Supplementary material for:

Reprocessed MODIS Version 6.1 Leaf Area Index Dataset and Its Evaluation for Land Surface and Climate Modeling

Contents

1. Characteristics of the validation sites and associated LAI reference maps

Table S1. Characteristics of the validation sites (total 73) and associated LAI reference maps (total 2762). In the table head, "Lat" and "Lon" stand for "latitude" and "longitude" respectively. "LC" is the main land cover type in this site and ENF is short for evergreen needleleaf forest, EBF for evergreen broadleaf forest and MF for mixed (evergreen needleleaf + deciduous broadleaf) forest. "DB" is the database which the map comes from and "BU" is short for Boston University. "MAP" is the average of the values aggregated to the corresponding MODIS pixels from LAI reference map. "MCD" is the mean value of MODIS pixels and "RMCD" is the mean value of reprocessed MODIS pixels. For sites with multi-time observations, the minimum and maximum MAP, MCD, and RMCD values within the observed periods were given.

Station	Country	Lat	Lon	Datasets	Land Cover	Date	MAP (min–max)	MCD (min–max)	RMCD (min–max)	Number of observations
AGRO	USA	40.01	-88.29	BigFoot	Crop	2000/7/4–2000/8/11	2.30–3.10	2.36–2.71	2.62–2.80	2
KONZ	USA	39.09	-96.57	BigFoot	Grass	2000/6/7–2001/8/16	2.18–2.96	1.44–2.48	1.80–2.93	4
NOBS	Canada	55.89	-98.48	BigFoot	ENF	2000/7/14–2002/7/14	2.78–3.02	2.44–3.08	2.84–3.23	3
SEVI	USA	34.35	-106.69	BigFoot	Grass	2002/11/15–2003/9/15	0.05–0.38	0.11–0.32	0.15–0.38	8
TUND	USA	71.27	-156.61	BigFoot	Grass	2002/8/15	1.15	0.34	0.71	1
Ruokolahti	Finland	61.53	28.71	Boston University	ENF	2000/6/18	2.20	1.70	2.66	1
BART	USA	44.06	-71.29	GBOV	MF	2014/10/3–2020/9/9	0.83–6.27	0.70–6.12	0.70–6.80	110
BLAN	USA	39.06	-78.07	GBOV	DBF	2016/1/5–2020/9/5	0.17–1.82	0.38–3.00	0.50–3.10	121
CPER	USA	40.82	-104.75	GBOV	Grass	2014/5/31–2020/9/20	0.03–0.76	0.20–1.18	0.20–1.30	51
DELA	USA	32.54	-87.80	GBOV	DBF	2016/10/20–2020/9/9	1.04–5.68	0.67–5.77	0.67–6.50	112
DSNY	USA	28.13	-81.44	GBOV	Shrub	2014/10/24–2020/9/6	0.97–4.05	0.80–5.00	1.11–5.10	162
GUAN	Puerto Rico	17.97	-66.87	GBOV	EBF	2015/1/31–2020/9/4	0.89–4.45	0.80–6.60	2.44–6.60	201
HAIN	Germany	51.08	10.45	GBOV	MF	2020/1/15–2020/9/6	0.91–5.80	0.75–5.71	0.96–5.78	27
HARV	USA	42.54	-72.17	GBOV	MF	2014/4/10–2020/9/19	0.85–6.09	0.73–6.18	0.80–6.50	112
JERC	USA	31.19	-84.47	GBOV	ENF	2014/4/13–2020/9/6	0.97–4.92	0.69–4.53	0.98–4.45	212
JORN	USA	32.59	-106.84	GBOV	Shrub	2015/4/25–2020/9/13	0.03–0.61	0.20–0.77	0.20–0.77	61
KONA	USA	39.11	-96.61	GBOV	Crop	2017/10/2–2020/9/6	0.28–1.63	0.60–4.70	0.60–4.90	72
LAJA	Puerto Rico	18.02	-67.08	GBOV	Grass	2016/1/14–2020/9/29	0.33–1.74	0.33–3.20	0.74–3.60	163
MOAB	USA	38.25	-109.39	GBOV	Shrub	2015/4/14–2019/7/14	0.12–0.52	0.20–0.48	0.20–0.50	13
NRMN	USA	40.05	-105.58	GBOV	ENF	2015/6/19–2020/9/3	0.11–1.28	0.20–1.70	0.30–1.90	77
ONAQ	USA	40.18	-112.45	GBOV	Shrub	2014/4/9–2020/9/7	0.07–0.85	0.20–1.00	0.24–1.00	95
ORNL	USA	35.96	-84.28	GBOV	MF	2015/10/23–2020/9/6	0.78–5.62	0.53–5.57	0.55–5.60	119

OSBS	USA	29.68	-82.01	GBOV	ENF	2013/10/5–2020/9/30	0.76–4.06	0.91–2.88	1.13–3.30	183
SCBI	USA	38.89	-78.14	GBOV	MF	2015/11/16–2020/9/5	0.73–6.09	0.62–6.15	0.62–6.60	94
SERC	USA	38.89	-76.56	GBOV	Crop	2015/11/13–2020/9/7	1.02–6.05	0.80–6.80	0.94–6.80	106
SRER	USA	31.91	-110.84	GBOV	Shrub	2016/1/27–2020/9/2	0.02–0.77	0.21–0.82	0.27–0.92	79
STEI	USA	45.51	-89.59	GBOV	DBF	2016/3/20–2020/9/5	1.28–5.26	0.45–6.15	0.70–6.32	105
STER	USA	40.46	-103.03	GBOV	Grass	2014/3/30–2020/9/6	0.12–1.19	0.41–2.40	0.46–2.44	72
TALL	USA	32.95	-87.39	GBOV	ENF	2015/10/6–2020/9/9	1.30–4.30	1.55–6.23	1.81–6.19	116
TUMB	Australia	-35.66	148.15	GBOV	EBF	2020/1/23	0.70	1.00	1.45	1
UNDE	USA	46.23	-89.54	GBOV	MF	2015/10/22–2020/9/5	0.93–5.31	0.10–5.75	0.55–6.28	89
VASN	Spain	39.57	-1.29	GBOV	MF	2020/1/14–2020/9/25	0.08–0.65	0.40–1.00	0.50–0.70	23
WOOD	USA	47.13	-99.24	GBOV	Grass	2014/5/26–2020/9/5	0.14–1.48	0.53–2.91	0.60–3.12	99
25de Mayo_Alfalfa	Argentina	-37.91	-67.75	ImagineS	Shrub	2014/2/9	0.97	0.70	0.97	1
25de Mayo_Shurb	Argentina	-37.94	-67.79	ImagineS	Shrub	2014/2/9	0.82	0.68	0.80	1
Albufera	Spain	39.27	-0.32	ImagineS	Crop	2014/6/17–2014/8/7	0.61–5.84	0.81–5.77	1.68–5.96	5
Barrax-LasTiesas	Spain	39.05	-2.10	ImagineS	Crop	2014/5/29–2015/7/22	0.44–2.48	0.48–0.67	0.55–0.92	3
Capitanata	Italy	41.46	15.49	ImagineS	Crop	2014/3/18–2015/4/23	1.86–3.60	1.58–3.25	1.75–3.27	3
Collelongo	Italy	41.85	13.59	ImagineS	DBF	2015/7/8–2015/9/25	3.22–3.97	3.17–4.89	3.23–5.03	2
LaReina_Cordoba_1	Spain	37.82	-4.86	ImagineS	Crop	2014/5/20	1.19	1.02	1.29	1
LaReina_Cordoba_2	Spain	37.79	-4.83	ImagineS	Crop	2014/5/20	1.57	1.22	1.60	1
Maragua_UpperTana	Kenya	-0.77	36.97	ImagineS	Crop	2016/3/8	1.87	2.35	2.59	1
Pshenichne	Ukraine	50.08	30.23	ImagineS	Crop	2013/5/14–2015/7/7	0.56–3.51	0.73–4.93	1.09–4.21	8
Rosasco	Italy	45.25	8.56	ImagineS	Crop	2014/7/3	4.32	2.80	3.06	1
SanFernando	Chile	-34.72	-71.00	ImagineS	Crop	2015/1/19	2.09	1.52	1.57	1
AHSPECT-Condom	France	43.97	0.34	ImagineS	Crop	2015/6/23	1.43	1.28	1.37	1
AHSPECT-Creón D'armagnac	France	43.99	-0.05	ImagineS	Crop	2015/6/23	2.30	3.40	3.91	1
AHSPECT-Meteopol	France	43.57	1.37	ImagineS	Crop	2015/6/23	1.13	2.02	2.19	1
AHSPECT-Peyrousse	France	43.67	0.22	ImagineS	Crop	2015/6/23	1.66	1.84	1.99	1
AHSPECT-Savenès	France	43.82	1.17	ImagineS	Crop	2015/6/23	1.28	1.25	1.32	1
AHSPECT-Urgons	France	43.64	-0.43	ImagineS	Crop	2015/6/23	1.93	2.18	2.31	1
SouthWest_1	France	43.55	1.09	ImagineS	Crop	2013/6/22–2013/9/4	1.28–2.60	1.35–2.16	1.48–2.29	5
SouthWest_2	France	43.45	1.15	ImagineS	Crop	2013/6/22–2013/9/4	0.73–1.94	1.03–1.55	1.43–1.71	4
Walnut Creek	USA	41.93	-93.75	SMEX02	Crop	2002/6/23–2002/7/8	1.40–2.89	1.55–2.84	1.73–2.91	3
Camerons	Australia	-32.62	116.28	VALERI	EBF	2004/3/3	2.13	1.84	2.04	1
Counami	French Guiana	5.34	-53.24	VALERI	EBF	2001/9/26–2002/10/13	4.37–4.93	5.41–6.55	5.97–6.38	2
Demmin	Germany	53.89	13.21	VALERI	Crop	2004/7/12	4.19	1.75	2.10	1

