

Supplementary materials:

Table S1. Code and label of LPIS classes used to select crop and grassland reference samples.

Code	Label	Reference sample class
1	Wheat	Crop
2	Corn	Crop
3	Barley	Crop
4	Other cereals	Crop
5	Rapeseed	Crop
6	Sunflower	Crop
7	Other oilseeds	Crop
8	Proteaginous	Crop
9	Fibre crops	Crop
10	Seedings	Crop
11	Fallows	Crop
12	Fallows	Crop
13	Fallows	Crop
14	Rice	Crop
15	Grain legumes	Crop
18	Permanent grassland	Grassland
19	Temporary grassland	Grassland
20	Orchards	Crop
23	Olive trees	Crop
25	Vegetables - flowers	Crop

Table S2. Number of reference points per year for the whole of France used to calibrate and validate random forest models (LULC: land-use and land-cover).

Year	Calibration Points		Validation Points	
	All LULC Classes	Grassland Class	All LULC Classes	Grassland Class
2006	12,127	2,986	12,130	2,988
2007	12,129	2,983	12,130	2,982
2008	12,130	2,903	12,124	2,904
2009	12,140	2,898	12,144	2,899
2010	12,118	2,883	12,113	2,880
2011	12,228	2,939	12,217	2,939
2012	12,222	2,931	12,217	2,932
2013	12,141	2,883	12,138	2,883
2014	12,288	2,919	12,277	2,916
2015	11,885	2,592	11,881	2,593
2016	11,604	2,514	11,595	2,513
2017	10,857	2,198	10,846	2,196

Table S3. Number of reference points per year for the Atlantic biogeographical region used to calibrate and validate random forest models (LULC: land-use and land-cover).

Year	Calibration Points		Validation Points	
	All LULC Classes	Grassland Class	All LULC Classes	Grassland Class
2006	6,105	1,335	6,198	1,361
2007	6,126	1,332	6,223	1,385

2008	6,215	1,332	6,181	1,338
2009	6,209	1,345	6,159	1,276
2010	6,201	1,336	6,142	1,298
2011	6,246	1,398	6,268	1,347
2012	6,261	1,368	6,278	1,389
2013	6,226	1,352	6,315	1,376
2014	6,332	1,369	6,260	1,348
2015	5,997	1,186	5,969	1,141
2016	5,765	1,121	5,829	1,088
2017	5,174	861	5,125	871

Table S4. Number of reference points per year for the Continental biogeographical region used to calibrate and validate random forest models (LULC: land-use and land-cover).

Year	Calibration Points		Validation Points	
	All LULC Classes	Grassland Class	All LULC Classes	Grassland Class
2006	4,683	1,308	4,651	1,307
2007	4,718	1,347	4,624	1,264
2008	4,652	1,299	4,718	1,295
2009	4,689	1,287	4,755	1,372
2010	4,668	1,289	4,760	1,334
2011	4,708	1,287	4,752	1,345
2012	4,705	1,315	4,708	1,281
2013	4,666	1,281	4,575	1,262
2014	4,730	1,326	4,783	1,329
2015	4,614	1,194	4,696	1,267
2016	4,634	1,219	4,577	1,208
2017	4,459	1,157	4,545	1,147

Table S5. Number of reference points per year for the Alpine biogeographical region used to calibrate and validate random forest models (LULC: land-use and land-cover).

Year	Calibration Points		Validation Points	
	All LULC Classes	Grassland Class	All LULC Classes	Grassland Class
2006	461	145	441	147
2007	459	134	436	152
2008	426	105	402	115
2009	424	110	393	109
2010	408	104	413	116
2011	421	103	388	100
2012	421	102	402	118
2013	398	101	414	106
2014	409	94	404	108
2015	430	91	416	78
2016	447	86	438	117
2017	428	86	438	91

Table S6. Number of reference points per year for the Mediterranean biogeographical region used to calibrate and validate random forest models (LULC: land-use and land-cover).

Year	Calibration Points		Validation Points	
	All LULC Classes	Grassland Class	All LULC Classes	Grassland Class
2006	878	198	840	173
2007	826	170	847	181

2008	837	167	823	156
2009	818	156	837	142
2010	841	154	798	132
2011	853	151	809	147
2012	835	146	829	144
2013	851	149	834	139
2014	817	130	830	131
2015	844	121	800	107
2016	758	88	751	100
2017	796	94	738	87

Table S7. Annual confusion matrices between modeling the five LULC derived from the MODIS time-series (rows) and the validation samples (columns) for the whole of France from 2006–2017. Entries are percentage cell counts per column (i.e., number of reference samples per class).

