

# Supplementary materials for “Spatiotemporally consistent global dataset of the GIMMS Leaf Area Index (GIMMS LAI4g) from 1982 to 2020”

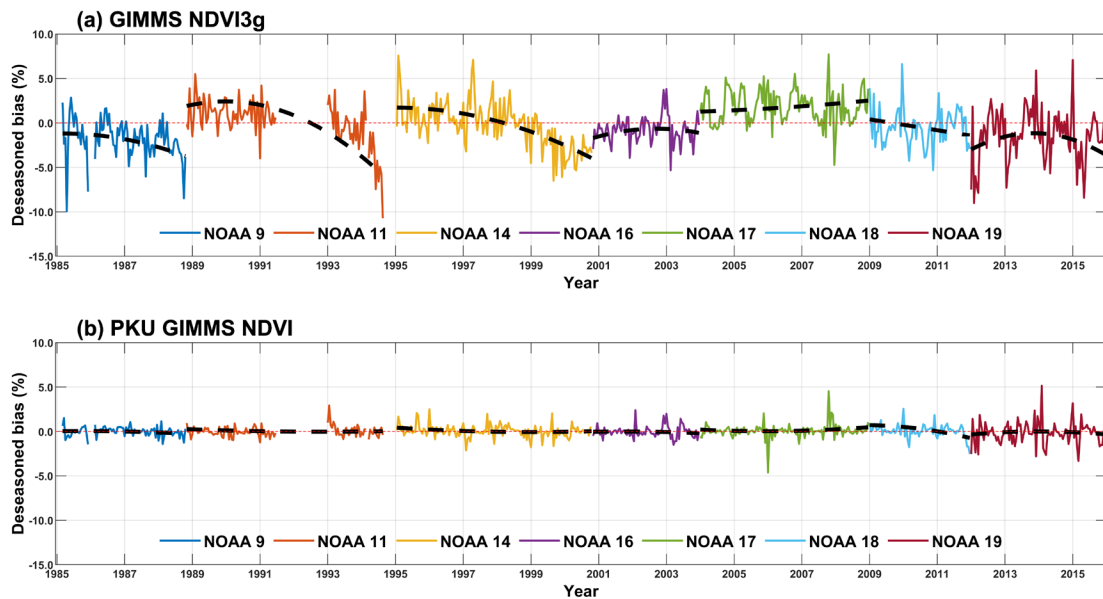
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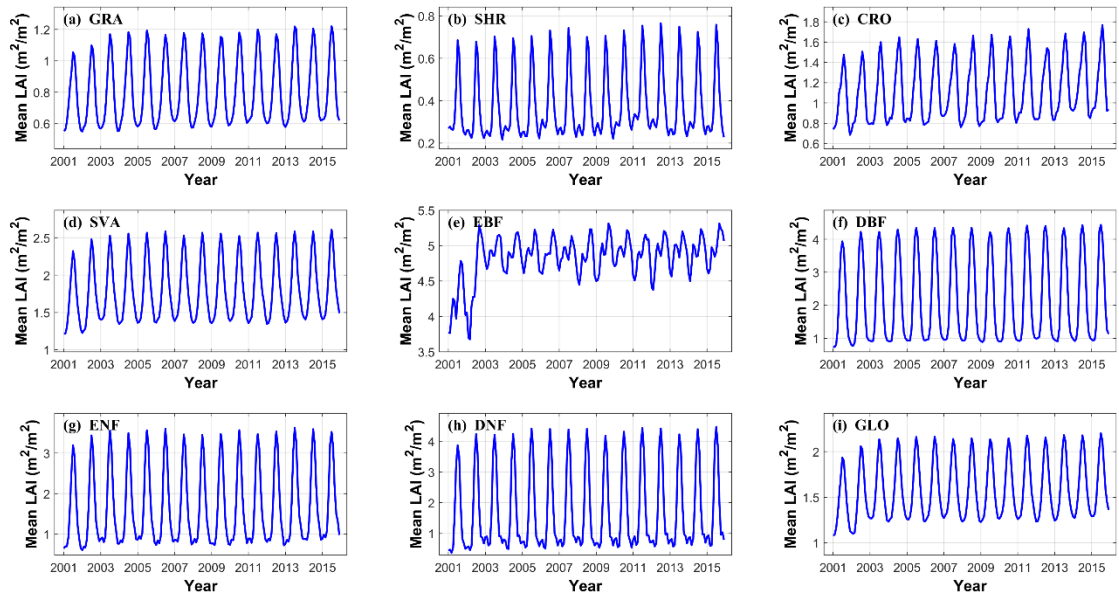
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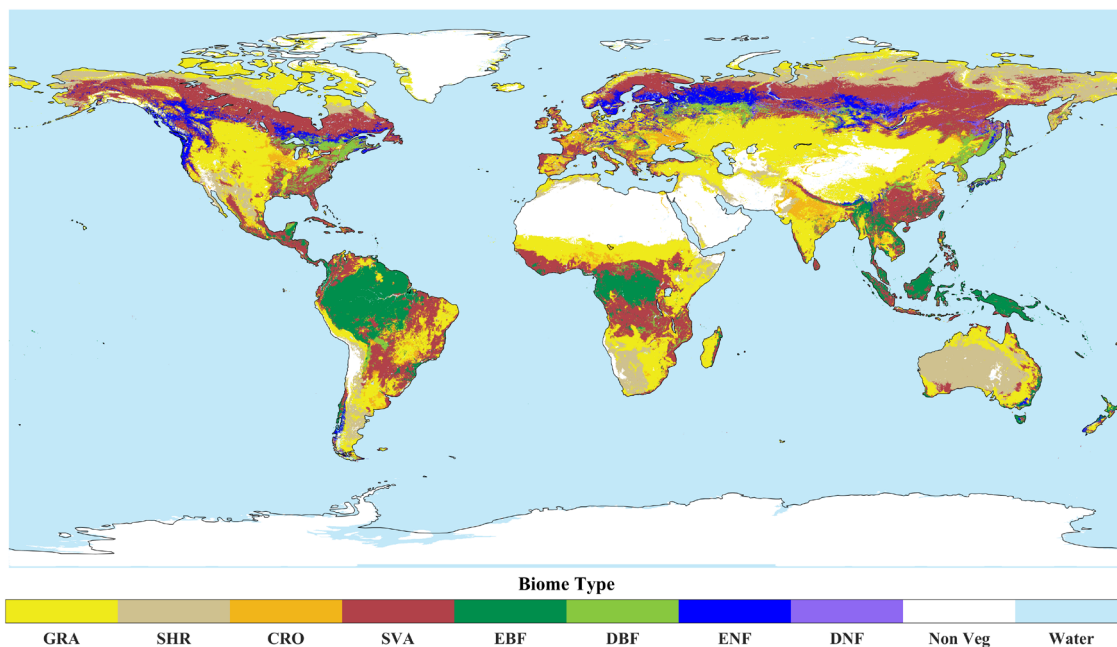
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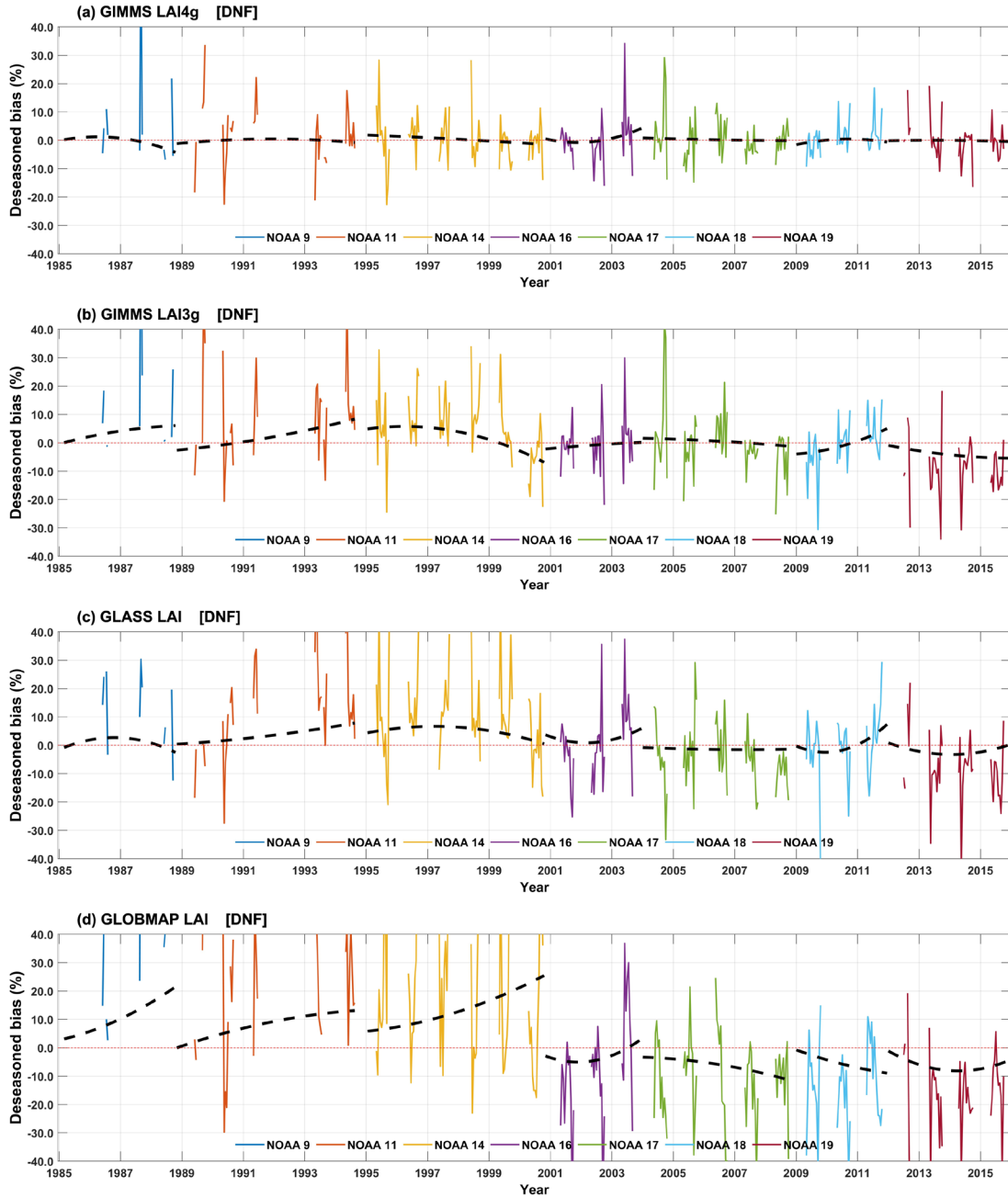
**Figure S1.** Temporal variations of NDVI bias% in EBF for (a) the GIMMS NDVI3g product and (b) the PKU GIMMS NDVI product. The black dash line represents the interannual trend extracted by the EEMD method. Values from different NOAA satellite missions are distinguished with colors. The figure illustrates that the effects of NOAA satellite orbital drift and AVHRR sensor degradation were efficiently removed in the PKU GIMMS NDVI product.