Donga	Benin	9.77	1.75	VALERI	Grass	2005/6/20	1.88	1.75	2.24	1
Fundulea	Romania	44.41	26.59	VALERI	Crop	2001/5/8–2002/5/24	1.51–3.08	1.73–2.21	2.18–2.56	2
Gilching	Germany	48.08	11.32	VALERI	Crop	2002/7/18	5.45	3.08	3.17	1
Gnangara	Australia	-31.53	115.88	VALERI	EBF	2004/3/1	1.00	0.92	0.99	1
Laprida	Argentina	-36.99	-60.55	VALERI	Grass	2002/10/19	2.81	1.43	2.00	1
Larose	Canada	45.38	-75.22	VALERI	MF	2003/8/7	5.85	2.58	5.80	1
Le Larzac	France	43.94	3.12	VALERI	Grass	2002/7/2	0.83	1.82	2.24	1
Les Alpilles	France	43.81	4.71	VALERI	Crop	2002/7/23	1.69	1.19	1.22	1
Nezer	France	44.57	-1.04	VALERI	ENF	2002/4/17	2.38	1.47	1.66	1
Plan-de-Dieu	France	44.20	4.95	VALERI	Crop	2004/7/7	1.15	0.77	0.67	1
Puéchabon	France	43.72	3.65	VALERI	MF	2001/6/13	2.84	2.02	2.39	1
Sonian forest	Belgium	50.77	4.41	VALERI	MF	2004/6/22	5.67	4.97	4.58	1
Sud-Ouest	France	43.51	1.24	VALERI	Crop	2002/7/8	1.95	1.47	1.75	1
Turco	Bolivia	-18.24	-68.19	VALERI	Grass	2001/7/27–2002/8/28	0.04–0.30	0.21–0.22	0.21–0.26	2
Wankama	Niger	13.65	2.64	VALERI	Grass	2005/6/23	0.14	0.23	0.25	1
Zhang Bei	China	41.28	114.69	VALERI	Grass	2002/8/9	1.28	1.49	1.61	1

2. Time series plot of LAI mean values within the reference map extent

Figure S1. Time series plot of LAI mean values within the reference map extent for sites ARGO, KONZ, SEVI from BigFoot dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

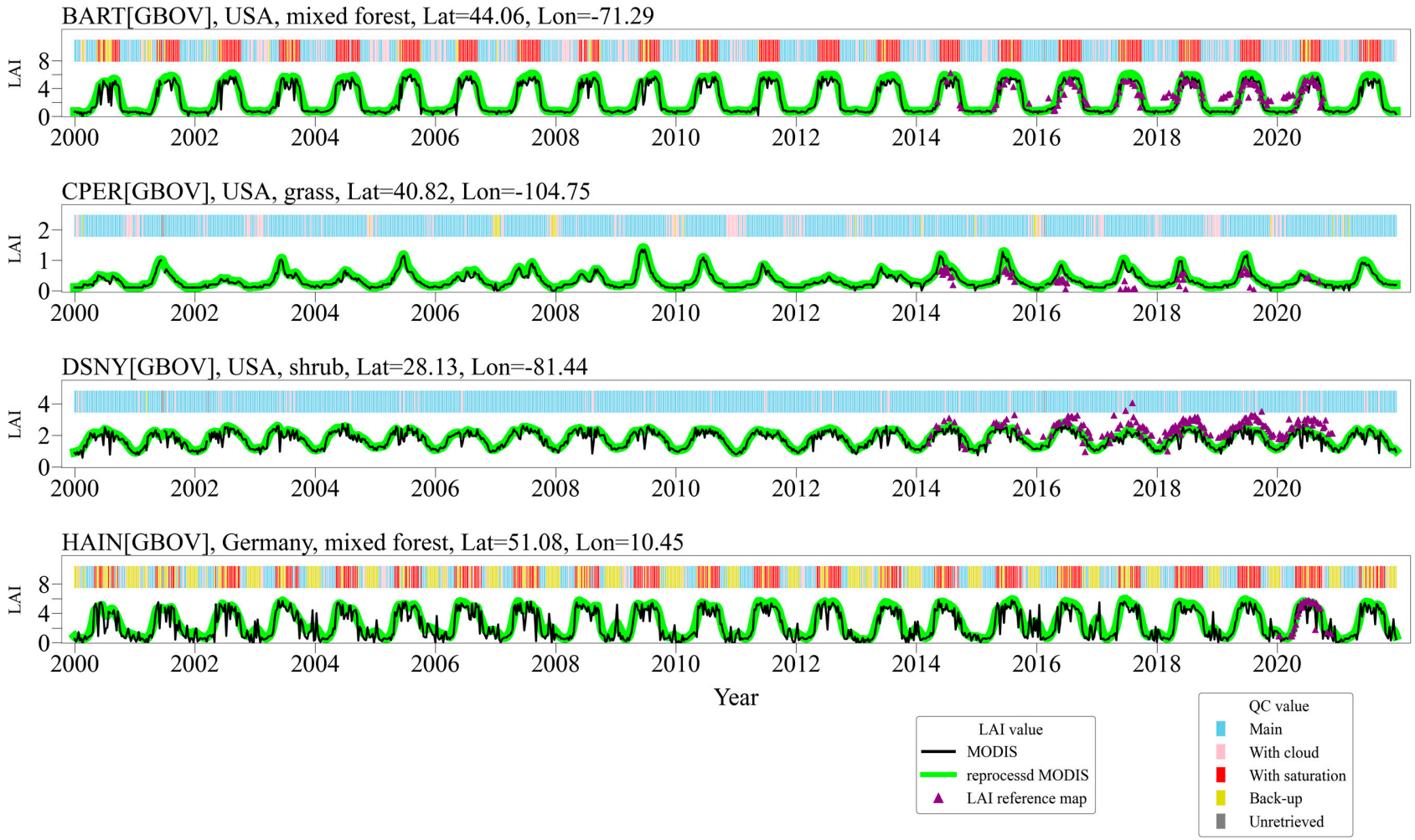

Figure S2. Time series plot of LAI mean values within the reference map extent for sites BART, CPER, DSNY, HAIN from GBOV dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

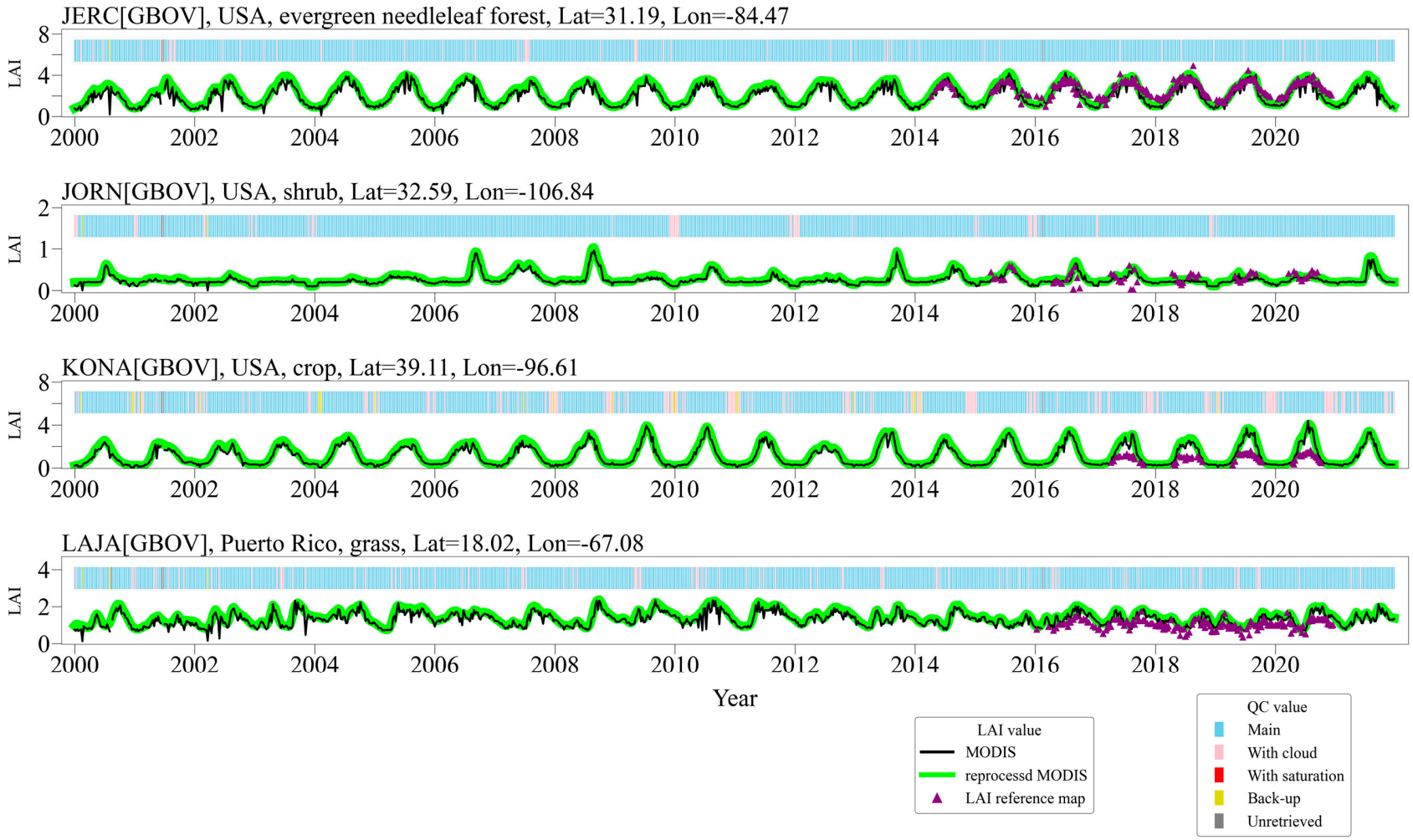

Figure S3. Time series plot of LAI mean values within the reference map extent for sites JERC, JORN, KONA, LAJA from GBOV dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