2006		Reference					User's accuracy
Modeling	Urban	Water	Woods	Crop	Grassland		
Urban	90.8	1.3	0.0	0.4	0.4	96.5	
Water	0.2	97.0	0.2	0.0	0.2	97.0	
Woods	2.2	0.4	97.8	0.5	3.0	97.0	
Crop	6.3	0.9	0.4	96.8	2.9	95.1	
Grassland	0.6	0.4	1.6	2.3	93.5	94.7	
Producer's accuracy	90.8	97.0	97.8	96.8	93.5		
Pixel counts	973	466	4,269	3,434	2,988		

2007		Reference					User's accuracy
Modeling	Urban	Water	Woods	Crop	Grassland		
Urban	92.5	1.1	0.0	0.3	0.5	96.5	
Water	0.3	98.1	0.0	0.0	0.1	98.7	
Woods	1.4	0.4	98.6	0.7	4.8	95.9	
Crop	5.2	0.4	0.4	97.2	3.9	94.8	
Grassland	0.5	0.0	0.9	1.7	90.8	96.3	
Producer's accuracy	92.5	98.1	98.6	97.2	90.8		
Pixel counts	973	468	4,272	3,435	2,982		

2008		Reference					User's accuracy
Modeling	Urban	Water	Woods	Crop	Grassland		
Urban	84.7	1.3	0.0	0.5	0.4	95.6	
Water	0.4	96.4	0.0	0.0	0.1	98.0	
Woods	3.6	1.9	98.1	0.6	6.0	94.6	
Crop	10.0	0.2	0.6	95.4	7.1	91.1	
Grassland	1.3	0.2	1.2	3.5	86.4	93.1	
Producer's accuracy	84.7	96.4	98.1	95.4	86.4		
Pixel counts	972	466	4,268	3,514	2,904		

2009		Reference					User's accuracy
Modeling	Urban	Water	Woods	Crop	Grassland		
Urban	92.3	1.7	0.0	0.6	0.5	95.2	
Water	0.5	95.3	0.1	0.0	0.1	97.4	
Woods	0.1	1.7	98.2	0.5	4.7	96.3	
Crop	6.3	0.6	0.8	95.6	6.3	92.5	
Grassland	0.8	0.6	1.0	3.3	88.4	93.8	
Producer's accuracy	92.3	95.3	98.2	95.6	88.4		

Pixel counts	932	468	4,267	3,578	2,899	
2010						
Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	94.1	2.1	0.0	0.4	0.4	96.1
Water	0.5	96.1	0.1	0.0	0.1	97.8
Woods	0.0	1.1	98.4	0.4	5.1	96.2
Crop	4.7	0.2	0.6	95.5	7.6	92.2
Grassland	0.6	0.4	0.9	3.7	86.9	93.3
Producer's accuracy	94.1	96.1	98.4	95.5	86.9	
Pixel counts	932	467	4,265	3,569	2,880	
2011						
Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	92.6	2.6	0.0	0.4	0.5	95.1
Water	0.5	95.0	0.1	0.0	0.0	97.8
Woods	0.0	1.9	98.3	0.4	4.8	96.3
Crop	6.4	0.2	0.6	95.8	7.0	92.2
Grassland	0.4	0.2	1.0	3.4	87.6	93.8
Producer's accuracy	92.6	95.0	98.3	95.8	87.6	
Pixel counts	932	462	4,269	3,615	2,939	
2012						
Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	93.6	1.9	0.0	0.7	0.5	94.6
Water	0.8	96.8	0.1	0.1	0.0	96.6
Woods	0.0	0.9	98.2	0.4	5.2	96.1
Crop	5.6	0.0	0.6	94.9	8.0	91.7
Grassland	0.0	0.4	1.1	4.0	86.2	92.9
Producer's accuracy	93.6	96.8	98.2	94.9	86.2	
Pixel counts	921	466	4,268	3,630	2,932	
2013						
Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	93.7	0.9	0.0	0.7	0.4	95.4
Water	0.5	97.9	0.1	0.0	0.0	97.9
Woods	0.0	0.9	98.3	0.5	5.0	96.2
Crop	5.8	0.4	0.7	95.0	6.4	92.7
Grassland	0.0	0.0	0.9	3.8	88.1	93.6
Producer's accuracy	93.7	97.9	98.3	95.0	88.1	
Pixel counts	921	467	4,271	3,596	2,883	
2014						
Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	91.2	1.7	0.0	0.4	0.2	96.4
Water	0.8	96.8	0.1	0.0	0.0	97.0
Woods	0.1	1.1	97.6	0.5	4.6	96.3
Crop	7.9	0.4	1.0	96.1	7.8	91.2
Grassland	0.0	0.0	1.3	3.0	87.3	93.9
Producer's accuracy	91.2	96.8	97.6	96.1	87.3	
Pixel counts	921	467	4,270	3,703	2,916	