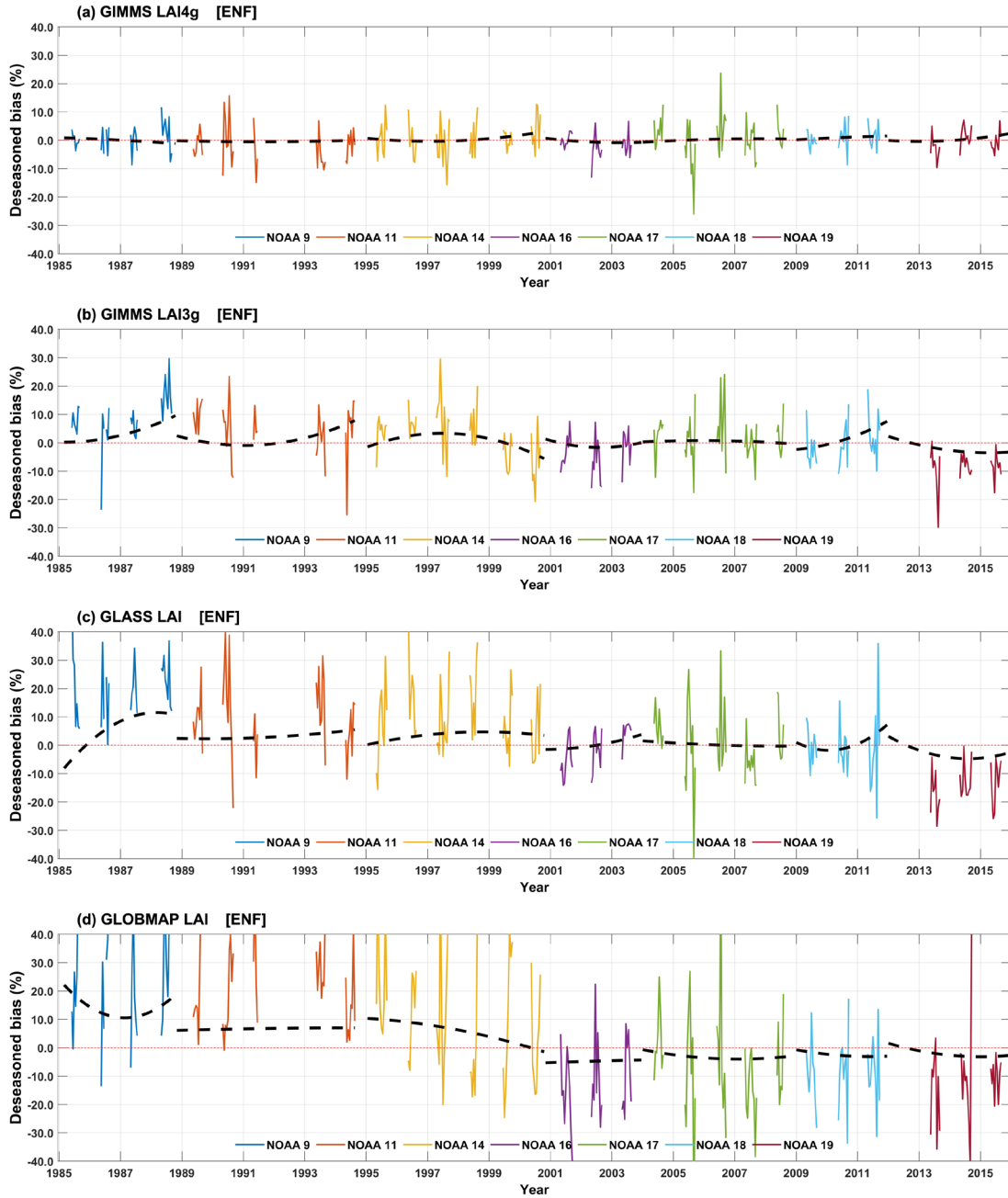
**Figure S2.** Annual LAI averages from the Reprocessed MODIS LAI product (version 6) for different vegetation biome types. The vegetation biome types use the third classification scheme in the MODIS Land-Cover Type product (MCD12Q1, version 6) (see section 2.4). GLO represents the global vegetation biome. This figure demonstrates unexpected low LAI values for evergreen broadleaf forests (EBF) between 2000 and 2003.



