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Supplement of

Spatiotemporally consistent global dataset of the GIMMS leaf area index (GIMMS LAI4g) from 1982 to 2020

Sen Cao et al.

Correspondence to: Zaichun Zhu (zhu.zaichun@pku.edu.cn)

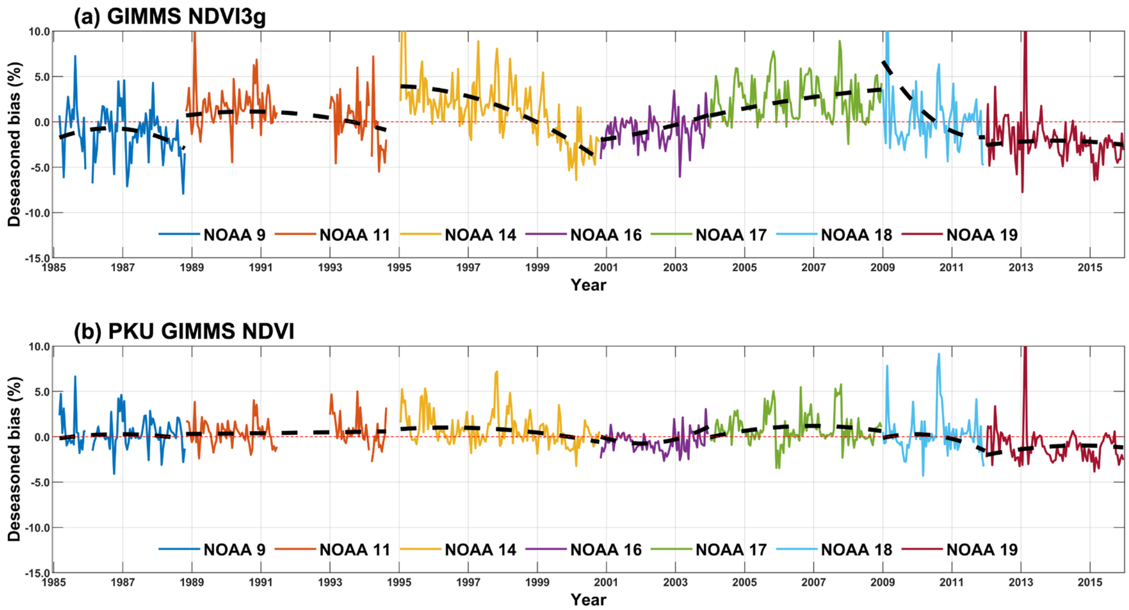

Figure S1. Temporal variations of NDVI bias% in EBF for (a) the GIMMS NDVI3g product and (b) the PKU GIMMS NDVI product. The black dash line represents the interannual trend extracted by the EEMD method. Values from different NOAA satellite missions are distinguished with colors. The figure illustrates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

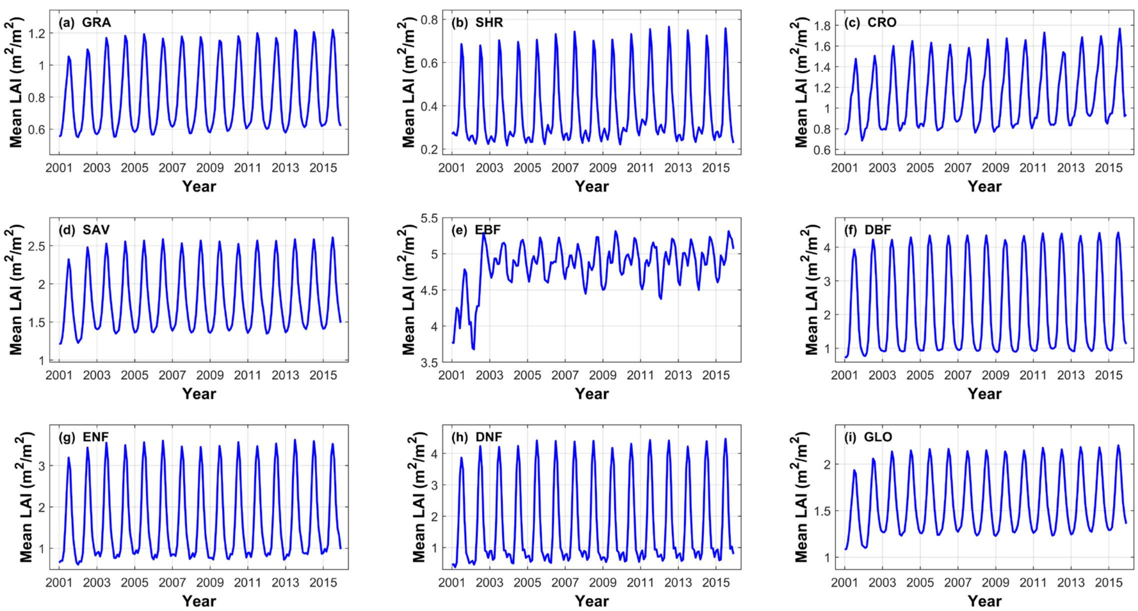

Figure S2. Annual LAI averages from the reprocessed MODIS LAI product (version 6) for different vegetation biome types. The vegetation biome types use the third classification scheme in the MODIS Land-Cover Type product (MCD12Q1, version 6.1) (see section 2.4). GLO represents the global vegetation biome. This figure demonstrates unexpected low LAI values for evergreen broadleaf forests (EBF) between 2000 and 2003.