2015 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	92.9	1.9	0.0	0.7	0.7	94.0
Water	0.8	96.8	0.0	0.0	0.1	97.6
Woods	0.1	1.1	98.5	0.5	5.9	96.2
Crop	6.1	0.2	0.4	94.9	6.5	92.9
Grassland	0.1	0.0	1.0	3.9	86.8	92.7
Producer's accuracy	92.9	96.8	98.5	94.9	86.8	
Pixel counts	906	464	4,535	3,383	2,593	

2016 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	94.7	1.1	0.0	0.4	0.5	96.4
Water	0.4	96.1	0.1	0.0	0.1	97.6
Woods	0.0	2.2	98.9	0.5	5.7	96.4
Crop	4.9	0.2	0.3	95.6	7.1	92.8
Grassland	0.0	0.4	0.6	3.5	86.6	93.8
Producer's accuracy	94.7	96.1	98.9	95.6	86.6	
Pixel counts	906	462	4,542	3,172	2,513	

2017 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	91.6	3.4	0.1	0.2	0.1	97.2
Water	1.8	92.3	0.1	0.0	0.2	94.6
Woods	0.2	3.4	97.7	1.1	4.4	96.7
Crop	6.4	0.5	0.9	95.3	10.7	91.9
Grassland	0.0	0.5	1.3	3.5	84.6	89.8
Producer's accuracy	91.6	92.3	97.7	95.3	84.6	
Pixel counts	451	208	1,907	1,688	871	

Table S8. Annual confusion matrices between modeling the five LULC derived from the MODIS time-series (rows) and the validation samples (columns) in the Atlantic biogeographical region from 2006–2017. Entries are percentage cell counts per column (i.e., number of reference samples per class).

2006 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	89.9	1.4	0.1	0.1	0.0	98.7
Water	0.4	97.7	0.0	0.0	0.1	98.1
Woods	1.9	0.5	97.3	0.4	1.3	97.8
Crop	7.2	0.5	0.6	97.5	4.6	95.3
Grassland	0.6	0.0	2.1	2.0	94.0	93.7
Producer's accuracy	89.9	97.7	97.3	97.5	94.0	
Pixel counts	515	216	1,797	2,309	1,361	

2007 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	92.2	1.5	0.0	0.0	0.1	98.9
Water	0.6	97.0	0.0	0.0	0.0	98.5
Woods	1.8	0.5	98.3	0.8	1.8	97.1
Crop	5.2	1.0	0.5	97.5	4.3	95.9
Grassland	0.2	0.0	1.1	1.7	93.8	95.4
Producer's accuracy	92.2	97.0	98.3	97.5	93.8	

Pixel counts	499	201	1,830	2,308	1,385	
2008						
	Reference					
Modeling	Urban	Water	Woods	Crop	Grassland	User's accuracy
Urban	83.1	1.5	0.0	0.1	0.2	97.9
Water	0.6	96.5	0.0	0.0	0.0	98.5
Woods	3.9	1.5	97.6	0.6	3.1	95.7
Crop	11.4	0.5	0.6	95.8	9.5	91.8
Grassland	1.0	0.0	1.8	3.5	87.1	90.8
Producer's accuracy	83.1	96.5	97.6	95.8	87.1	
Pixel counts	516	201	1,797	2,329	1,338	
2009						
	Reference					
Modeling	Urban	Water	Woods	Crop	Grassland	User's accuracy
Urban	93.5	1.4	0.0	0.1	0.2	98.3
Water	0.8	96.1	0.0	0.0	0.0	98.0
Woods	0.2	0.5	97.6	0.5	2.1	97.7
Crop	5.1	1.0	1.1	96.2	9.6	93.2
Grassland	0.4	1.0	1.2	3.2	88.2	91.5
Producer's accuracy	93.5	96.1	97.6	96.2	88.2	
Pixel counts	494	207	1,764	2,418	1,276	
2010						
	Reference					
Modeling	Urban	Water	Woods	Crop	Grassland	User's accuracy
Urban	94.4	2.3	0.0	0.2	0.2	97.0
Water	0.6	96.3	0.0	0.0	0.0	98.6
Woods	0.0	0.5	97.6	0.3	2.9	97.4
Crop	4.6	0.5	1.0	96.5	10.9	92.7
Grassland	0.4	0.5	1.4	3.0	86.0	91.9
Producer's accuracy	94.4	96.3	97.6	96.5	86.0	
Pixel counts	480	218	1,740	2,406	1,298	
2011						
	Reference					
Modeling	Urban	Water	Woods	Crop	Grassland	User's accuracy
Urban	90.7	3.7	0.0	0.1	0.1	97.1
Water	0.4	95.3	0.1	0.0	0.0	98.6
Woods	0.0	0.9	97.6	0.5	2.7	97.3
Crop	8.1	0.0	0.9	96.2	9.6	92.6
Grassland	0.8	0.0	1.5	3.2	87.6	91.6
Producer's accuracy	90.7	95.3	97.6	96.2	87.6	
Pixel counts	484	214	1,815	2,408	1,347	
2012						
	Reference					
Modeling	Urban	Water	Woods	Crop	Grassland	User's accuracy
Urban	92.5	2.9	0.0	0.1	0.1	97.8
Water	1.0	97.1	0.1	0.0	0.0	97.1
Woods	0.0	0.0	97.5	0.2	2.7	97.7
Crop	6.5	0.0	0.9	95.8	11.0	92.0
Grassland	0.0	0.0	1.5	3.9	86.2	90.9
Producer's accuracy	92.5	97.1	97.5	95.8	86.2	
Pixel counts	477	205	1,804	2,403	1,389	