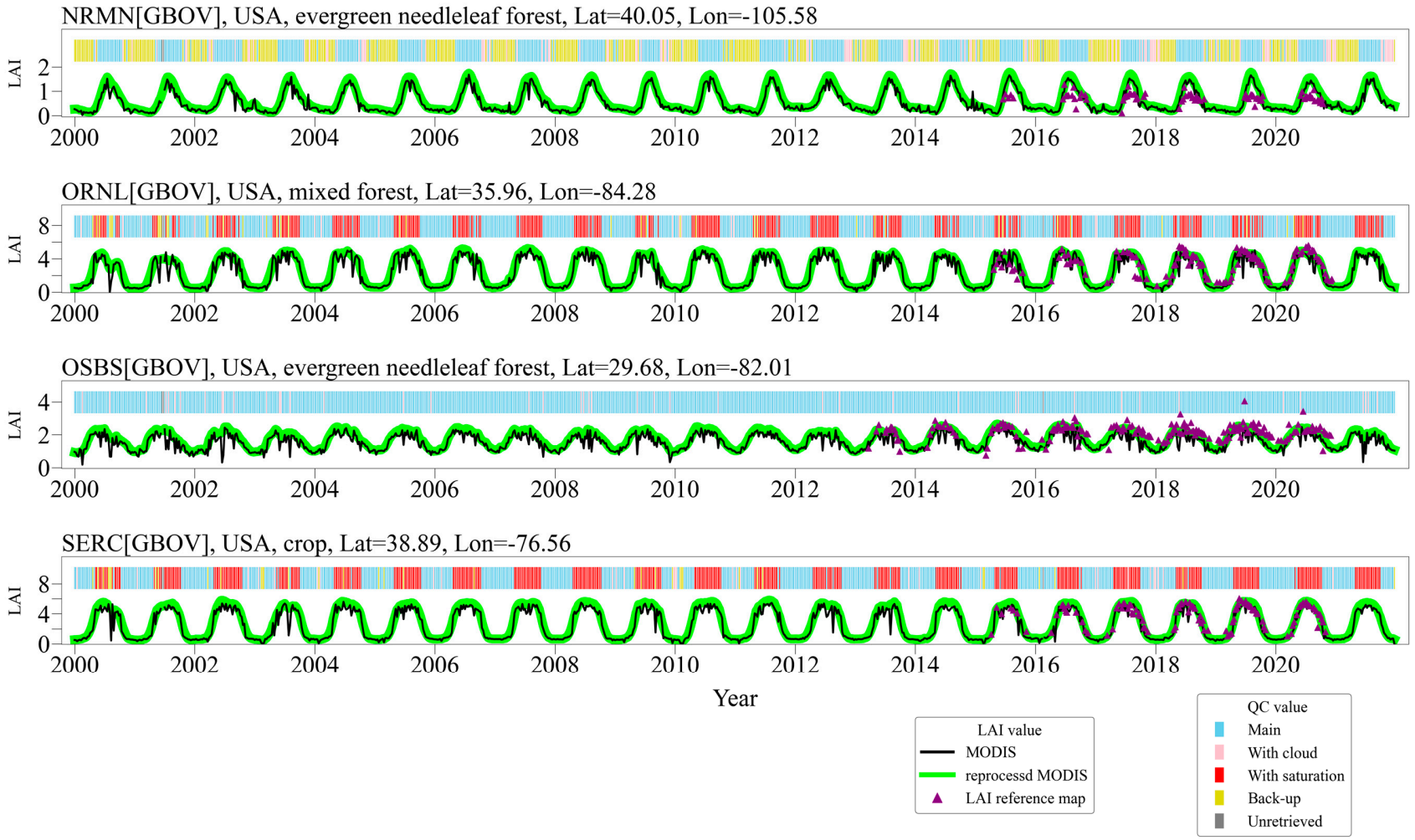

Figure S4. Time series plot of LAI mean values within the reference map extent for sites NRMN, ORNL, OSBS, SERC from GBOV dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

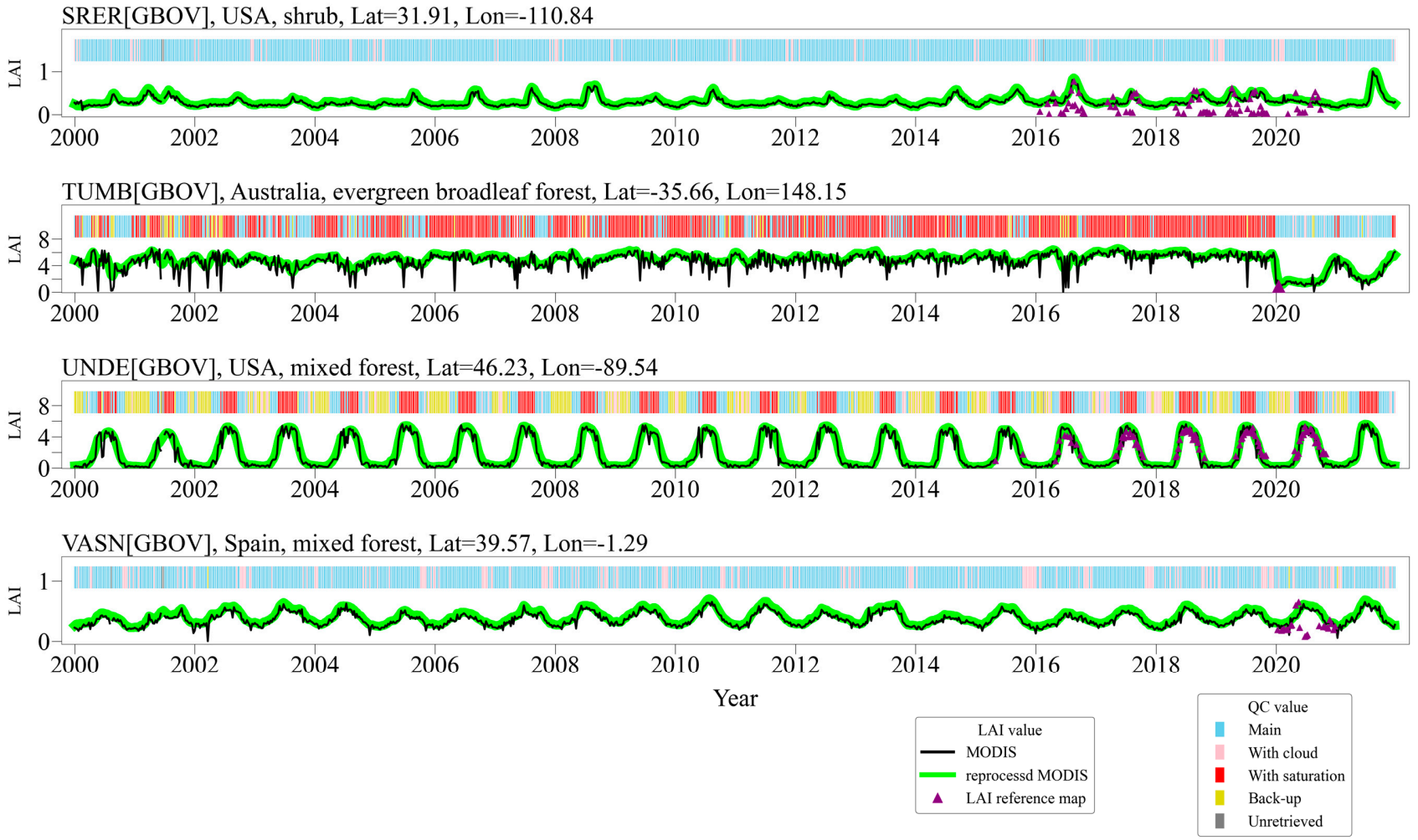

Figure S5. Time series plot of LAI mean values within the reference map extent for sites SRER, TUMB, UNDE, VASN from GBOV dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