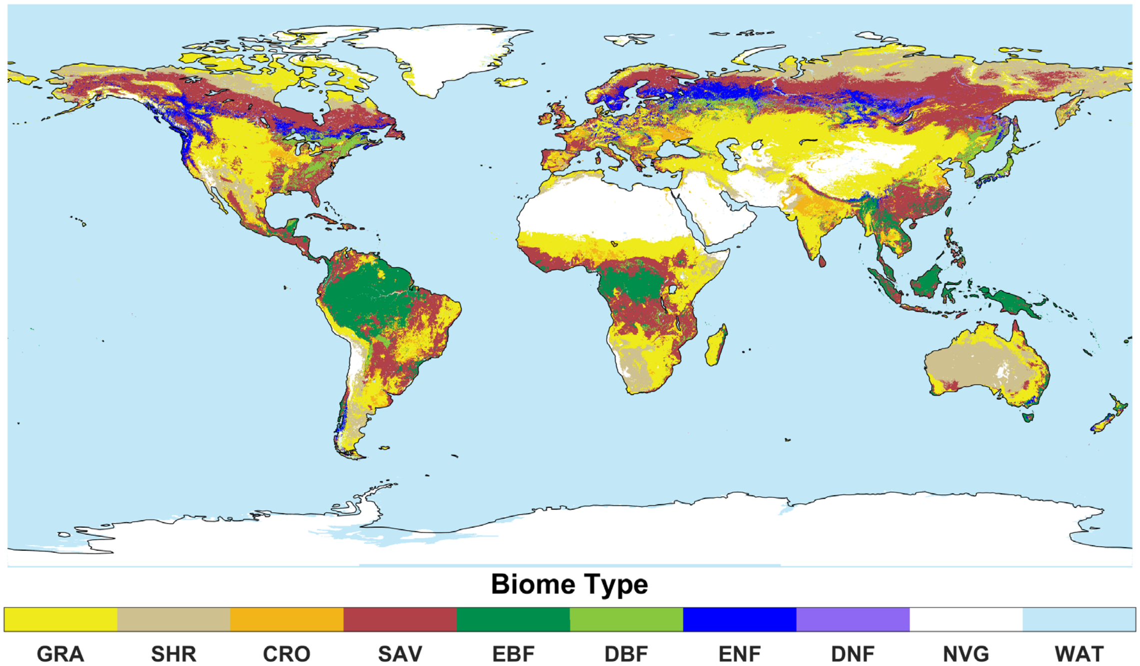

Figure S3. The global land cover map derived from the MODIS Land-Cover Type product (MCD12Q1, version 6.1). The third classification scheme in MCD12Q1 was adopted. Each grid (1/12°) in the map was labeled as the most frequent land cover type between 2001 and 2019.