2013		Reference					User's accuracy
Modeling	Urban	Water	Woods	Crop	Grassland		
Urban	93.0	1.5	0.0	0.2	0.1	98.1	
Water	0.8	98.0	0.0	0.0	0.0	98.0	
Woods	0.0	0.5	97.8	0.4	2.5	97.5	
Crop	6.2	0.0	1.2	96.1	8.4	93.4	
Grassland	0.0	0.0	1.0	3.3	89.0	92.5	
Producer's accuracy	93.0	98.0	97.8	96.1	89.0		
Pixel counts	487	197	1,816	2,439	1,376		

2014		Reference					User's accuracy
Modeling	Urban	Water	Woods	Crop	Grassland		
Urban	90.4	2.8	0.0	0.1	0.0	98.2	
Water	1.3	96.3	0.0	0.0	0.0	97.2	
Woods	0.2	0.9	96.9	0.5	3.0	96.8	
Crop	8.1	0.0	1.6	96.8	9.5	92.4	
Grassland	0.0	0.0	1.5	2.6	87.5	92.8	
Producer's accuracy	90.4	96.3	96.9	96.8	87.5		
Pixel counts	480	214	1,756	2,462	1,348		

2015		Reference					User's accuracy
Modeling	Urban	Water	Woods	Crop	Grassland		
Urban	92.7	3.0	0.1	0.3	0.5	95.9	
Water	0.6	95.0	0.0	0.0	0.0	98.4	
Woods	0.2	2.0	97.8	0.5	3.9	96.8	
Crop	6.3	0.0	0.8	95.3	9.1	93.5	
Grassland	0.2	0.0	1.3	3.9	86.4	89.7	
Producer's accuracy	92.7	95.0	97.8	95.3	86.4		
Pixel counts	477	199	1,897	2,255	1,141		

2016		Reference					User's accuracy
Modeling	Urban	Water	Woods	Crop	Grassland		
Urban	93.8	0.9	0.1	0.0	0.1	98.9	
Water	0.6	96.8	0.1	0.0	0.1	97.7	
Woods	0.0	1.8	98.6	0.5	3.5	97.3	
Crop	5.6	0.5	0.6	95.7	10.9	92.9	
Grassland	0.0	0.0	0.7	3.7	85.4	90.8	
Producer's accuracy	93.8	96.8	98.6	95.7	85.4		
Pixel counts	467	222	1,914	2,138	1,088		

2017		Reference					User's accuracy
Modeling	Urban	Water	Woods	Crop	Grassland		
Urban	91.6	3.4	0.1	0.2	0.1	97.2	
Water	1.8	92.3	0.1	0.0	0.2	94.6	
Woods	0.2	3.4	97.7	1.1	4.4	96.7	
Crop	6.4	0.5	0.9	95.3	10.7	91.9	
Grassland	0.0	0.5	1.3	3.5	84.6	89.8	
Producer's accuracy	91.6	92.3	97.7	95.3	84.6		
Pixel counts	451	208	1,907	1,688	871		

Table S9. Annual confusion matrices between modeling the five LULC derived from the MODIS time-series (rows) and the validation samples (columns) in the Continental biogeographical region from 2006–2017. Entries are percentage cell counts per column (i.e., number of reference samples per class).