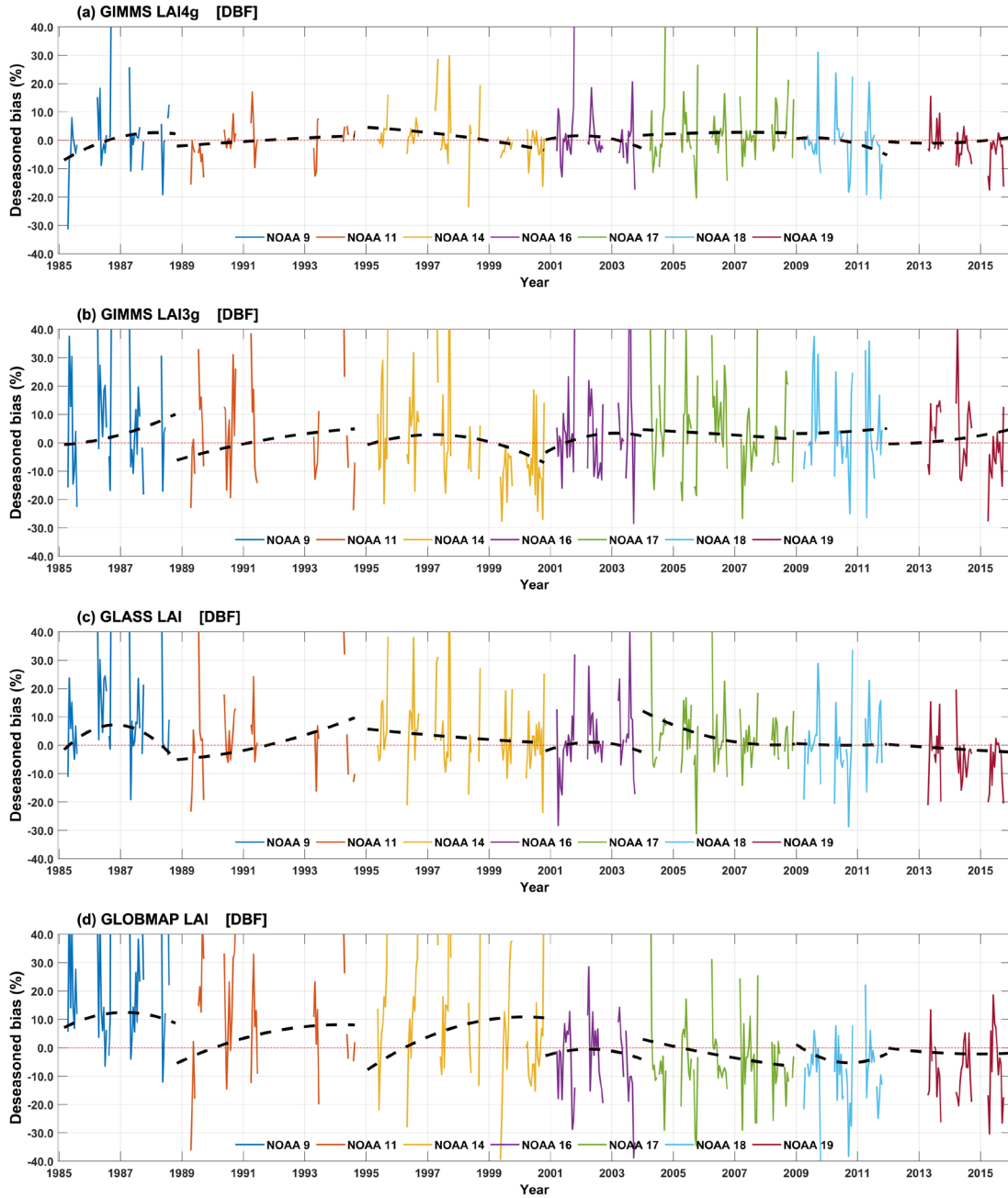
**Figure S3.** The global land cover map derived from the MODIS Land-Cover Type product (MCD12Q1, version 6). The third classification scheme in MCD12Q1 was adopted. Each grid ( $1/12^\circ$ ) in the map was labeled as the most frequent land cover type between 2001 and 2019.