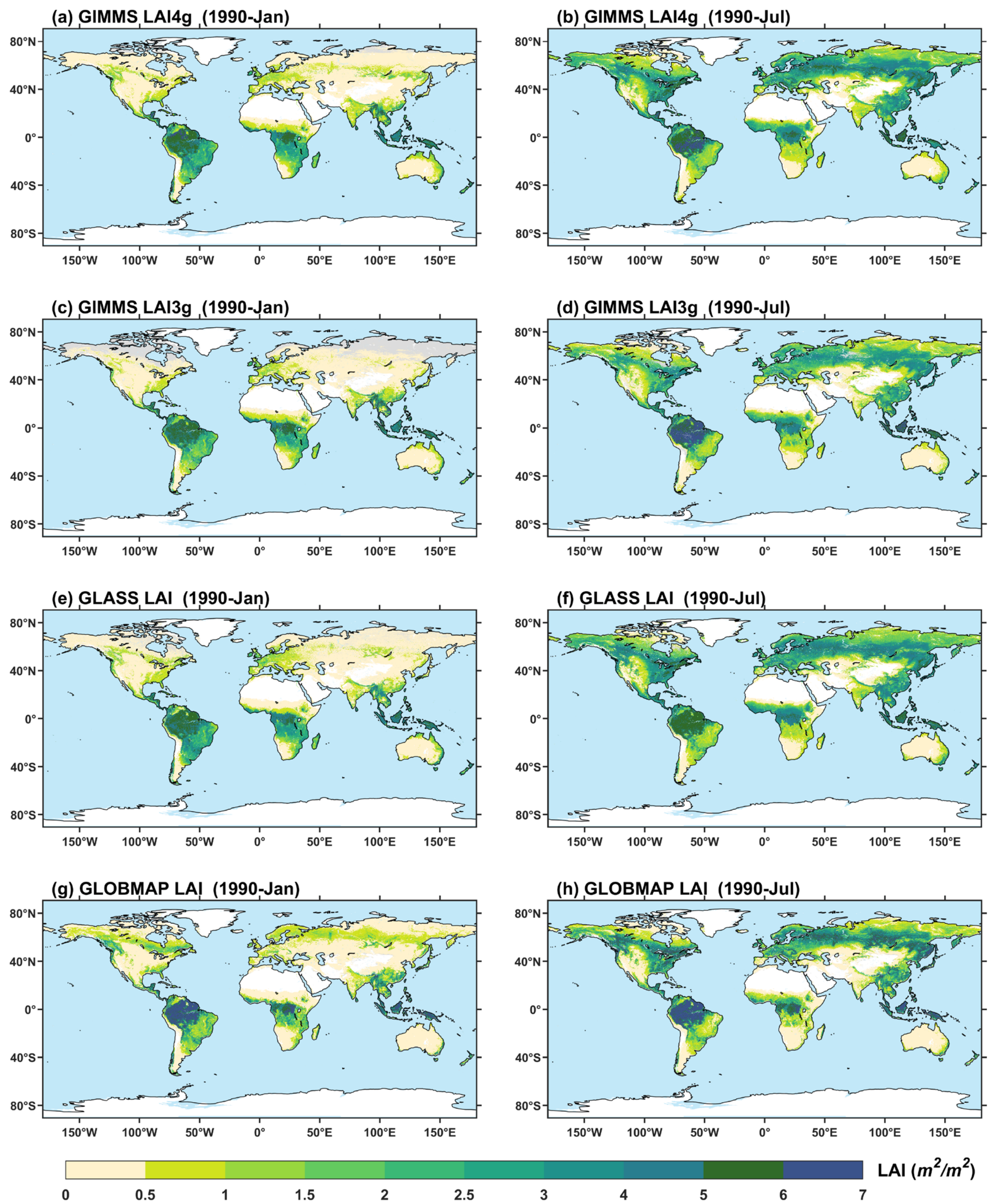

Figure S4. Illustrations of global distribution maps of GIMMS LAI4g after consolidation (a and b), GIMMS LAI3g (c and d), GLASS LAI (e and f), and GLOBMAP LAI (g and h) in January and July of **1990**.

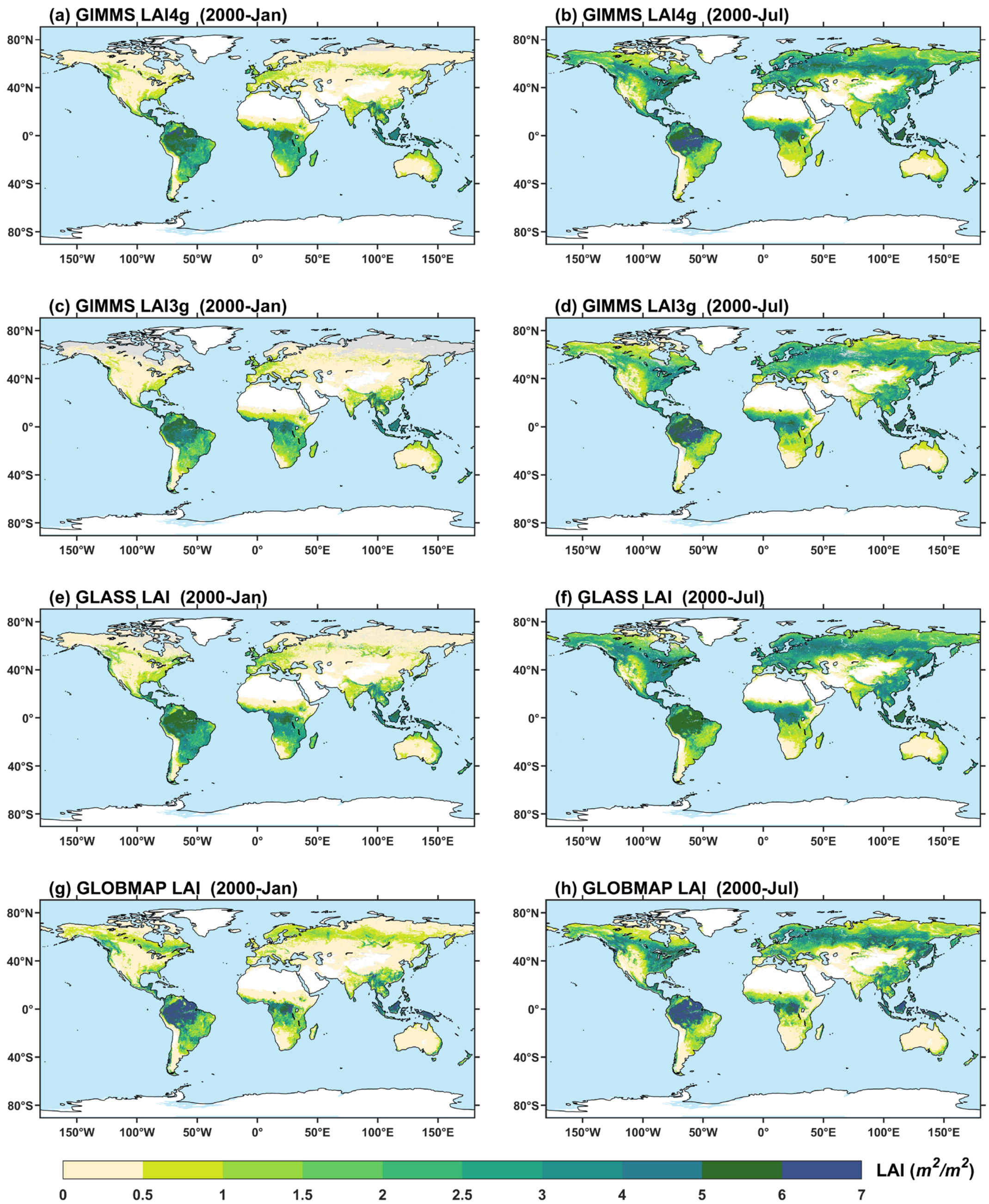

Figure S5. Illustrations of global distribution maps of GIMMS LAI4g after consolidation (a and b), GIMMS LAI3g (c and d), GLASS LAI (e and f), and GLOBMAP LAI (g and h) in January and July of **2000**.