2006 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	89.2	1.1	0.0	0.0	0.1	99.0
Water	0.0	96.1	0.1	0.0	0.1	98.9
Woods	3.2	0.6	98.8	0.4	3.4	96.8
Crop	6.7	1.7	0.4	96.9	1.1	95.2
Grassland	0.9	0.6	0.8	2.7	95.3	96.5
Producer's accuracy	89.2	96.1	98.8	96.9	95.3	
Pixel counts	342	180	1,856	966	1,307	

2007 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	91.2	0.5	0.0	0.0	0.1	99.4
Water	0.0	98.9	0.0	0.0	0.0	100.0
Woods	1.4	0.5	99.1	0.4	5.0	96.1
Crop	6.6	0.0	0.3	97.8	1.7	94.9
Grassland	0.8	0.0	0.6	1.7	93.3	97.4
Producer's accuracy	91.2	98.9	99.1	97.8	93.3	
Pixel counts	364	183	1,838	975	1,264	

2008 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	83.4	1.6	0.1	0.1	0.2	97.7
Water	0.3	95.2	0.0	0.0	0.0	99.4
Woods	4.0	3.2	98.9	0.4	6.0	94.7
Crop	10.6	0.0	0.4	95.6	2.5	92.9
Grassland	1.7	0.0	0.7	3.9	91.4	95.2
Producer's accuracy	83.4	95.2	98.9	95.6	91.4	
Pixel counts	350	187	1,852	1,034	1,295	

2009 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	88.1	2.4	0.0	0.0	0.1	98.0
Water	0.3	92.9	0.0	0.1	0.0	98.7
Woods	0.0	4.2	98.9	0.5	5.0	95.8
Crop	10.0	0.6	0.6	95.7	2.2	92.7
Grassland	1.5	0.0	0.5	3.7	92.6	96.1
Producer's accuracy	88.1	92.9	98.9	95.7	92.6	
Pixel counts	329	168	1,884	1,002	1,372	

2010 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	92.0	1.8	0.0	0.0	0.2	98.2

Water	0.6	95.8	0.0	0.0	0.0	98.8
Woods	0.0	2.4	99.1	0.4	4.9	96.2
Crop	6.3	0.0	0.5	94.8	3.2	92.7
Grassland	1.1	0.0	0.4	4.8	91.6	95.3
Producer's accuracy	92.0	95.8	99.1	94.8	91.6	
Pixel counts	348	166	1,903	1,009	1,334	

2011 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	93.3	1.7	0.0	0.1	0.1	98.2
Water	0.6	93.8	0.0	0.0	0.0	98.8
Woods	0.0	4.0	98.9	0.2	4.5	96.3
Crop	6.1	0.6	0.6	95.8	2.6	93.6
Grassland	0.0	0.0	0.5	3.9	92.7	96.1
Producer's accuracy	93.3	93.8	98.9	95.8	92.7	
Pixel counts	342	177	1,842	1,046	1,345	

2012 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	93.4	1.6	0.0	0.0	0.2	98.1
Water	0.3	95.6	0.0	0.2	0.0	98.3
Woods	0.0	2.2	99.0	0.5	5.0	96.2
Crop	6.3	0.0	0.4	94.9	2.7	94.0
Grassland	0.0	0.5	0.6	4.4	92.0	95.2
Producer's accuracy	93.4	95.6	99.0	94.9	92.0	
Pixel counts	331	183	1,866	1,047	1,281	

2013 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	93.4	0.0	0.0	0.0	0.0	100.0
Water	0.0	97.3	0.0	0.0	0.0	100.0
Woods	0.0	1.6	99.2	0.5	5.2	96.1
Crop	6.6	1.1	0.4	94.8	2.9	93.1
Grassland	0.0	0.0	0.4	4.6	91.8	95.6
Producer's accuracy	93.4	97.3	99.2	94.8	91.8	
Pixel counts	332	186	1,825	970	1,262	

2014 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	90.2	0.5	0.1	0.0	0.2	98.7
Water	0.3	96.8	0.0	0.0	0.0	99.4
Woods	0.0	1.6	98.8	0.5	3.6	97.0
Crop	9.5	1.1	0.5	95.7	3.2	92.2
Grassland	0.0	0.0	0.6	3.8	93.0	95.9
Producer's accuracy	90.2	96.8	98.8	95.7	93.0	
Pixel counts	338	185	1,863	1,068	1,329	

2015

Reference

Modeling	Urban	Water	Woods	Crop	Grassland	User's accuracy
Urban	92.0	1.7	0.0	0.1	0.0	98.7
Water	0.9	97.2	0.0	0.0	0.1	97.8
Woods	0.0	0.6	99.1	0.4	5.4	96.3
Crop	7.1	0.6	0.2	95.7	3.1	93.3
Grassland	0.0	0.0	0.7	3.8	91.4	95.9
Producer's accuracy	92.0	97.2	99.1	95.7	91.4	
Pixel counts	324	181	1,955	969	1,267	