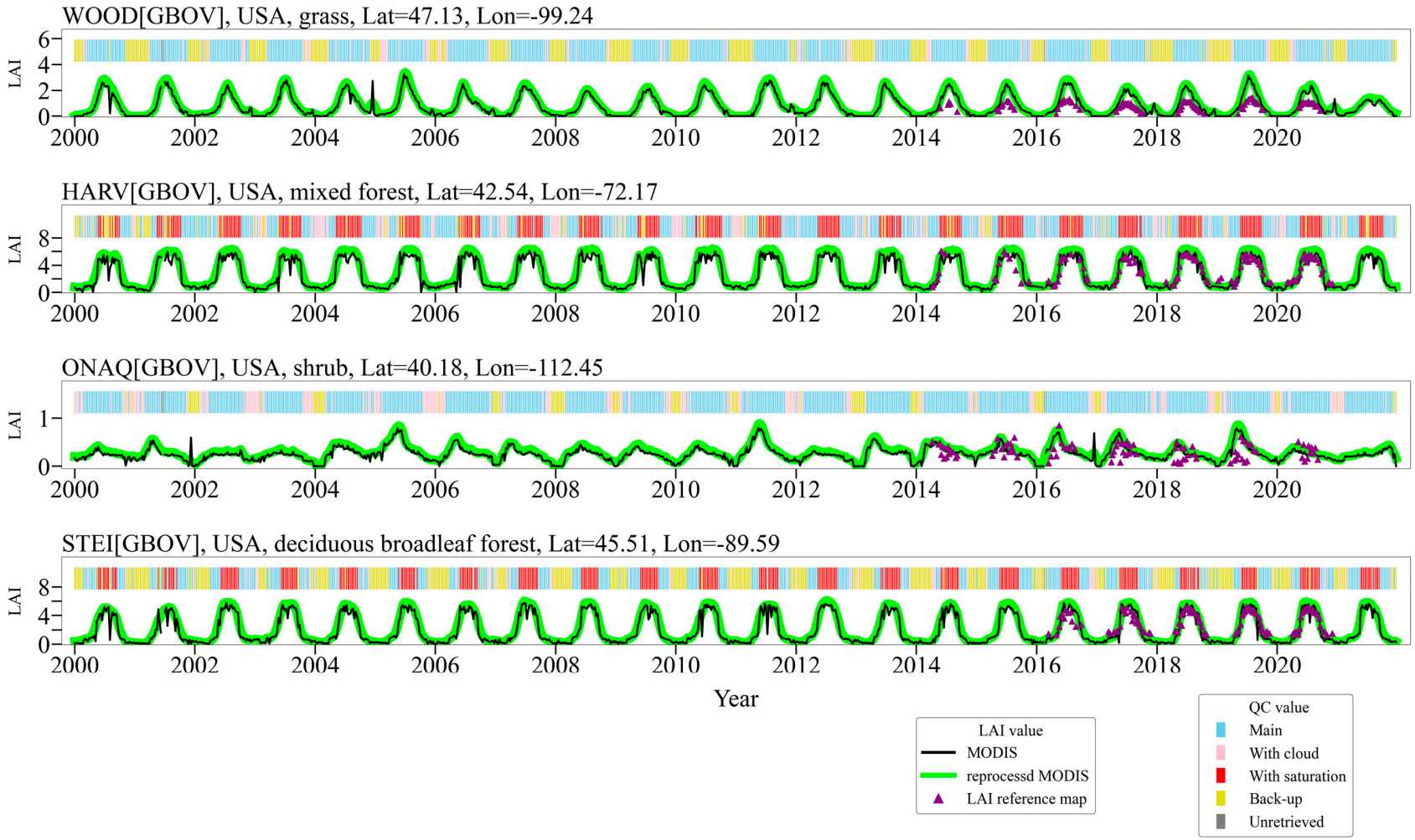

Figure S6. Time series plot of LAI mean values within the reference map extent for sites WOOD, HARV, ONAQ, STEI from GBOV dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

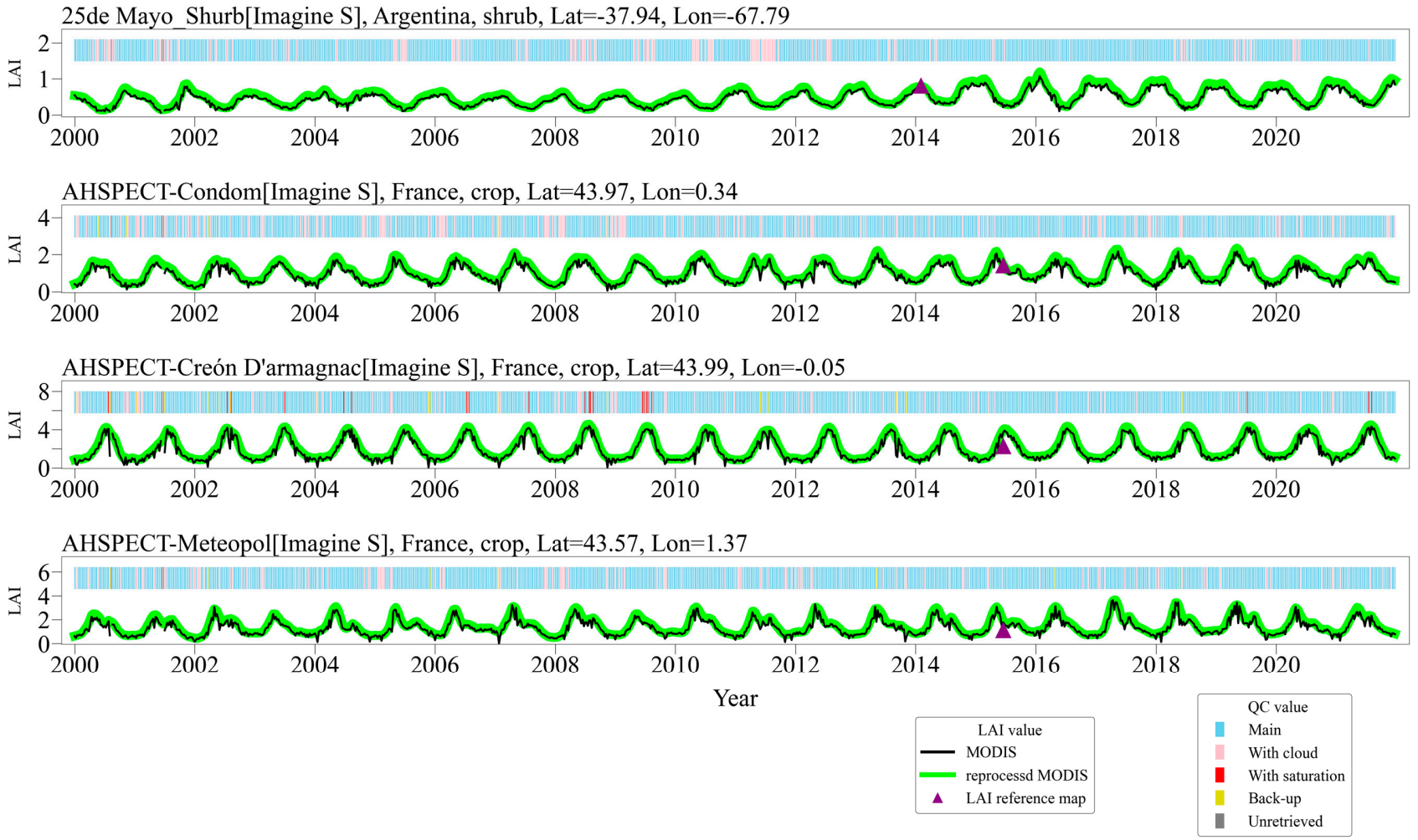

Figure S7. Time series plot of LAI mean values within the reference map extent for sites 25de Mayo_Shurb, AHSPECT-Condom, AHSPECT-Creón D'armagnac, AHSPECT-Meteopol from ImagineS dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