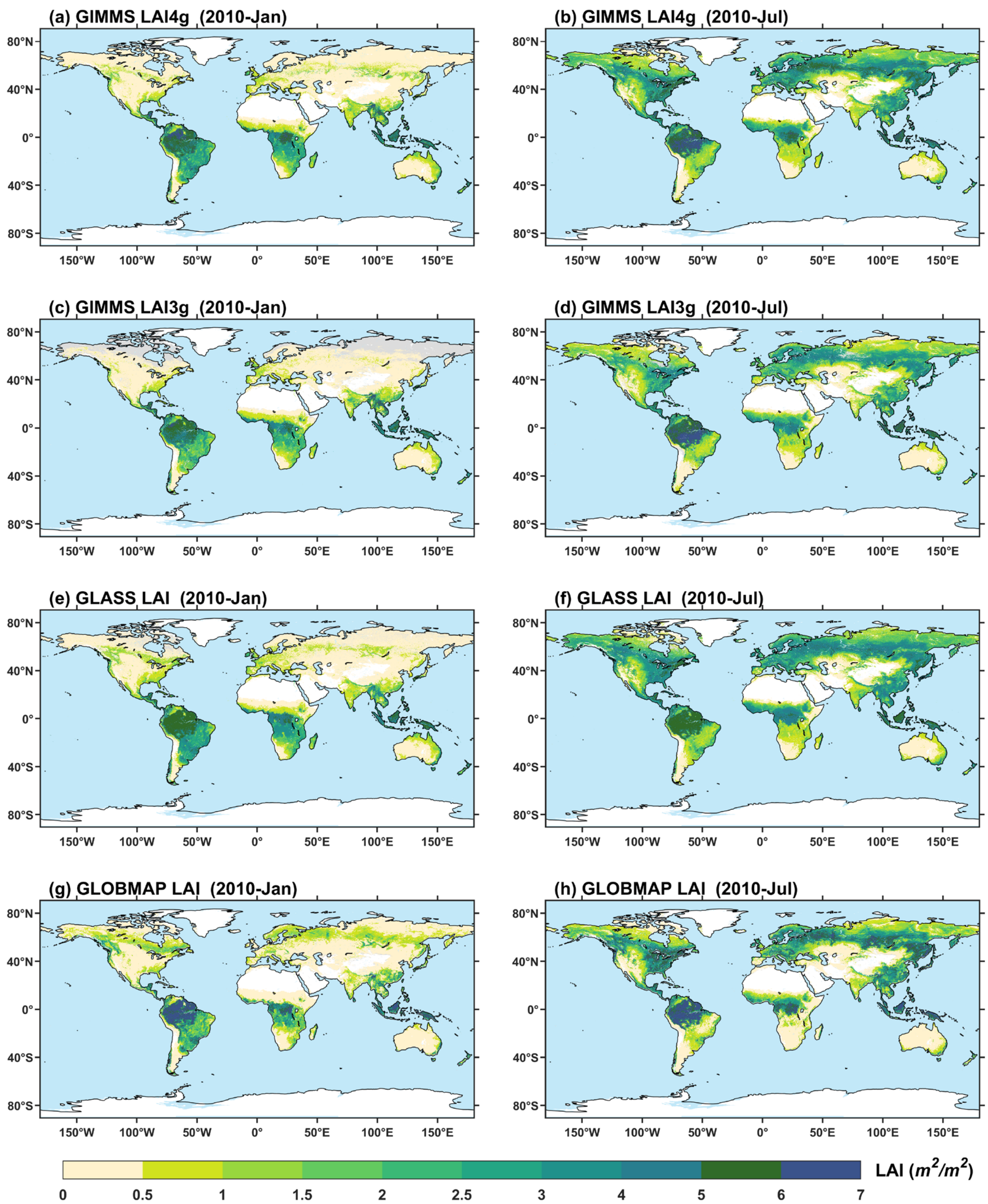

Figure S6. Illustrations of global distribution maps of GIMMS LAI4g after consolidation (a and b), GIMMS LAI3g (c and d), GLASS LAI (e and f), and GLOBMAP LAI (g and h) in January and July of **2010**.