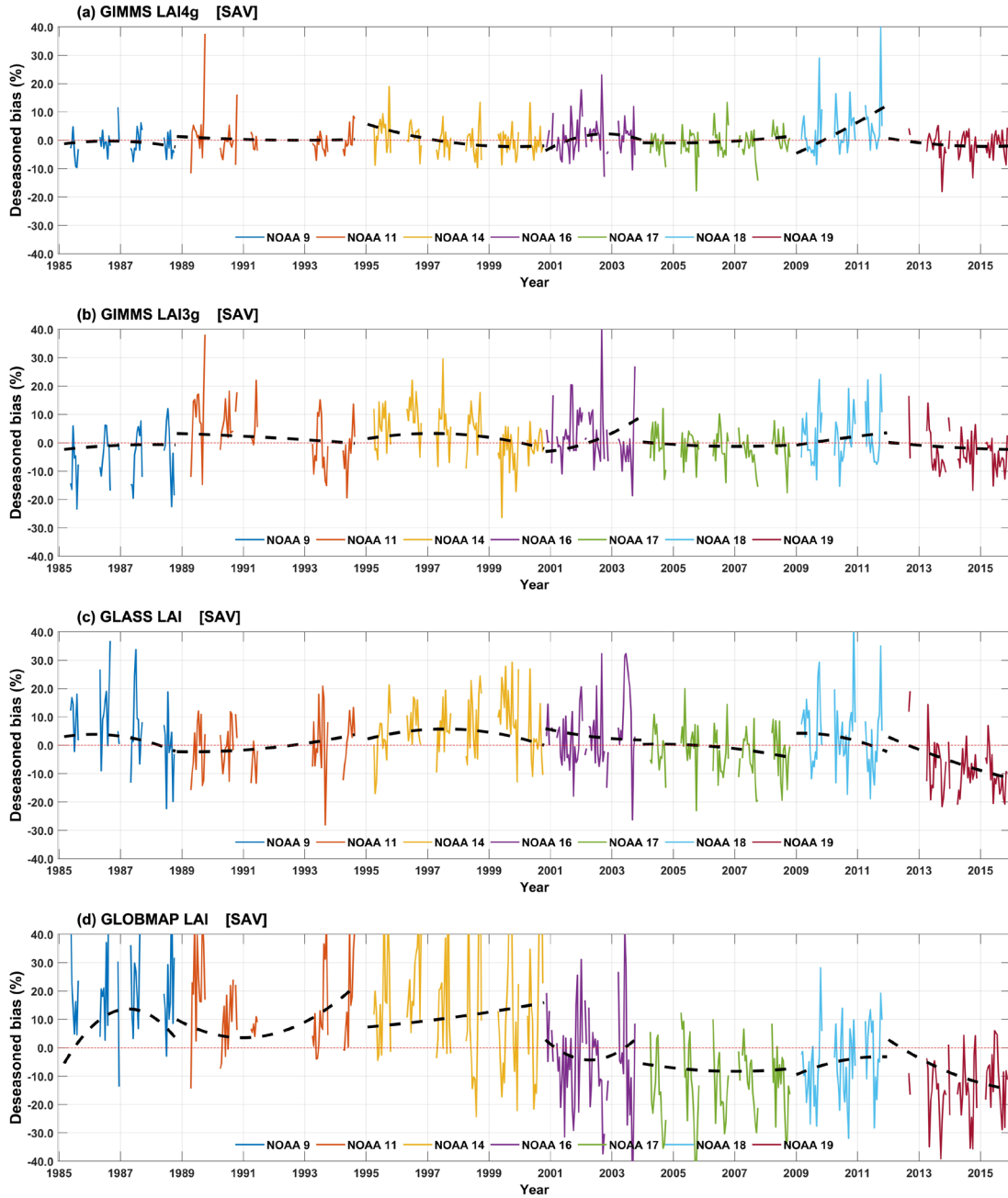
**Figure S4.** Temporal variations of LAI bias% in **DNF** for (a) the GIMMS LAI4g, (b) GIMMS LAI3g, (c) GLASS LAI, and (d) GLOBMAP LAI. The black dash line represents the interannual trend extracted by the EEMD method. Values from different NOAA satellite missions were distinguished with colors.



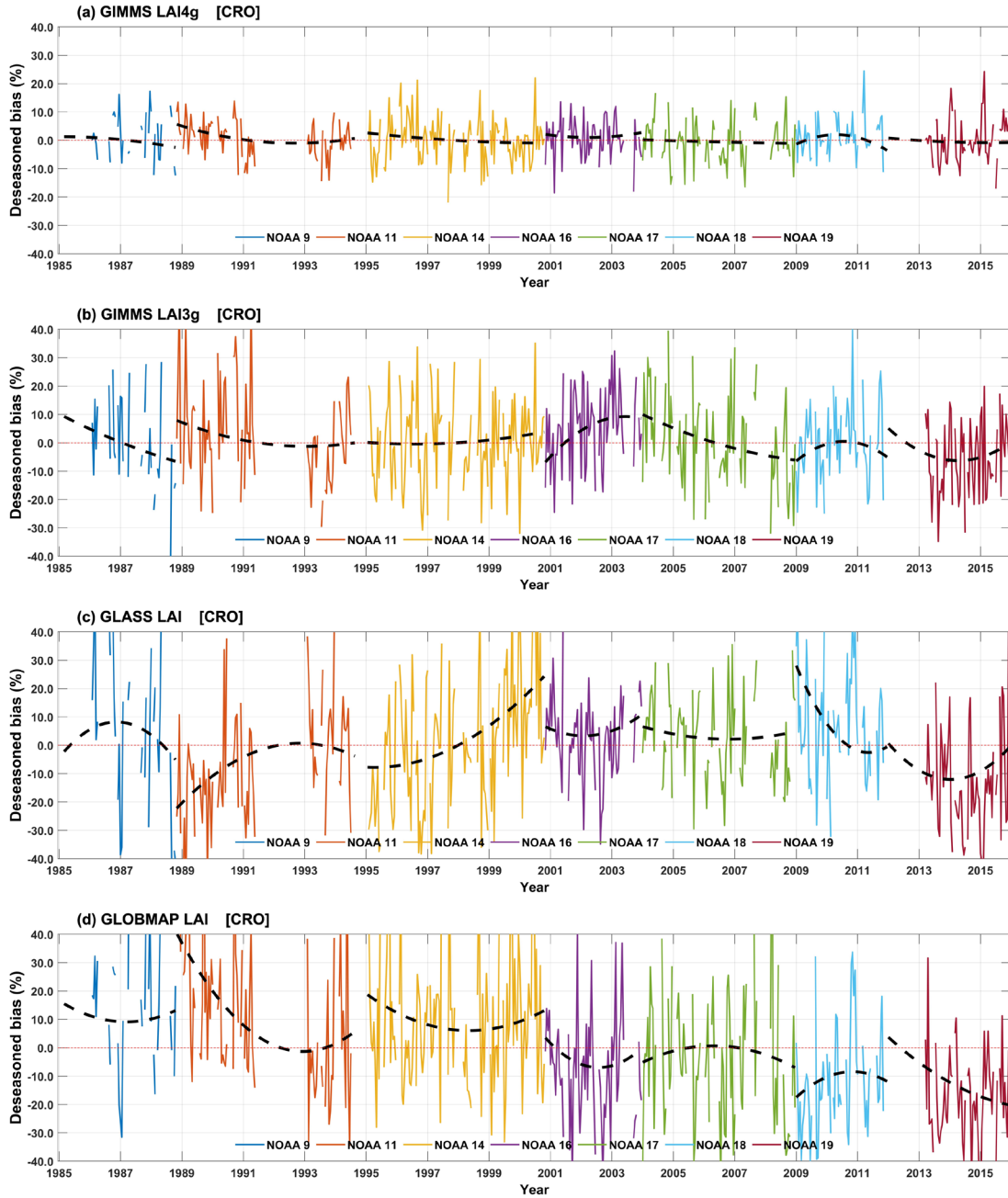
**Figure S5.** Temporal variations of LAI bias% in ENF for (a) the GIMMS LAI4g, (b) GIMMS LAI3g, (c) GLASS LAI, and (d) GLOBMAP LAI. The black dash line represents the interannual trend extracted by the EEMD method. Values from different NOAA satellite missions were distinguished with colors.