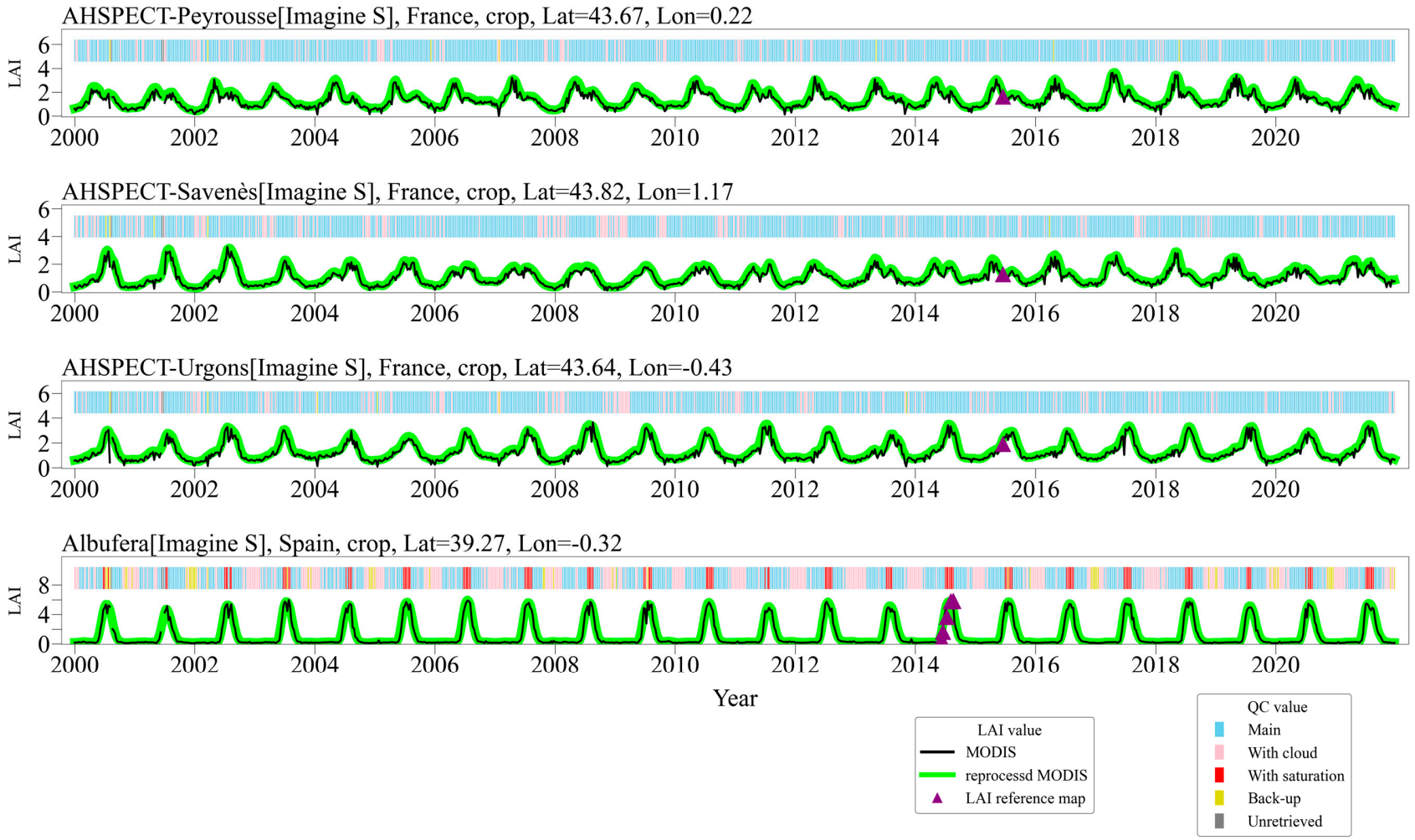

Figure S8. Time series plot of LAI mean values within the reference map extent for sites AHSPECT-Peyrousse, AHSPECT-Savenès, AHSPECT-Urgons, Albufera from ImagineS dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

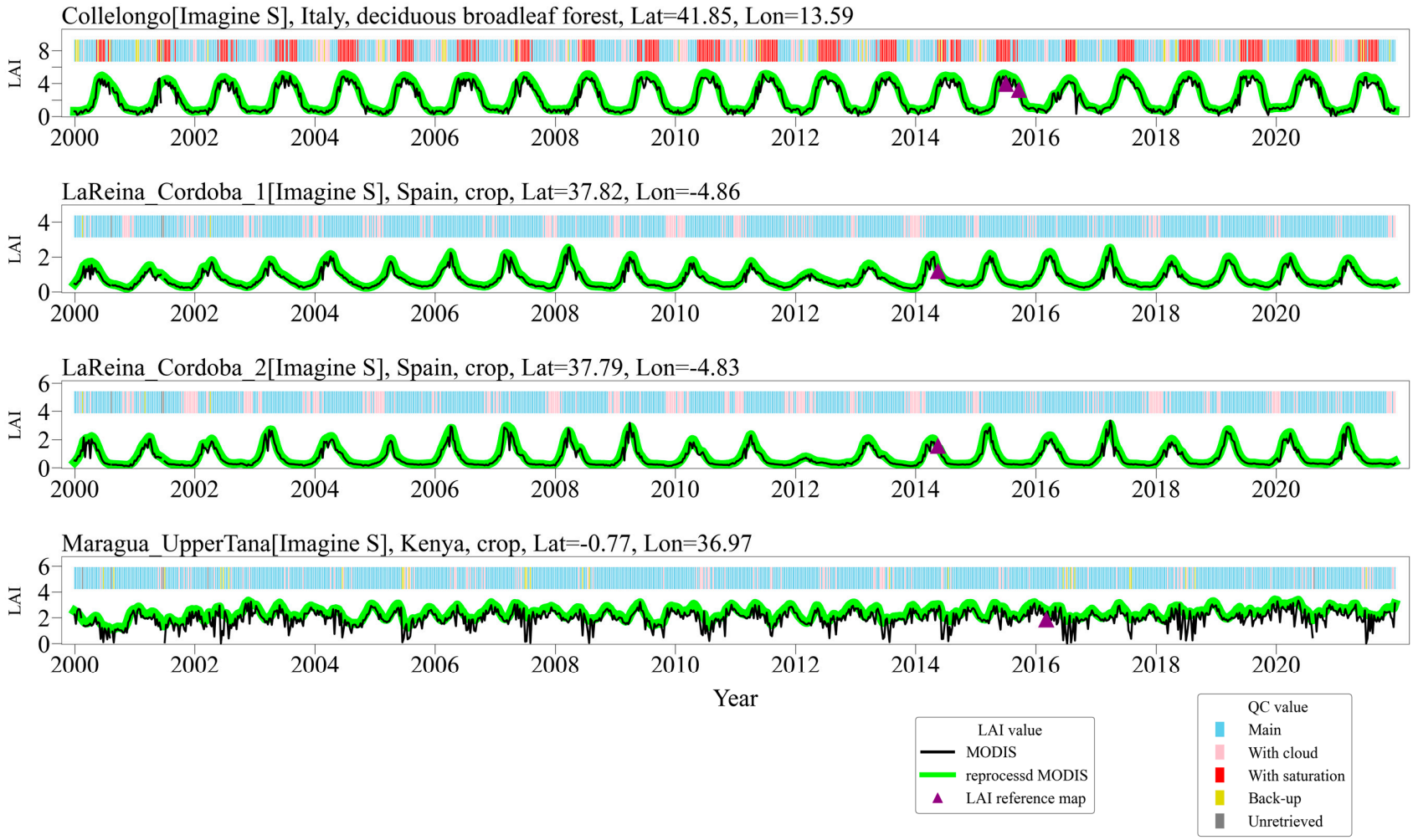

Figure S9. Time series plot of LAI mean values within the reference map extent for sites Collelongo, LaReina_Cordoba_1, LaReina_Cordoba_2, Maragua_UpperTana from ImagineS dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

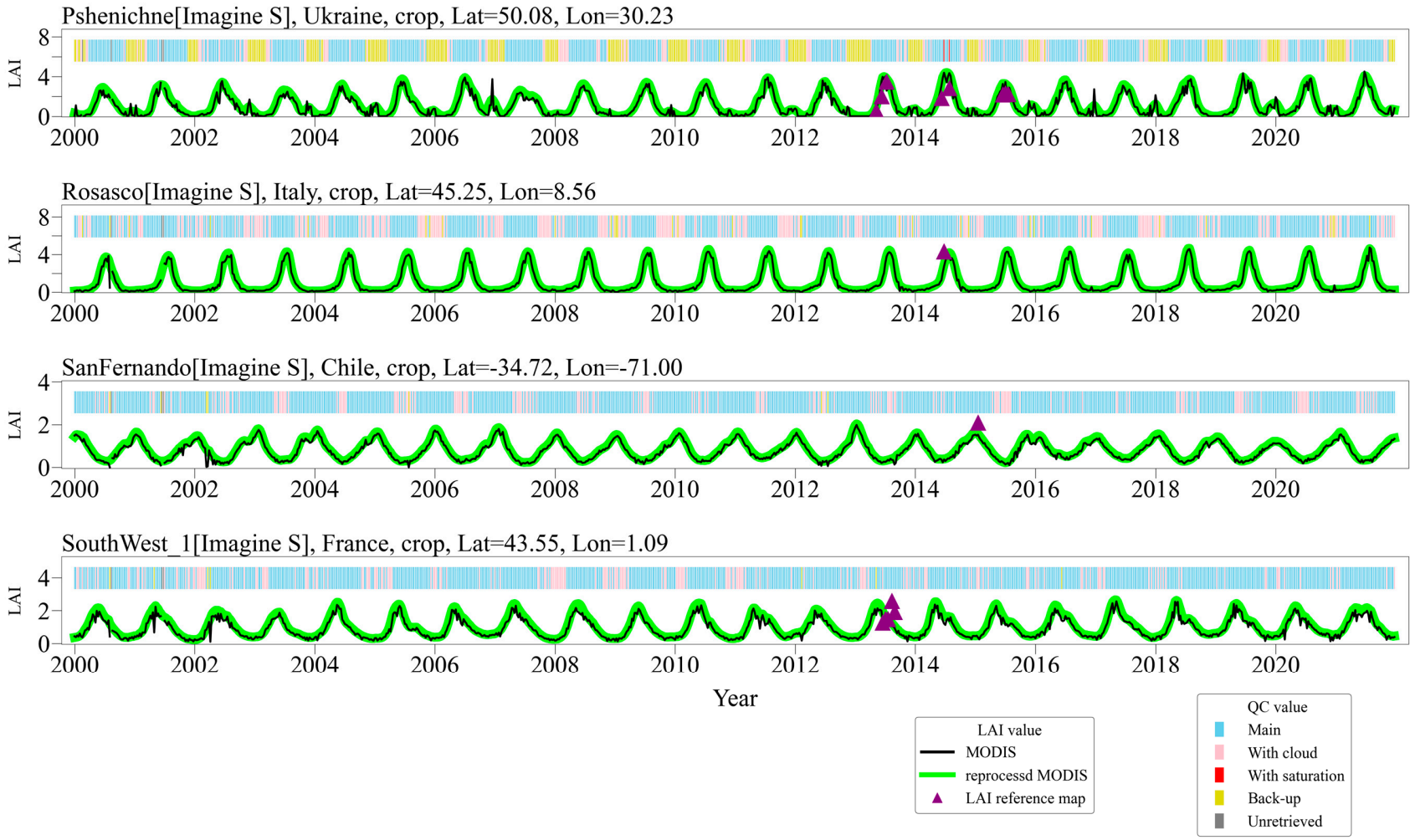

Figure S10. Time series plot of LAI mean values within the reference map extent for sites Pshenichne, Rosasco, SanFernando, SouthWest_1 from ImagineS dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