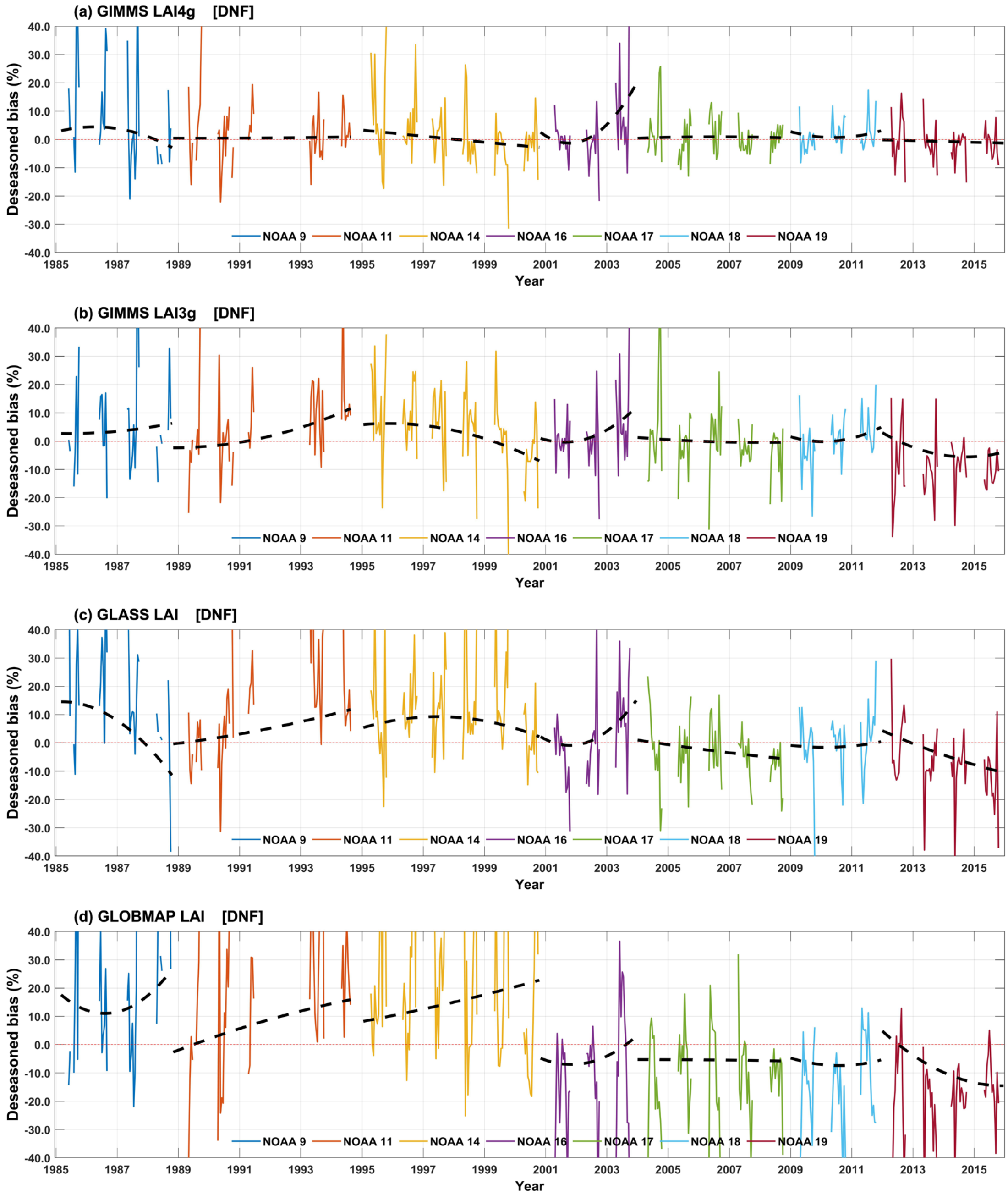

Figure S7. Temporal variations of LAI bias% in **DNF** for (a) the GIMMS LAI4g, (b) GIMMS LAI3g, (c) GLASS LAI, and (d) GLOBMAP LAI. The black dash line represents the interannual trend extracted by the EEMD method. Values from different NOAA satellite missions were distinguished with colors.

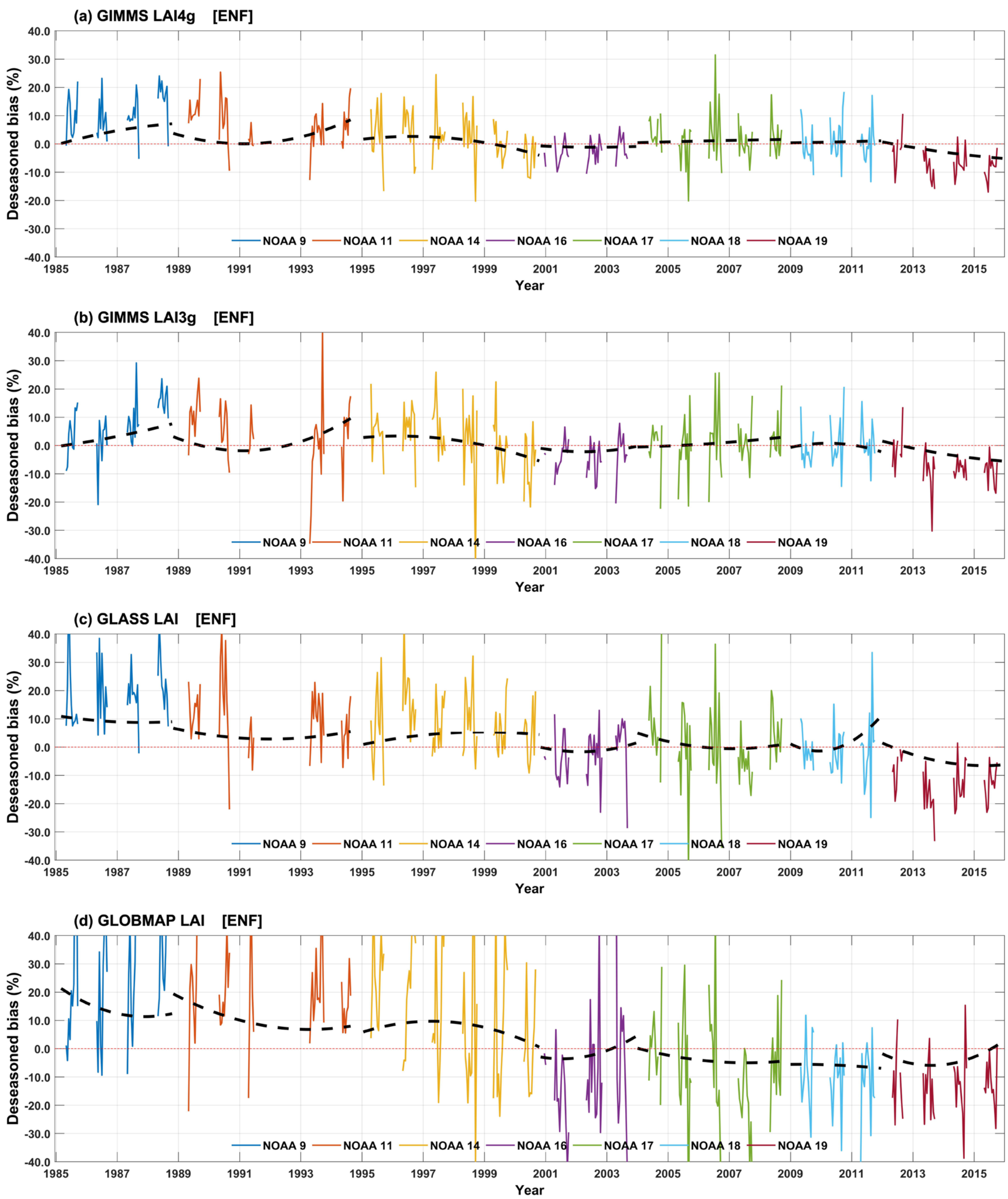

Figure S8. Temporal variations of LAI bias% in **ENF** for (a) the GIMMS LAI4g, (b) GIMMS LAI3g, (c) GLASS LAI, and (d) GLOBMAP LAI. The black dash line represents the interannual trend extracted by the EEMD method. Values from different NOAA satellite missions were distinguished with colors.