**Figure S6.** Temporal variations of LAI bias% in **DBF** for (a) the GIMMS LAI4g, (b) GIMMS LAI3g, (c) GLASS LAI, and (d) GLOBMAP LAI. The black dash line represents the interannual trend extracted by the EEMD method. Values from different NOAA satellite missions were distinguished with colors.

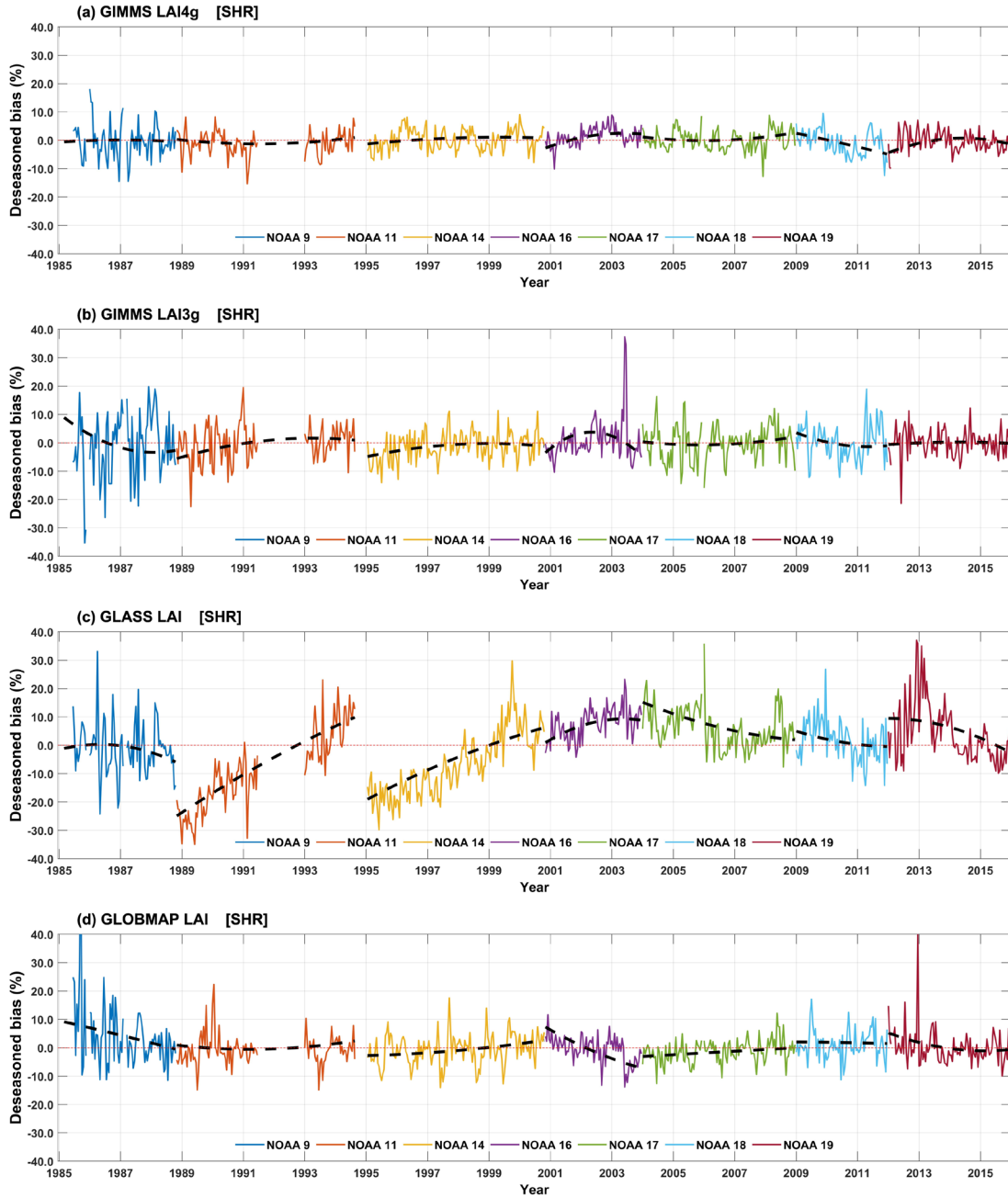


**Figure S7.** Temporal variations of LAI bias% in SAV for (a) the GIMMS LAI4g, (b) GIMMS LAI3g, (c) GLASS LAI, and (d) GLOBMAP LAI. The black dash line represents the interannual trend extracted by the EEMD method. Values from different NOAA satellite missions were distinguished with colors.