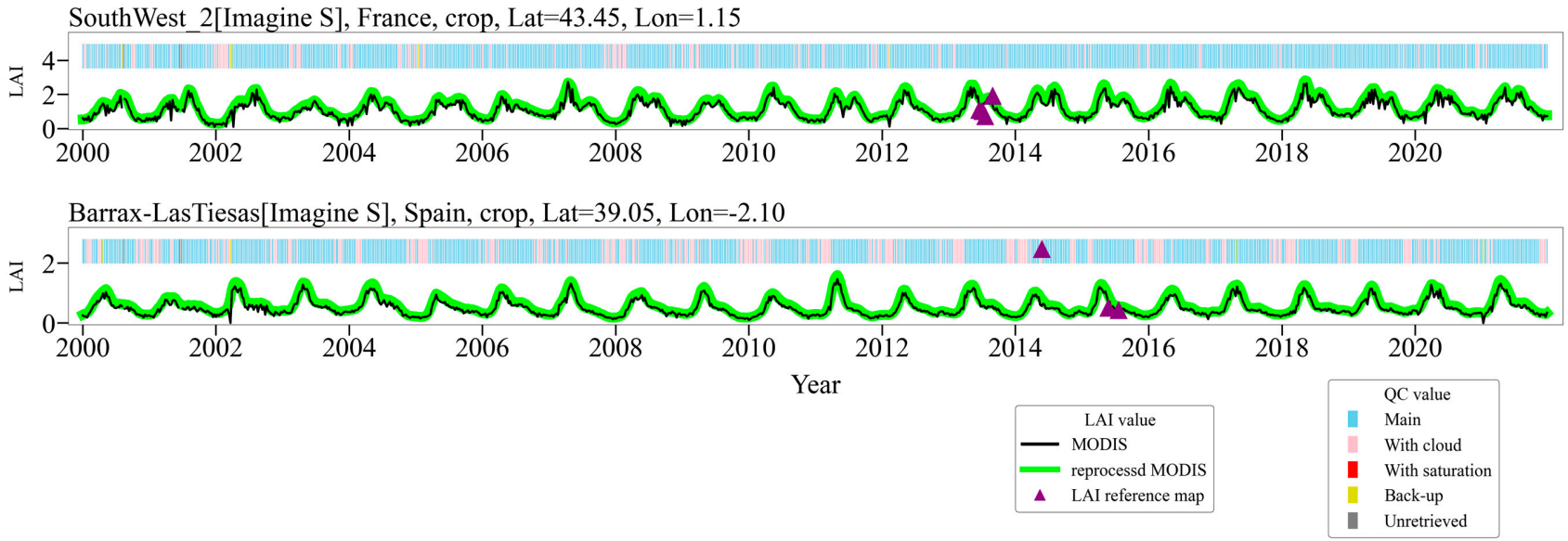

Figure S11. Time series plot of LAI mean values within the reference map extent for sites SouthWest_2 and Barrax-LasTiesas from ImagineS dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

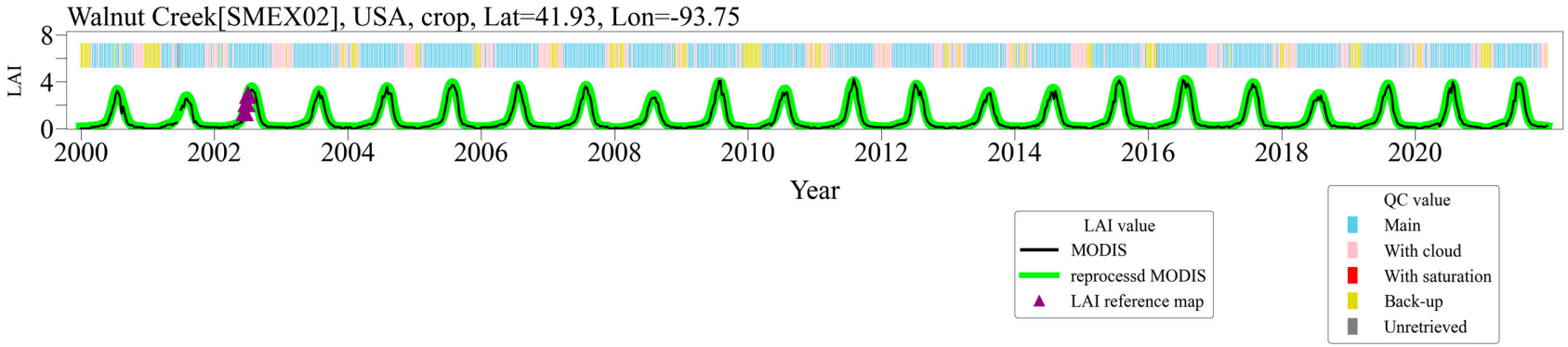

Figure S12. Time series plot of LAI mean values within the reference map extent for site Walnut Creek from SMEX02 dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

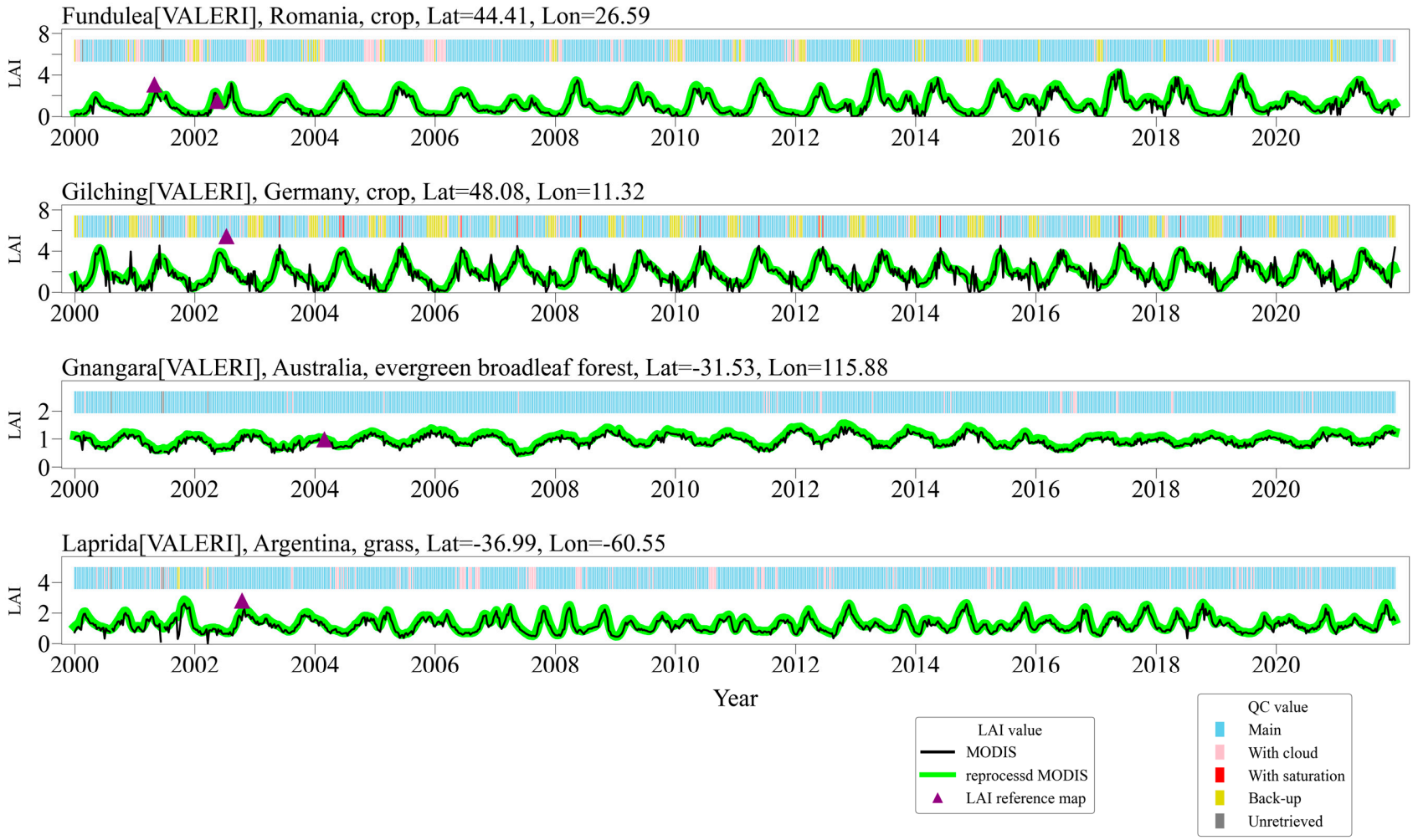

Figure S13. Time series plot of LAI mean values within the reference map extent for sites Fundulea, Gilching, Gnangara, Laprida from VALERI dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