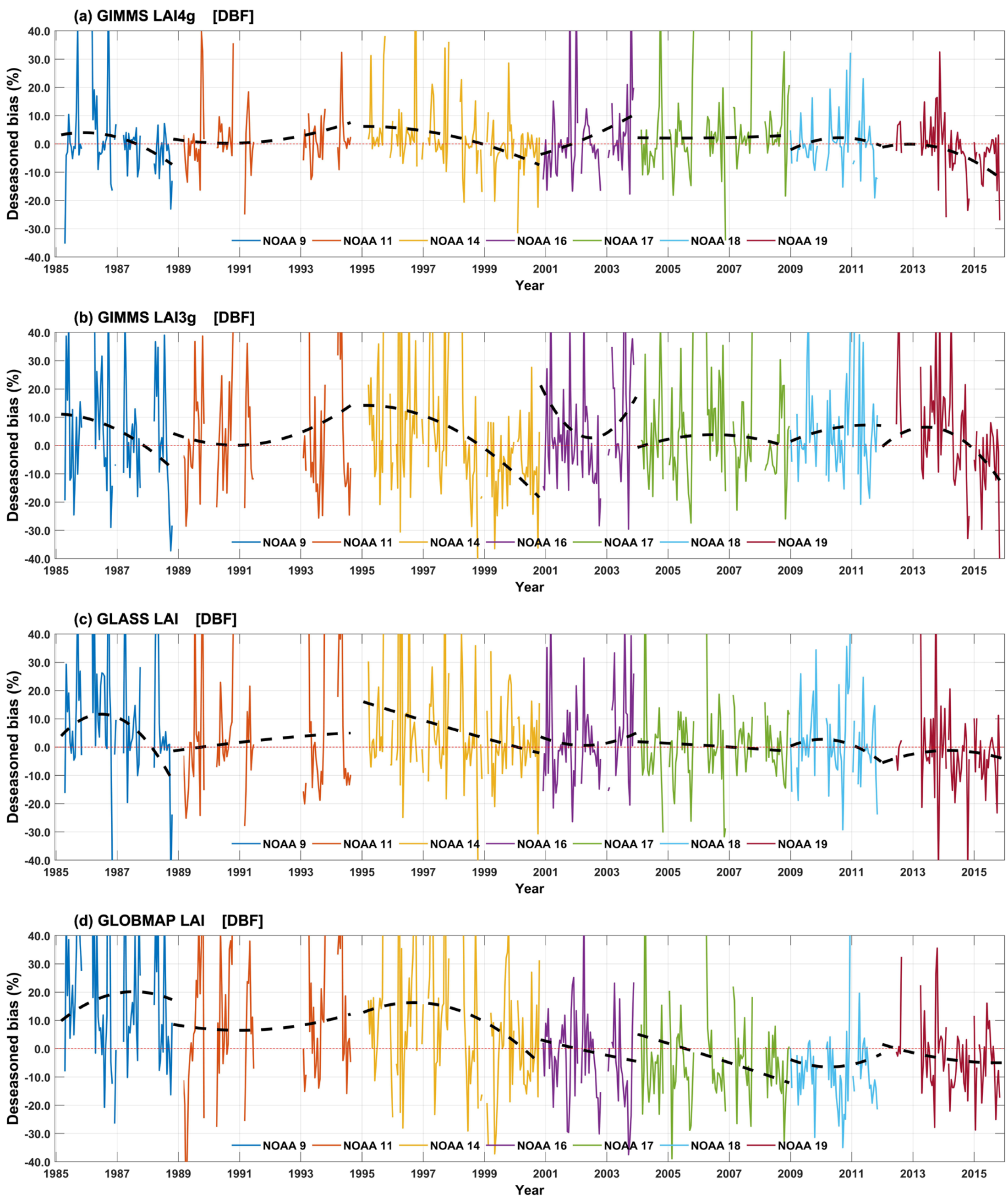

Figure S9. Temporal variations of LAI bias% in **DBF** for (a) the GIMMS LAI4g, (b) GIMMS LAI3g, (c) GLASS LAI, and (d) GLOBMAP LAI. The black dash line represents the interannual trend extracted by the EEMD method. Values from different NOAA satellite missions were distinguished with colors.