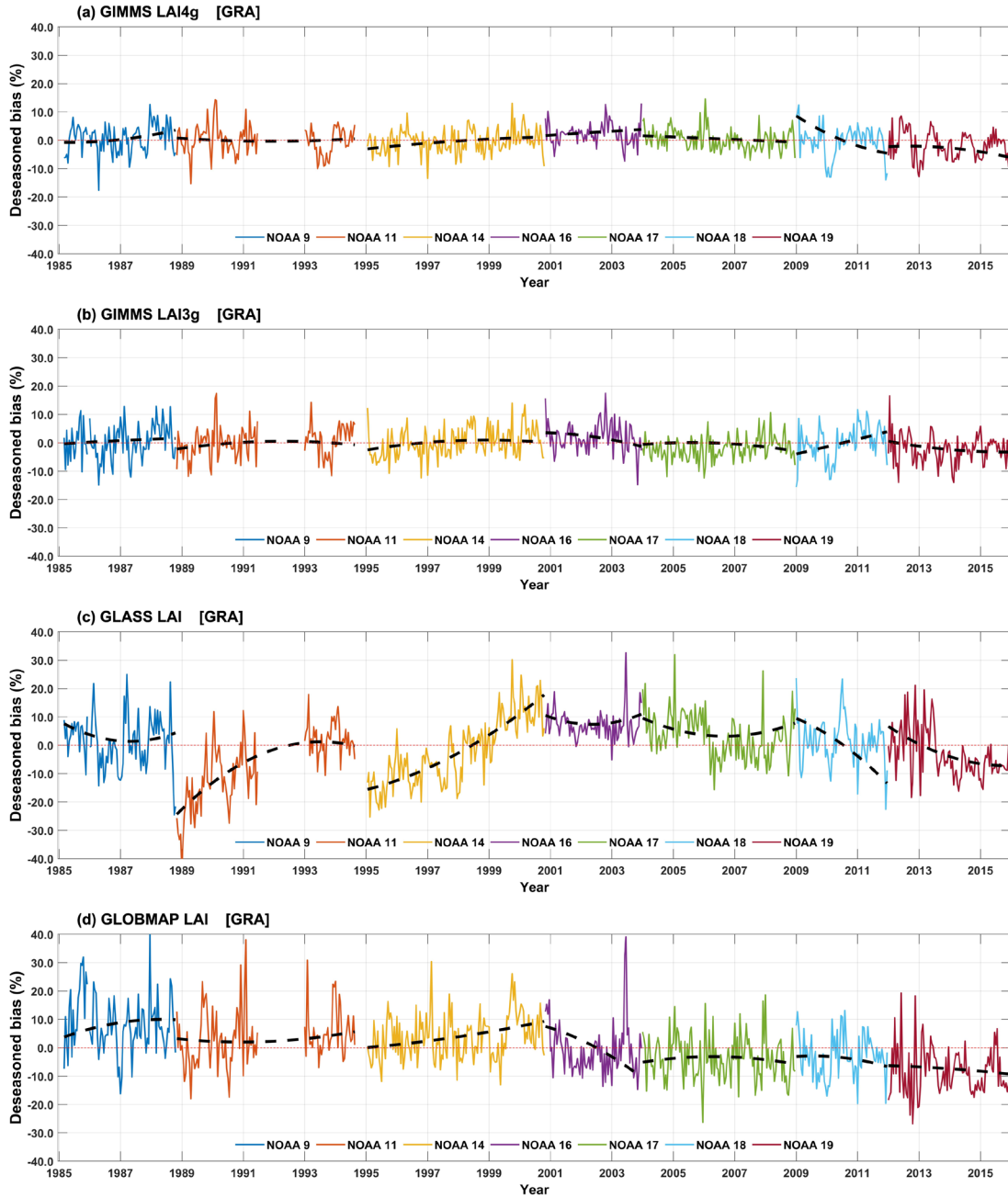


**Figure S8.** Temporal variations of LAI bias% in **CRO** for (a) the GIMMS LAI4g, (b) GIMMS LAI3g, (c) GLASS LAI, and (d) GLOBMAP LAI. The black dash line represents the interannual trend extracted by the EEMD method. Values from different NOAA satellite missions were distinguished with colors.

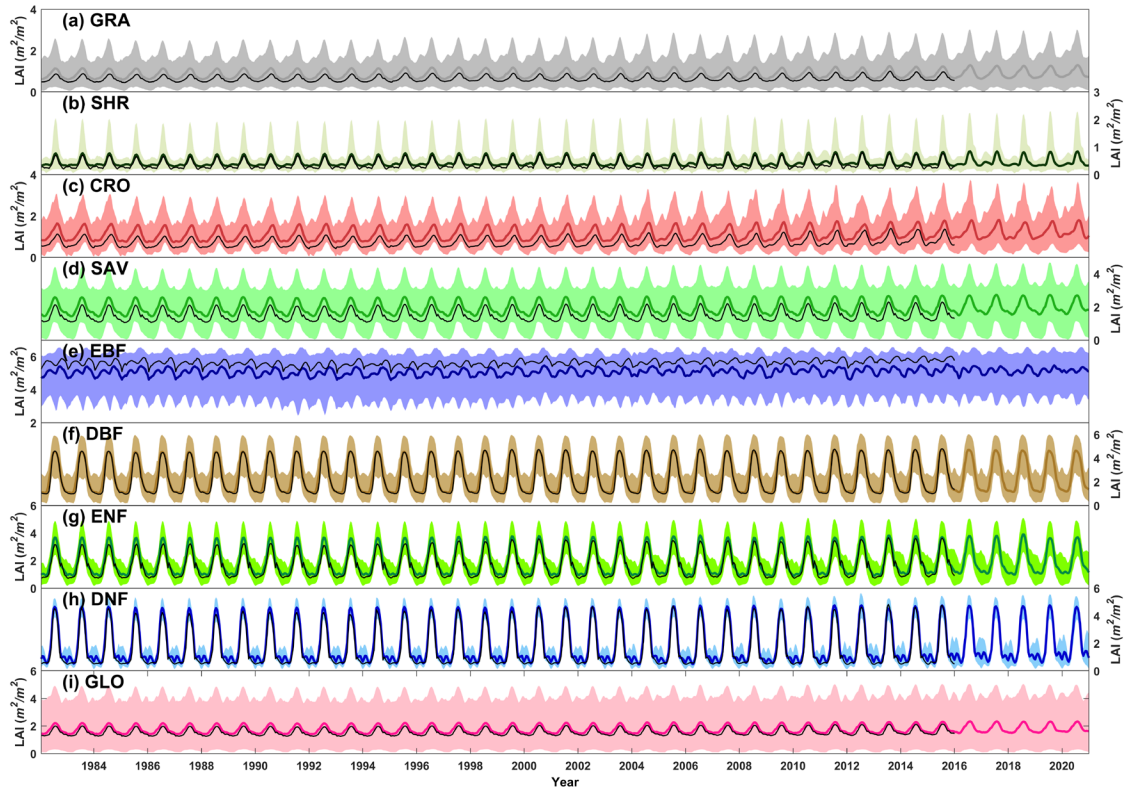




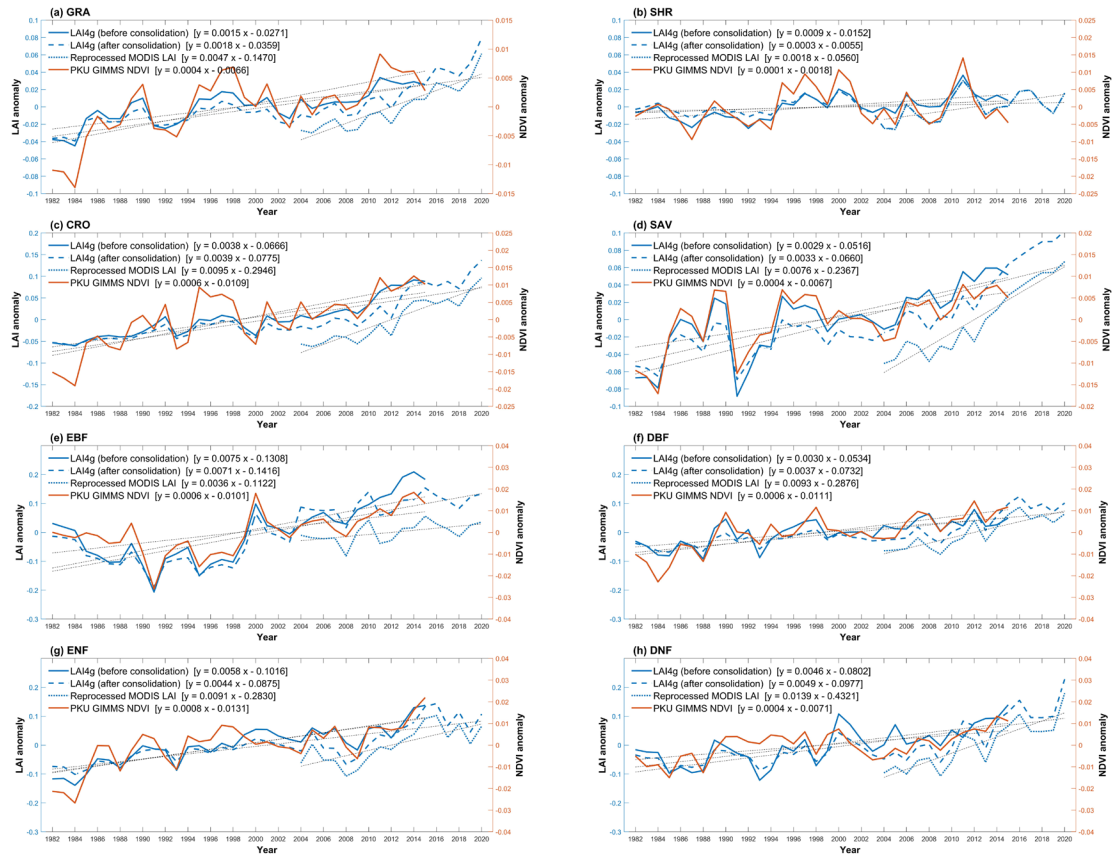
**Figure S9.** Temporal variations of LAI bias% in **SHR** for (a) the GIMMS LAI4g, (b) GIMMS LAI3g, (c) GLASS LAI, and (d) GLOBMAP LAI. The black dash line represents the interannual trend extracted by the EEMD method. Values from different NOAA satellite missions were distinguished with colors.