2016 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	95.0	1.7	0.0	0.2	0.1	98.2
Water	0.3	94.8	0.1	0.0	0.0	98.8
Woods	0.0	3.5	99.3	0.4	4.9	96.5
Crop	4.7	0.0	0.1	96.4	2.6	94.8
Grassland	0.0	0.0	0.6	3.0	92.4	96.6
Producer's accuracy	95.0	94.8	99.3	96.4	92.4	
Pixel counts	339	173	1,922	935	1,208	

2017 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	91.9	2.2	0.0	0.3	0.0	97.9
Water	1.1	87.2	0.1	0.1	0.0	96.3
Woods	0.3	9.5	99.1	0.6	6.7	95.0
Crop	6.7	1.1	0.2	96.1	4.0	92.2
Grassland	0.0	0.0	0.6	2.9	89.3	96.3
Producer's accuracy	91.9	87.2	99.1	96.1	89.3	
Pixel counts	358	179	1,921	940	1,147	

Table S10. Annual confusion matrices between modeling the five LULC derived from the MODIS time-series (rows) and the validation samples (columns) in the Alpine biogeographical region from 2006–2017. Entries are percentage cell counts per column (i.e., number of reference samples per class).

2006 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	95.7	0.0	0.0	0.0	0.0	100.0
Water	0.0	96.2	1.3	0.0	0.0	89.3
Woods	0.0	0.0	97.1	0.0	9.5	94.3
Crop	4.3	0.0	0.0	100.0	0.7	71.4
Grassland	0.0	3.8	1.7	0.0	89.8	96.4
Producer's accuracy	95.7	96.2	97.1	100.0	89.8	
Pixel counts	23	26	240	5	147	

2007 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	92.0	0.0	0.0	0.0	0.0	100.0
Water	0.0	100.0	0.4	0.0	0.0	96.4
Woods	0.0	0.0	97.8	0.0	12.5	92.1
Crop	4.0	0.0	0.0	100.0	1.3	62.5

Grassland	4.0	0.0	1.8	0.0	86.2	96.3
Producer's accuracy	92.0	100.0	97.8	100.0	86.2	
Pixel counts	25	27	227	5	152	

2008 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	91.3	0.0	0.0	0.0	0.0	100.0
Water	0.0	96.0	0.4	0.0	0.9	92.3
Woods	0.0	0.0	97.0	0.0	20.0	90.9
Crop	0.0	0.0	1.3	100.0	0.9	42.9
Grassland	8.7	4.0	1.3	0.0	78.3	93.8
Producer's accuracy	91.3	96.0	97.0	100.0	78.3	
Pixel counts	23	25	236	3	115	

2009 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	100.0	3.6	0.0	0.0	0.0	95.8
Water	0.0	92.9	0.4	0.0	0.9	92.9
Woods	0.0	0.0	97.0	0.0	16.5	92.6
Crop	0.0	0.0	0.4	100.0	0.9	33.3
Grassland	0.0	3.6	2.2	0.0	81.7	93.7
Producer's accuracy	100.0	92.9	97.0	100.0	81.7	
Pixel counts	23	28	232	1	109	

2010 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	100.0	7.4	0.0	0.0	0.9	88.9
Water	0.0	88.9	0.4	0.0	0.0	96.0
Woods	0.0	0.0	98.0	0.0	18.1	91.9
Crop	0.0	0.0	0.0	100.0	1.7	50.0
Grassland	0.0	3.7	1.6	0.0	79.3	94.8
Producer's accuracy	100.0	88.9	98.0	100.0	79.3	
Pixel counts	24	27	244	2	116	

2011 Modeling	Reference					User's accuracy
	urban	water	woods	crop	grassland	
Urban	100.0	5.0	0.0	0.0	1.0	93.1
Water	0.0	90.0	0.0	0.0	0.0	100.0
Woods	0.0	0.0	98.7	0.0	17.0	93.2
Crop	0.0	0.0	0.0	100.0	3.0	62.5
Grassland	0.0	5.0	1.3	0.0	79.0	95.2
Producer's accuracy	100.0	90.0	98.7	100.0	79.0	
Pixel counts	27	20	236	5	100	