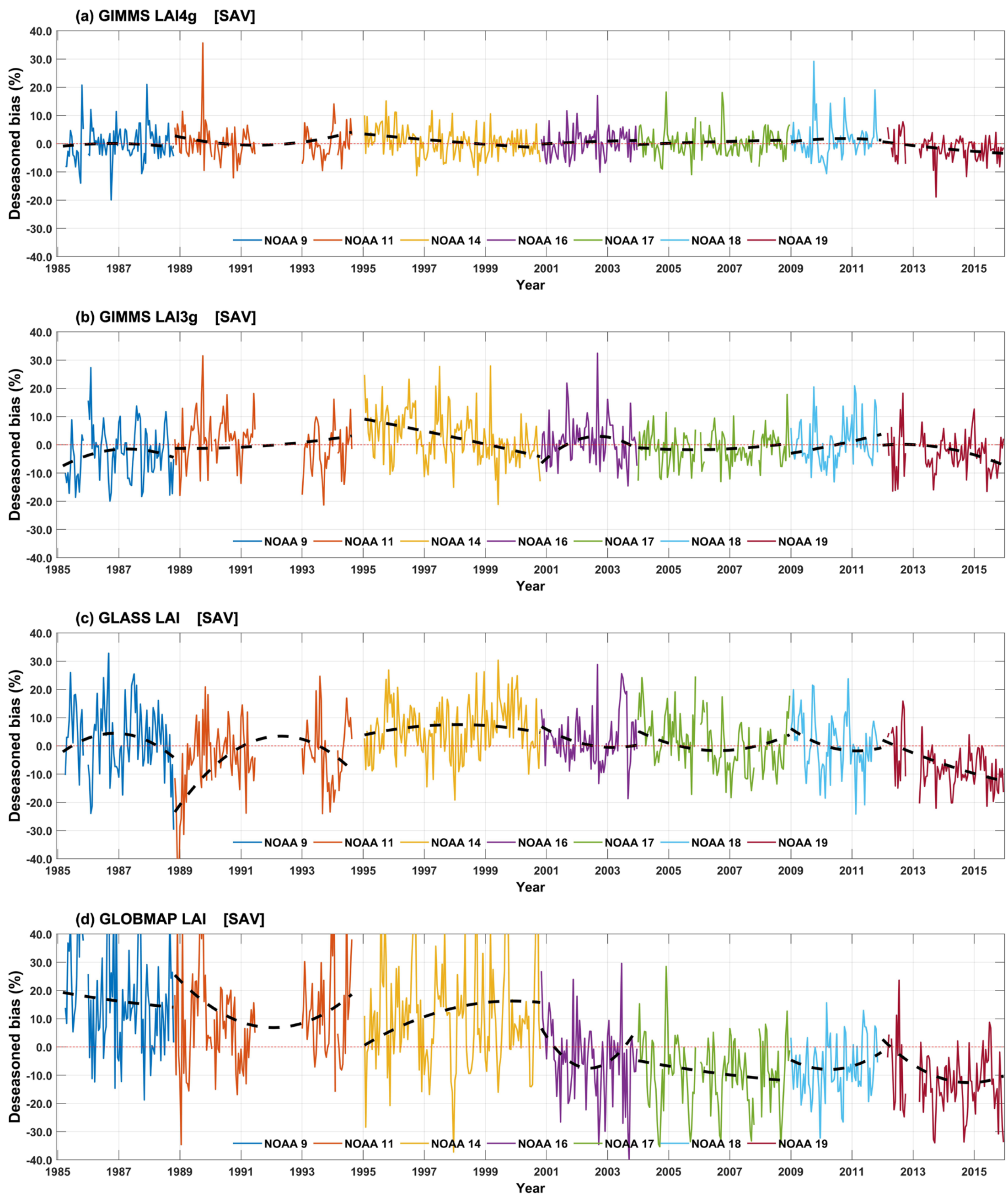

Figure S10. Temporal variations of LAI bias% in **SAV** for (a) the GIMMS LAI4g, (b) GIMMS LAI3g, (c) GLASS LAI, and (d) GLOBMAP LAI. The black dash line represents the interannual trend extracted by the EEMD method. Values from different NOAA satellite missions were distinguished with colors.