**Figure S10.** Temporal variations of LAI bias% in GRA for (a) the GIMMS LAI4g, (b) GIMMS LAI3g, (c) GLASS LAI, and (d) GLOBMAP LAI. The black dash line represents the interannual trend extracted by the EEMD method. Values from different NOAA satellite missions were distinguished with colors.



**Figure S11.** Temporal variations of the GIMMS LAI4g for different vegetation biome types during 1982–2020. GLO represents the global vegetation biome. The bold colored line represents the LAI average of GIMMSLAI4g after data consolidation, with shadow covering the value range between 10% and 90% quantiles. The thin black line represents the LAI average of GIMMSLAI4g before consolidation. It should be noted that the GIMMS LAI4g after consolidation shared the same footprint with the Reprocessed MODIS LAI after the year 2004.



**Figure S12.** Annual anomalies and trends of GIMMS LAI4g before consolidation (1982–2015), GIMMS LAI4g after consolidation (1982–2020), Reprocessed MODIS LAI (2004–2020), and PKU GIMMS NDVI (1982–2015) for different vegetation biome types.

**Table S1.** Information of field LAI measurements used for validation. A total of 113 measurements from 49 distinct sites were available. In the “Source” column, B stands for BELMANIP V2.1, D for DIRECT V2.1, O for ORNL, and B &D indicates that the measurements can be found both in BELMANIP V2.1 and DIRECT V2.1.

Site_name	Biome	Latitude	Longitude	Source	Year	Month	Day	LAI
<b>Camerons</b>	EBF	-32.60	116.25	B	2004	3	3	2.084
<b>AGRO</b>	Crops	40.01	-88.29	B & D	2000	7	4	2.56
<b>AGRO</b>	Crops	40.01	-88.29	B & D	2000	8	11	3.543
<b>KONZ</b>	Herb.	39.09	-96.57	B & D	2000	6	7	2.175
<b>KONZ</b>	Herb.	39.09	-96.57	B & D	2001	8	16	2.907
<b>SEVI</b>	Shrubs	34.35	-106.69	B & D	2002	9	9	0.402
<b>SEVI</b>	Shrubs	34.35	-106.69	B & D	2002	11	15	0.323
<b>SEVI</b>	Shrubs	34.35	-106.69	B & D	2003	6	23	0.061
<b>SEVI</b>	Shrubs	34.35	-106.69	B & D	2003	7	28	0.047
<b>SEVI</b>	Shrubs	34.35	-106.69	B & D	2003	9	15	0.05
<b>SEVI</b>	Shrubs	34.35	-106.69	B & D	2003	11	21	0.103
<b>Larose2</b>	Mixed F.	45.38	-75.17	B & D	2003	8	15	2.868
<b>Barrax</b>	Crops	39.07	-2.10	B & D	2005	7	13	0.37
<b>Barrax</b>	Crops	39.07	-2.10	B & D	2009	6	22	0.968
<b>Barrax</b>	Crops	39.07	-2.10	B & D	2010	6	16	0.5
<b>Counami</b>	EBF	5.35	-53.24	B & D	2001	9	26	4.929
<b>Counami</b>	EBF	5.34	-53.24	B & D	2002	10	13	4.373
<b>Fundulea</b>	Crops	44.41	26.58	B & D	2001	5	8	3.04
<b>Fundulea</b>	Crops	44.41	26.58	B & D	2002	5	24	1.476
<b>Gnangara</b>	EBF	-31.53	115.88	B & D	2004	3	1	1.007
<b>Larose</b>	Mixed F.	45.38	-75.22	B & D	2003	8	7	5.858
<b>Nezer</b>	NLF	44.57	-1.04	B & D	2002	4	17	2.547
<b>Plan_De_Dieu</b>	Crops	44.20	4.95	B & D	2004	7	7	1.133
<b>Turco</b>	Shrubs	-18.24	-68.18	B & D	2001	7	27	0.03
<b>Wankama</b>	Herb.	13.65	2.64	B & D	2005	6	23	0.014
<b>Zhang_Bei</b>	Herb.	41.28	114.69	B & D	2002	8	9	1.263
<b>Pandamatenga</b>	DBF	-18.65	25.50	B & D	2000	3	4	1.579
<b>Maun</b>	Shrubs	-19.92	23.59	B & D	2000	3	8	1.24
<b>Mongu</b>	Shrubs	-15.44	23.25	B & D	1999	8	18	0.67
<b>Mongu</b>	Shrubs	-15.44	23.25	B & D	2000	2	29	2.34
<b>Mongu</b>	Shrubs	-15.44	23.25	B & D	2000	4	19	2.25
<b>Mongu</b>	Shrubs	-15.44	23.25	B & D	2000	5	17	1.84
<b>Mongu</b>	Shrubs	-15.44	23.25	B & D	2000	6	14	1.54
<b>Mongu</b>	Shrubs	-15.44	23.25	B & D	2000	9	1	1.12
<b>Mongu</b>	Shrubs	-15.44	23.25	B & D	2000	9	27	1.142
<b>Mongu</b>	Shrubs	-15.44	23.25	B & D	2000	10	17	1.22
<b>Mongu</b>	Shrubs	-15.44	23.25	B & D	2000	11	6	1.38
<b>Mongu</b>	Shrubs	-15.44	23.25	B & D	2000	11	20	1.66
<b>Mongu</b>	Shrubs	-15.44	23.25	B & D	2000	12	19	1.95