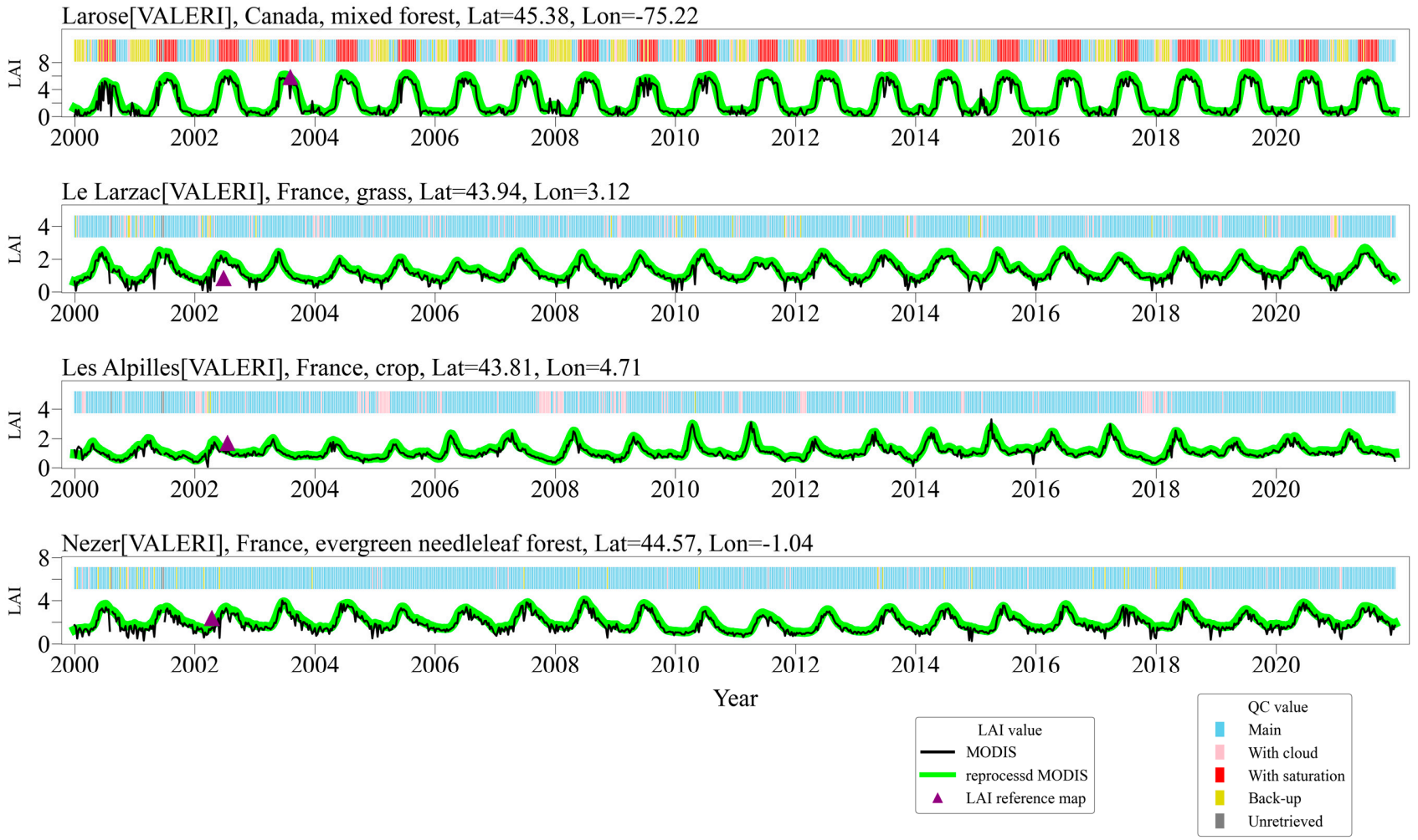

Figure S14. Time series plot of LAI mean values within the reference map extent for sites Larose, Le Larzac, Les Alpilles, Nezer from VALERI dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

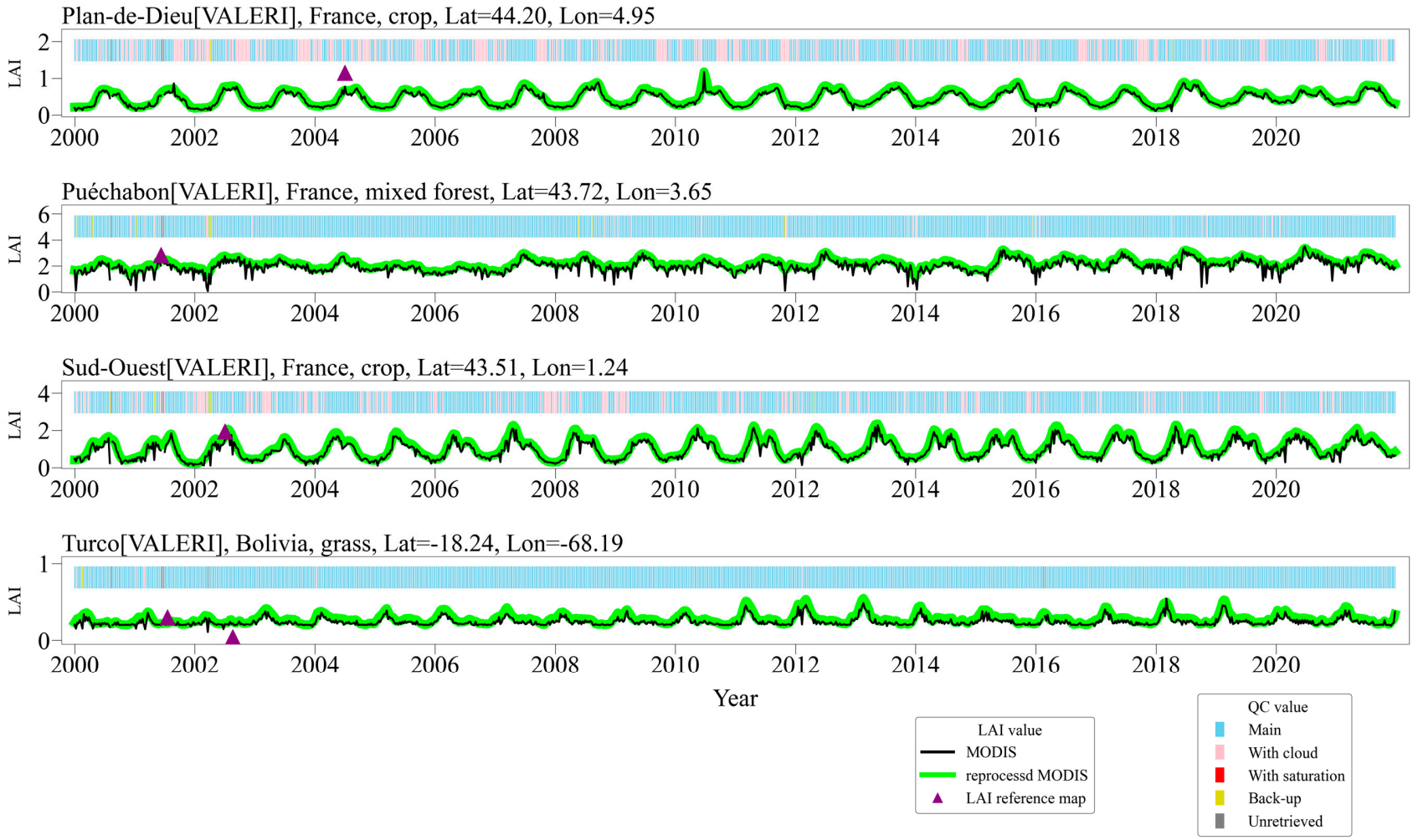

Figure S15. Time series plot of LAI mean values within the reference map extent for sites Plan-de-Dieu, Puechabon, Sud-Ouest, Turco from VALERI dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