2012 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	100.0	0.0	0.0	14.3	0.0	96.3
Water	0.0	96.7	0.5	0.0	0.0	96.7
Woods	0.0	0.0	97.3	0.0	18.6	90.7
Crop	0.0	0.0	0.5	85.7	2.5	60.0
Grassland	0.0	3.3	1.8	0.0	78.8	94.9
Producer's accuracy	100.0	96.7	97.3	85.7	78.8	

Pixel counts	26	30	221	7	118	
2013						
Modeling	Reference					
	Urban	Water	Woods	Crop	Grassland	User's accuracy
Urban	100.0	3.6	0.0	0.0	0.0	96.4
Water	0.0	96.4	0.4	0.0	0.0	96.4
Woods	0.0	0.0	97.2	0.0	21.7	91.3
Crop	0.0	0.0	0.0	60.0	0.9	75.0
Grassland	0.0	0.0	2.4	40.0	77.4	91.1
Producer's accuracy	100.0	96.4	97.2	60.0	77.4	
Pixel counts	27	28	248	5	106	
2014						
Modeling	Reference					
	Urban	Water	Woods	Crop	Grassland	User's accuracy
Urban	100.0	5.6	0.0	12.5	0.0	89.5
Water	0.0	94.4	0.4	0.0	0.0	94.4
Woods	0.0	0.0	96.4	0.0	21.3	91.4
Crop	0.0	0.0	0.0	87.5	3.7	63.6
Grassland	0.0	0.0	3.2	0.0	75.0	91.0
Producer's accuracy	100.0	94.4	96.4	87.5	75.0	
Pixel counts	17	18	253	8	108	
2015						
Modeling	Reference					
	Urban	Water	Woods	Crop	Grassland	User's accuracy
Urban	95.8	0.0	0.0	0.0	0.0	100.0
Water	4.2	100.0	0.7	0.0	0.0	88.0
Woods	0.0	0.0	97.6	0.0	25.6	93.4
Crop	0.0	0.0	0.0	75.0	1.3	75.0
Grassland	0.0	0.0	1.7	25.0	73.1	90.5
Producer's accuracy	95.8	100.0	97.6	75.0	73.1	
Pixel counts	24	22	288	4	78	
2016						
Modeling	Reference					
	Urban	Water	Woods	Crop	Grassland	User's accuracy
Urban	100.0	0.0	0.0	0.0	2.6	86.4
Water	0.0	90.9	0.4	0.0	0.0	95.2
Woods	0.0	0.0	98.9	0.0	23.1	91.0
Crop	0.0	0.0	0.0	100.0	0.9	75.0
Grassland	0.0	9.1	0.7	0.0	73.5	95.6
Producer's accuracy	100.0	90.9	98.9	100.0	73.5	
Pixel counts	19	22	277	3	117	
2017						
Modeling	Reference					
	Urban	Water	Woods	Crop	Grassland	User's accuracy
Urban	100.0	4.8	0.0	0.0	1.1	92.6
Water	0.0	95.2	1.7	0.0	1.1	76.9
Woods	0.0	0.0	97.0	0.0	20.9	93.8
Crop	0.0	0.0	0.0	100.0	1.1	75.0
Grassland	0.0	0.0	1.3	0.0	75.8	94.5
Producer's accuracy	100.0	95.2	97.0	100.0	75.8	
Pixel counts	25	21	298	3	91	

Table S11. Annual confusion matrices between modeling the five LULC derived from the MODIS time-series (rows) and the validation samples (columns) in the Mediterranean biogeographical region from 2006–2017. Entries are percentage cell counts per column (i.e., number of reference samples per class).

2006 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	100.0	2.3	0.3	7.1	5.8	80.2
Water	0.0	97.7	0.8	0.0	1.2	89.6
Woods	0.0	0.0	95.5	1.9	8.1	95.5
Crop	0.0	0.0	0.0	86.4	5.8	93.0
Grassland	0.0	0.0	3.5	4.5	79.2	87.3
Producer's accuracy	100.0	97.7	95.5	86.4	79.2	
Pixel counts	93	44	376	154	173	

2007 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	100.0	1.8	0.3	8.2	6.6	76.6
Water	0.0	98.2	0.0	0.0	1.1	96.6
Woods	0.0	0.0	98.4	0.7	19.3	91.2
Crop	0.0	0.0	0.3	89.1	18.2	79.4
Grassland	0.0	0.0	1.1	2.0	54.7	93.4
Producer's accuracy	100.0	98.2	98.4	89.1	54.7	
Pixel counts	85	57	377	147	181	