<b>Harth Forest</b>	DBF	47.81	7.45	B & D	2013	9	4	3.795
<b>SouthWest_1</b>	Crops	43.55	1.09	B & D	2013	7	10	1.01
<b>SouthWest_1</b>	Crops	43.55	1.09	B & D	2013	7	26	1.19
<b>SouthWest_1</b>	Crops	43.55	1.09	B & D	2013	8	18	1.7
<b>25de</b>								
<b>Mayo_Alfalfa</b>	Crops	-37.91	-67.75	B & D	2014	2	9	1.3
<b>Barrax-</b>								
<b>LasTias</b>	Crops	39.05	-2.10	B & D	2015	5	27	1.01
<b>SanFernando</b>	Crops	-34.72	-71.00	B & D	2015	1	19	1.96
<b>Honghe_B</b>	Rice	47.66	133.53	D	2012	6	19	0.578
<b>Honghe_B</b>	Rice	47.66	133.53	D	2012	6	24	1.720
<b>Honghe_B</b>	Rice	47.66	133.53	D	2012	6	29	2.888
<b>Honghe_B</b>	Rice	47.66	133.53	D	2012	7	25	5.183
<b>Honghe_B</b>	Rice	47.66	133.53	D	2012	8	13	3.293
<b>Honghe_B</b>	Rice	47.66	133.53	D	2012	8	30	3.405
<b>Honghe_B</b>	Rice	47.66	133.53	D	2012	9	16	2.929
<b>Honghe_B</b>	Rice	47.66	133.53	D	2013	8	27	4.672
<b>Honghe_C</b>	Rice	47.65	133.52	D	2012	6	19	0.615
<b>Honghe_C</b>	Rice	47.65	133.52	D	2012	6	24	1.778
<b>Honghe_C</b>	Rice	47.65	133.52	D	2012	6	29	2.850
<b>Honghe_C</b>	Rice	47.65	133.52	D	2012	7	25	5.110
<b>Honghe_C</b>	Rice	47.65	133.52	D	2012	8	13	3.100
<b>Honghe_C</b>	Rice	47.65	133.52	D	2012	8	30	3.395
<b>Honghe_C</b>	Rice	47.65	133.52	D	2012	9	16	3.037
<b>Honghe_C</b>	Rice	47.65	133.52	D	2013	8	27	4.636
<b>Honghe_D</b>	Rice	47.64	133.52	D	2012	6	19	0.675
<b>Honghe_D</b>	Rice	47.64	133.52	D	2012	6	24	1.883
<b>Honghe_D</b>	Rice	47.64	133.52	D	2012	6	29	3.064
<b>Honghe_D</b>	Rice	47.64	133.52	D	2012	7	25	5.094
<b>Honghe_D</b>	Rice	47.64	133.52	D	2012	8	13	3.103
<b>Honghe_D</b>	Rice	47.64	133.52	D	2012	8	30	3.430
<b>Honghe_D</b>	Rice	47.64	133.52	D	2012	9	16	3.141
<b>Honghe_D</b>	Rice	47.64	133.52	D	2013	8	27	4.627
<b>Honghe_E</b>	Rice	47.64	133.53	D	2012	6	19	0.672
<b>Honghe_E</b>	Rice	47.64	133.53	D	2012	6	24	1.864
<b>Honghe_E</b>	Rice	47.64	133.53	D	2012	6	29	2.723
<b>Honghe_E</b>	Rice	47.64	133.53	D	2012	7	25	5.036
<b>Honghe_E</b>	Rice	47.64	133.53	D	2012	8	13	2.842
<b>Honghe_E</b>	Rice	47.64	133.53	D	2012	8	30	3.334
<b>Honghe_E</b>	Rice	47.64	133.53	D	2012	9	16	2.796
<b>Honghe_E</b>	Rice	47.64	133.53	D	2013	8	27	4.484
<b>HLJ_barley_1</b>	Crops	46.80	131.81	D	2007	6	14	1.135
<b>HLJ_barley_2</b>	Crops	46.80	131.90	D	2007	6	14	1.338
<b>HLJ_barley_3</b>	Crops	46.79	131.89	D	2005	5	23	0.763
<b>HLJ_barley_3</b>	Crops	46.79	131.89	D	2006	6	2	0.702

<b>HLJ_barley_3</b>	Crops	46.79	131.89	D	2007	6	14	1.202
<b>HLJ_barley_4</b>	Crops	46.79	131.98	D	2005	5	23	0.466
<b>HLJ_barley_4</b>	Crops	46.79	131.98	D	2006	6	2	0.812
<b>HLJ_barley_8</b>	Crops	46.74	131.76	D	2006	6	2	0.812
<b>HLJ_barley_13</b>	Crops	46.71	131.72	D	2006	6	2	0.654
<b>HLJ_barley_14</b>	Crops	46.75	131.84	D	2005	5	23	0.375
<b>HLJ_barley_16</b>	Crops	46.73	131.90	D	2007	6	14	1.312
<b>HLJ_barley_19</b>	Crops	46.70	131.87	D	2005	5	23	0.293
<b>HLJ_wheat_1</b>	Crops	46.97	131.97	D	2006	6	2	0.521
<b>HLJ_wheat_2</b>	Crops	46.96	131.99	D	2006	6	2	0.569
<b>HLJ_wheat_3</b>	Crops	46.94	131.97	D	2006	6	2	0.565
<b>HLJ_wheat_6</b>	Crops	46.90	131.98	D	2006	6	2	0.483
<b>HLJ_wheat_8</b>	Crops	46.79	131.91	D	2005	5	23	0.709
<b>HLJ_wheat_14</b>	Crops	46.76	131.74	D	2005	5	23	0.505
<b>HLJ_wheat_15</b>	Crops	46.76	131.85	D	2005	5	23	0.438
<b>HLJ_wheat_16</b>	Crops	46.74	131.71	D	2005	5	23	0.492
<b>Jadraas, plot C15</b>	Forest / BoENL	60.82	16.50	O	1990	8	\	1.32
<b>N/A</b>	Forest / BoDBL	56.42	-98.07	O	1994	7	\	2.2
<b>BOREAS NSA, Thompson</b>	Forest / BoENL	55.92	-97.69	O	1994	7	\	0.95
<b>BOREAS NSA, Thompson</b>	Forest / BoENL	55.89	-99.03	O	1994	7	\	1.24
<b>Tienhoven</b>	Grassland	52.17	5.08	O	1987	5	6	1.02
<b>Tienhoven</b>	Grassland	52.17	5.08	O	1987	7	23	2.69
<b>Tienhoven</b>	Grassland	52.17	5.08	O	1987	6	11	2.06
<b>Kioloa State Forest, NSW</b>	Forest / TeEBL	-35.35	150.18	O	1988	2	25	3.46
<b>Kioloa State Forest, NSW</b>	Forest / TeEBL	-35.35	150.18	O	1986	10	1	3.97
<b>Kioloa State Forest, NSW</b>	Forest / TeEBL	-35.35	150.18	O	1986	2	19	4.95
<b>Kioloa State Forest, NSW</b>	Forest / TeEBL	-35.35	150.18	O	1985	6	24	3.4
<b>Kioloa State Forest, NSW</b>	Forest / TeEBL	-35.35	150.18	O	1985	8	11	3.44
<b>Kioloa State Forest, NSW</b>	Forest / TeEBL	-35.35	150.18	O	1984	7	7	3.94
<b>Kioloa State Forest, NSW</b>	Forest / TeEBL	-35.35	150.18	O	1983	7	13	2.22
<b>Kioloa State Forest, NSW</b>	Forest / TeEBL	-35.35	150.18	O	1982	12	12	3.25