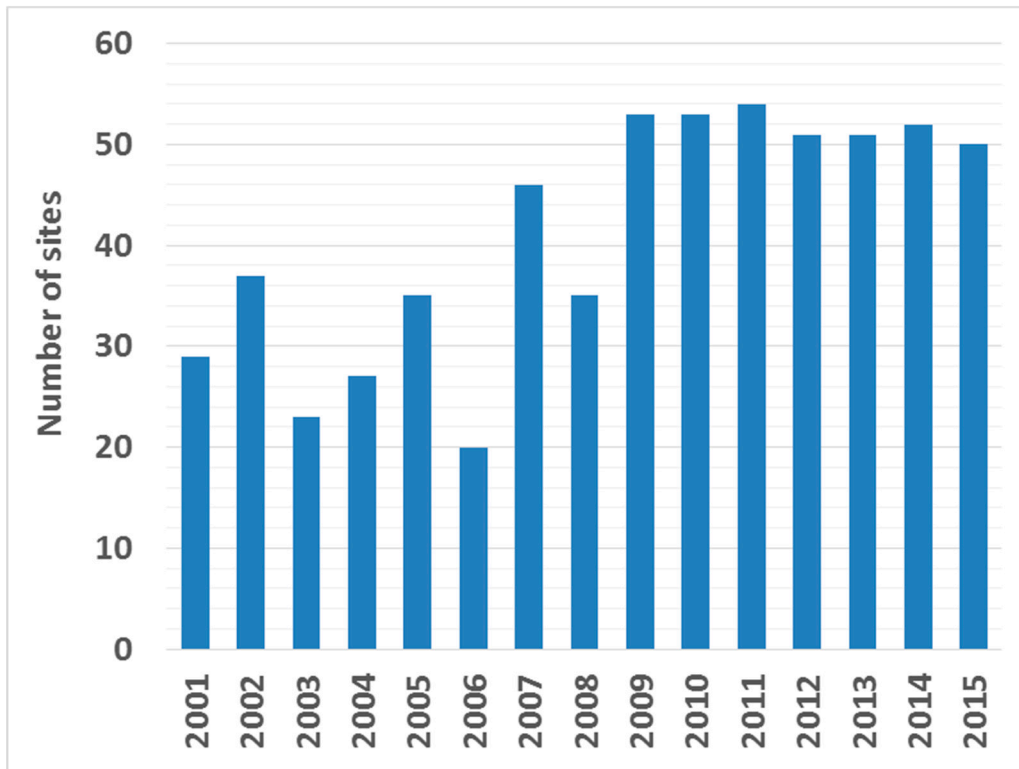
Figure S4. Number of available biomass measurement sites per year during the study period 2001–2015.