2008 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	97.6	0.0	0.3	9.5	4.5	78.6
Water	0.0	100.0	0.3	0.0	1.3	94.6
Woods	1.2	0.0	97.7	1.4	19.9	91.7
Crop	1.2	0.0	1.3	87.8	28.8	71.8
Grassland	0.0	0.0	0.5	1.4	45.5	94.7
Producer's accuracy	97.6	100.0	97.7	87.8	45.5	
Pixel counts	83	53	383	148	156	

2009 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	98.8	0.0	0.0	10.8	7.7	75.2
Water	0.0	100.0	0.5	0.0	1.4	94.2
Woods	0.0	0.0	97.7	1.9	14.8	94.0
Crop	1.2	0.0	0.5	85.4	21.1	80.2
Grassland	0.0	0.0	1.3	1.9	54.9	90.7
Producer's accuracy	98.8	100.0	97.7	85.4	54.9	
Pixel counts	86	65	387	157	142	

2010 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	100.0	0.0	0.0	5.9	3.0	86.0
Water	0.0	100.0	0.5	0.0	1.5	93.3
Woods	0.0	0.0	98.7	2.0	17.4	93.5
Crop	0.0	0.0	0.0	83.6	23.5	80.4
Grassland	0.0	0.0	0.8	8.6	54.5	81.8
Producer's accuracy	100.0	100.0	98.7	83.6	54.5	
Pixel counts	80	56	378	152	132	
2011 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	98.7	0.0	0.0	7.7	7.5	77.2
Water	1.3	100.0	0.8	0.0	0.7	91.1
Woods	0.0	0.0	98.4	0.0	18.4	93.2
Crop	0.0	0.0	0.0	89.7	27.2	77.8
Grassland	0.0	0.0	0.8	2.6	46.3	90.7
Producer's accuracy	98.7	100.0	98.4	89.7	46.3	
Pixel counts	79	51	376	156	147	
2012 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	98.9	0.0	0.0	12.1	7.6	72.9
Water	1.1	100.0	1.1	0.0	0.7	88.9
Woods	0.0	0.0	98.1	1.7	20.8	91.8
Crop	0.0	0.0	0.0	82.7	29.9	76.9
Grassland	0.0	0.0	0.8	3.5	41.0	86.8
Producer's accuracy	98.9	100.0	98.1	82.7	41.0	
Pixel counts	87	48	377	173	144	
2013 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	97.3	0.0	0.3	12.1	6.5	69.5
Water	1.3	100.0	0.8	0.0	0.7	91.8
Woods	0.0	0.0	97.1	1.1	15.1	94.2
Crop	1.3	0.0	0.8	81.9	23.0	80.5
Grassland	0.0	0.0	1.0	4.9	54.7	85.4
Producer's accuracy	97.3	100.0	97.1	81.9	54.7	
Pixel counts	75	56	382	182	139	
2014 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	97.7	0.0	0.3	6.7	3.8	83.2

Water	0.0	100.0	1.3	0.0	0.8	89.3
Woods	0.0	0.0	96.0	0.6	17.6	94.1
Crop	2.3	0.0	0.8	89.1	40.5	71.7
Grassland	0.0	0.0	1.8	3.6	37.4	79.0
Producer's accuracy	97.7	100.0	96.0	89.1	37.4	
Pixel counts	86	50	398	165	131	

2015 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	97.5	0.0	0.3	11.0	12.1	71.8
Water	0.0	100.0	0.0	0.0	0.9	98.4
Woods	0.0	0.0	99.2	1.3	18.7	94.7
Crop	2.5	0.0	0.0	83.2	22.4	83.2
Grassland	0.0	0.0	0.5	4.5	45.8	84.5
Producer's accuracy	97.5	100.0	99.2	83.2	45.8	
Pixel counts	81	62	395	155	107	

2016 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	97.5	0.0	0.2	9.4	8.0	81.4
Water	0.0	100.0	0.5	0.0	1.0	93.8
Woods	0.0	0.0	98.6	1.0	19.0	95.5
Crop	2.5	0.0	0.2	85.4	26.0	73.9
Grassland	0.0	0.0	0.5	4.2	46.0	88.5
Producer's accuracy	97.5	100.0	98.6	85.4	46.0	
Pixel counts	81	45	429	96	100	

2017 Modeling	Reference					User's accuracy
	Urban	Water	Woods	Crop	Grassland	
Urban	97.2	1.8	0.2	15.9	10.3	71.4
Water	0.0	98.2	0.5	0.9	1.1	93.1
Woods	0.0	0.0	98.3	1.9	23.0	94.9
Crop	2.8	0.0	0.2	77.6	33.3	72.2
Grassland	0.0	0.0	0.7	3.7	32.2	80.0
Producer's accuracy	97.2	98.2	98.3	77.6	32.2	
Pixel counts	72	55	417	107	87	