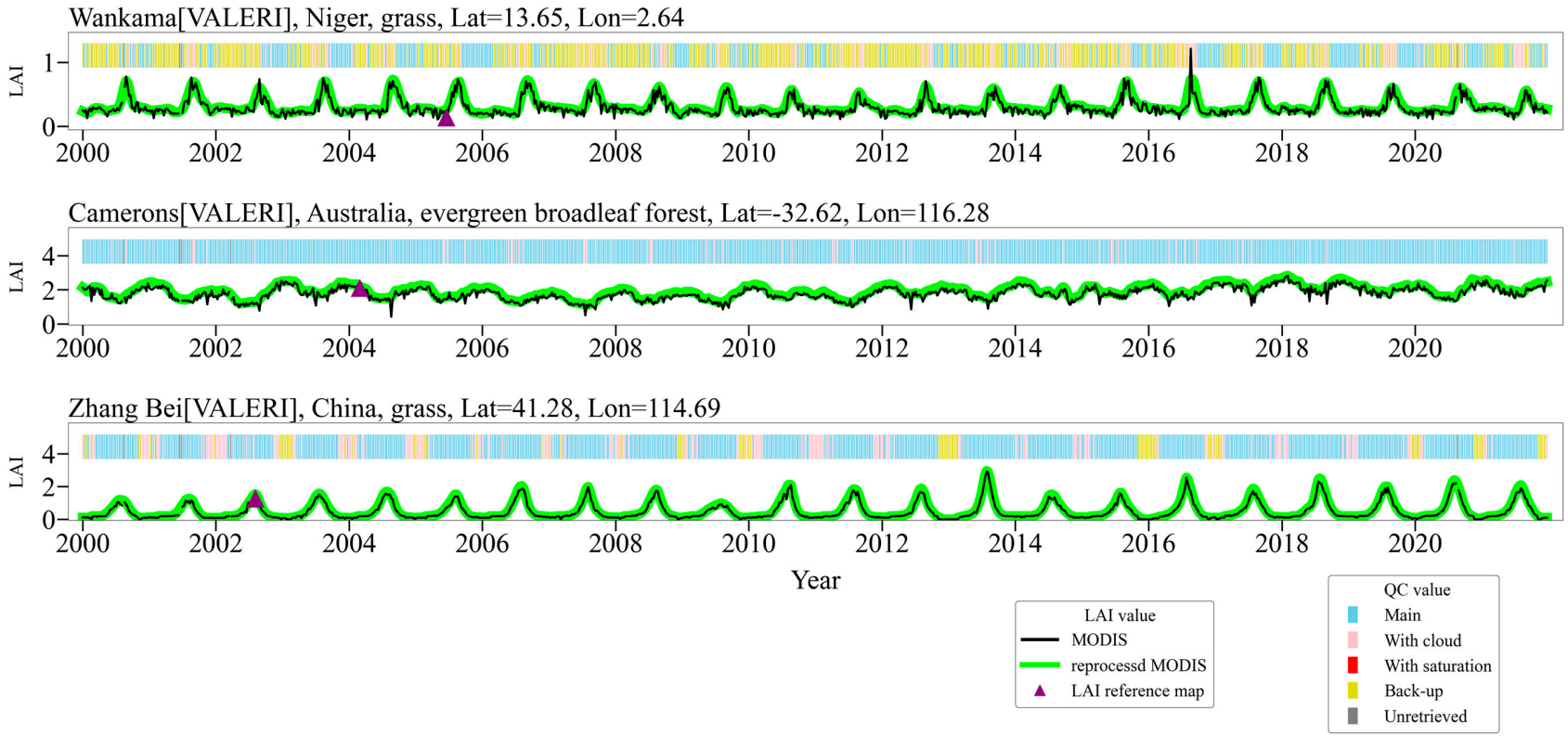

Figure S16. Time series plot of LAI mean values within the reference map extent for sites Wankama, Camerons and Zhang Bei from VALERI dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

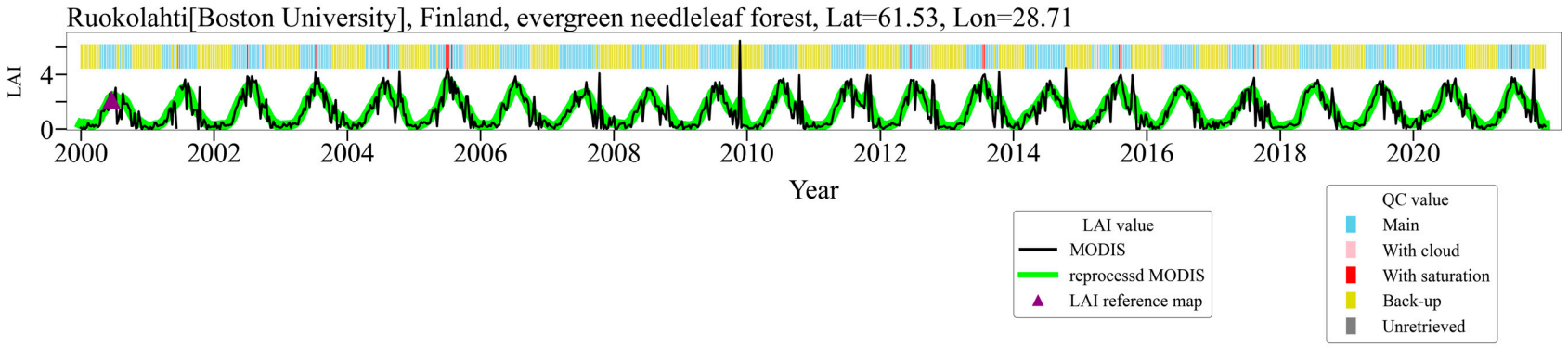

Figure S17. Time series plot of LAI mean values within the reference map extent for site Ruokolahti from Boston University dataset. The QC values, which indicate the retrieved algorithms, are drawn in different colors on the top of time series.

3. Global growing season mean LAI values and trends of different LAI products

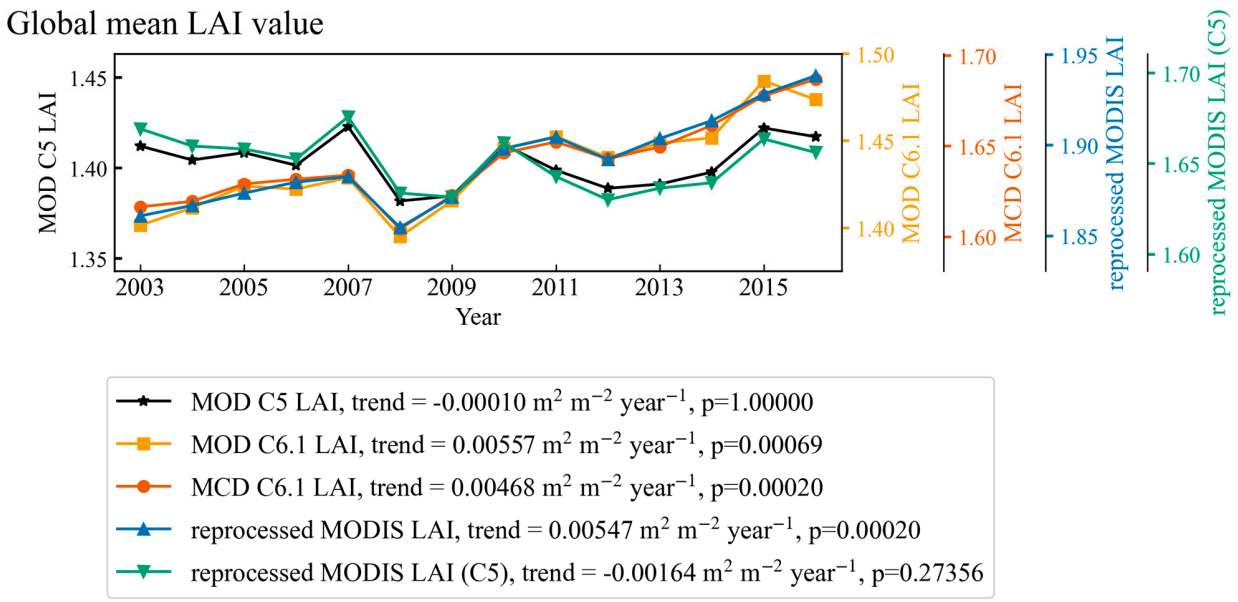

Figure S18. Linear trends of the global growing season mean LAI values of different LAI products during their overlapped period 2003–2016.

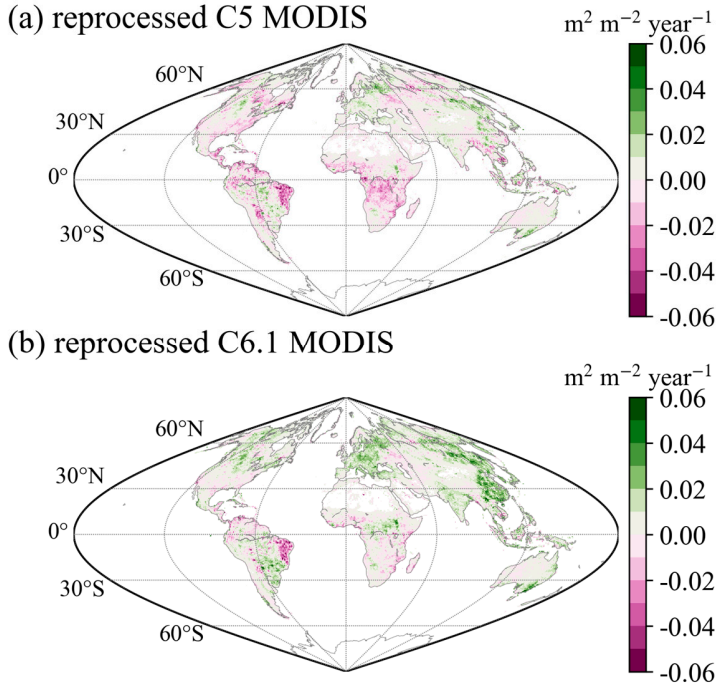

Figure S19. Linear trends of the growing season mean LAI of (a) reprocessed C5 LAI and (b) reprocessed C6.1 LAI during the period 2003–2016.