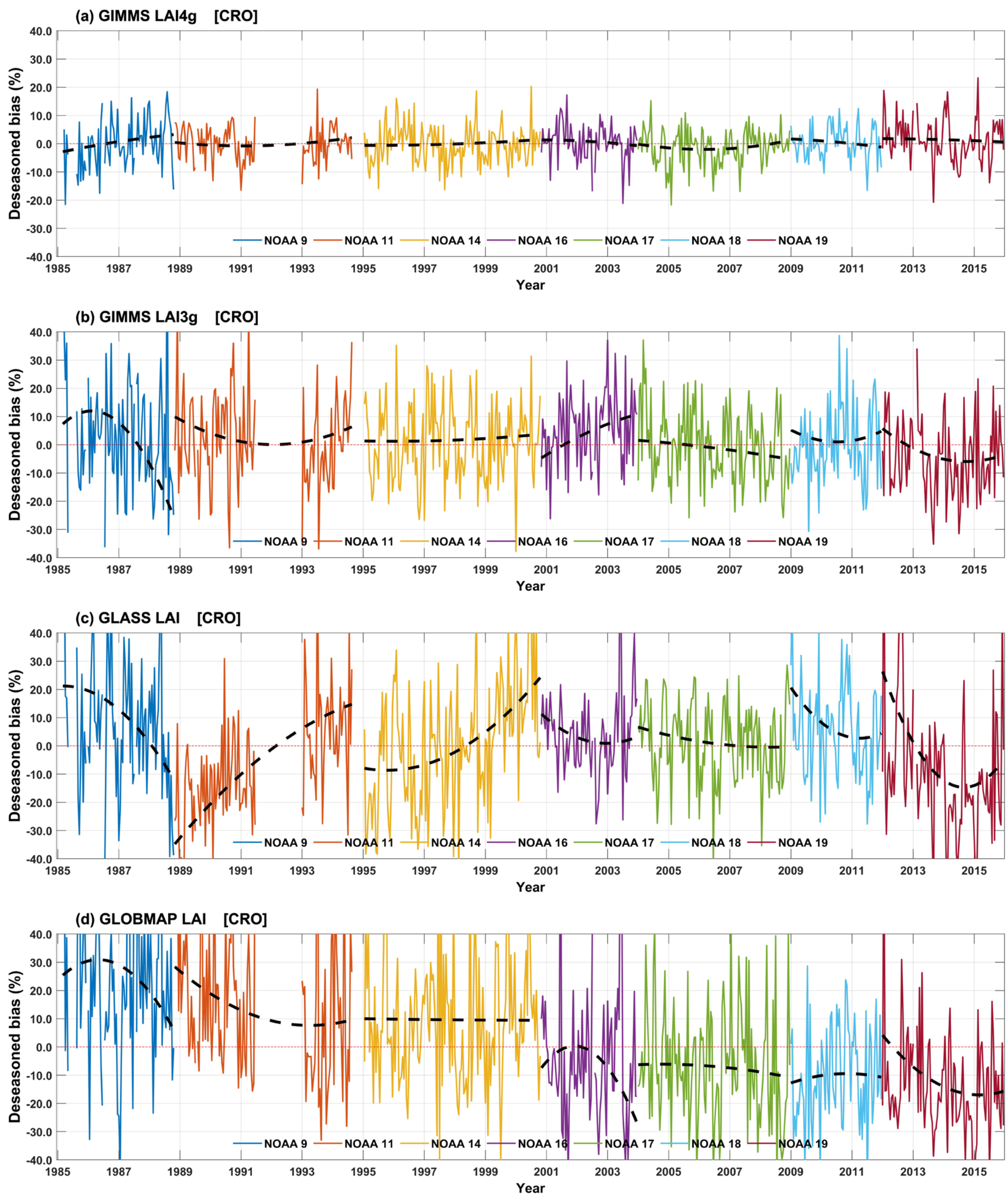

Figure S11. Temporal variations of LAI bias% in **CRO** for (a) the GIMMS LAI4g, (b) GIMMS LAI3g, (c) GLASS LAI, and (d) GLOBMAP LAI. The black dash line represents the interannual trend extracted by the EEMD method. Values from different NOAA satellite missions were distinguished with colors.

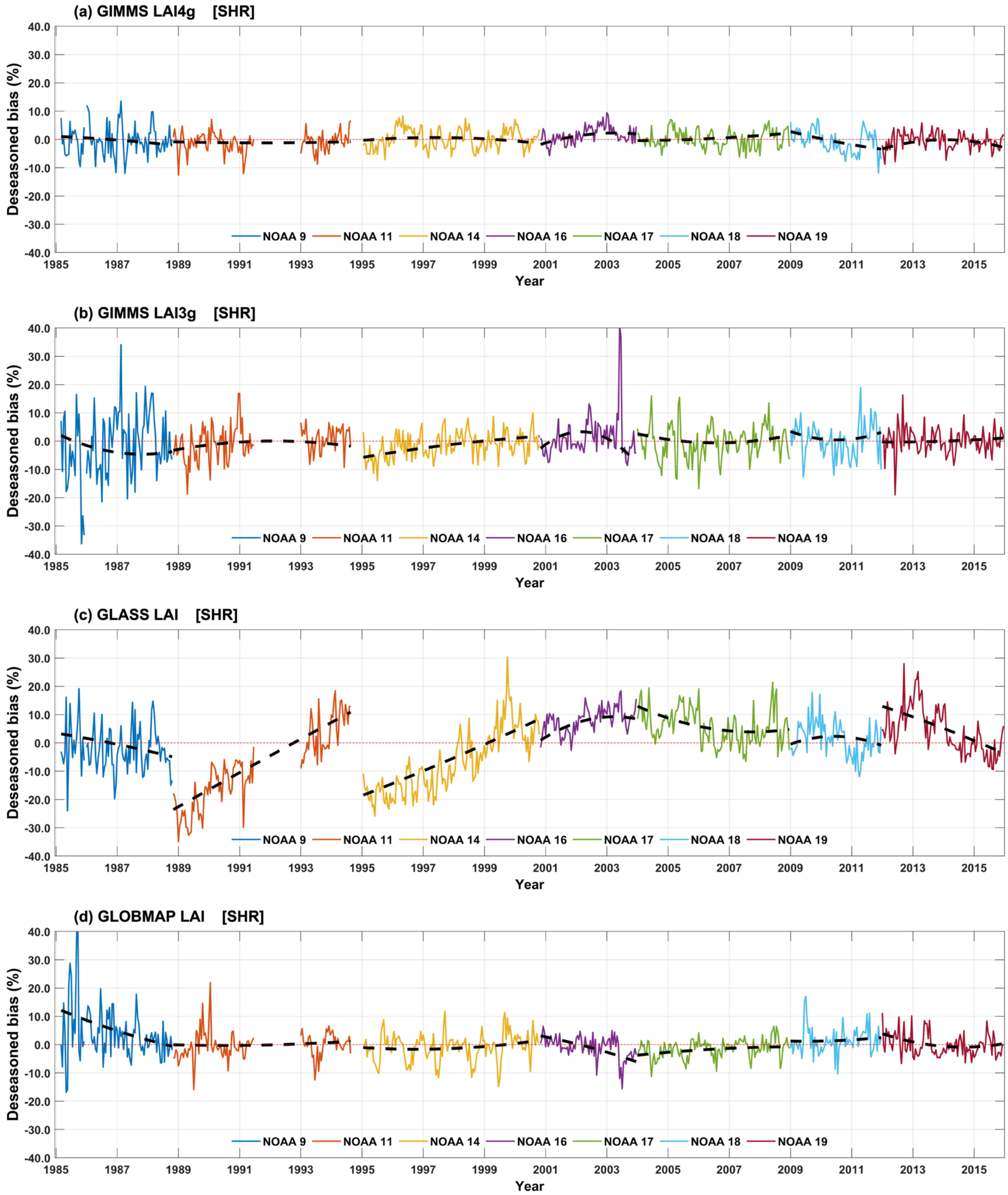

Figure S12. Temporal variations of LAI bias% in **SHR** for (a) the GIMMS LAI4g, (b) GIMMS LAI3g, (c) GLASS LAI, and (d) GLOBMAP LAI. The black dash line represents the interannual trend extracted by the EEMD method. Values from different NOAA satellite missions were distinguished with colors.

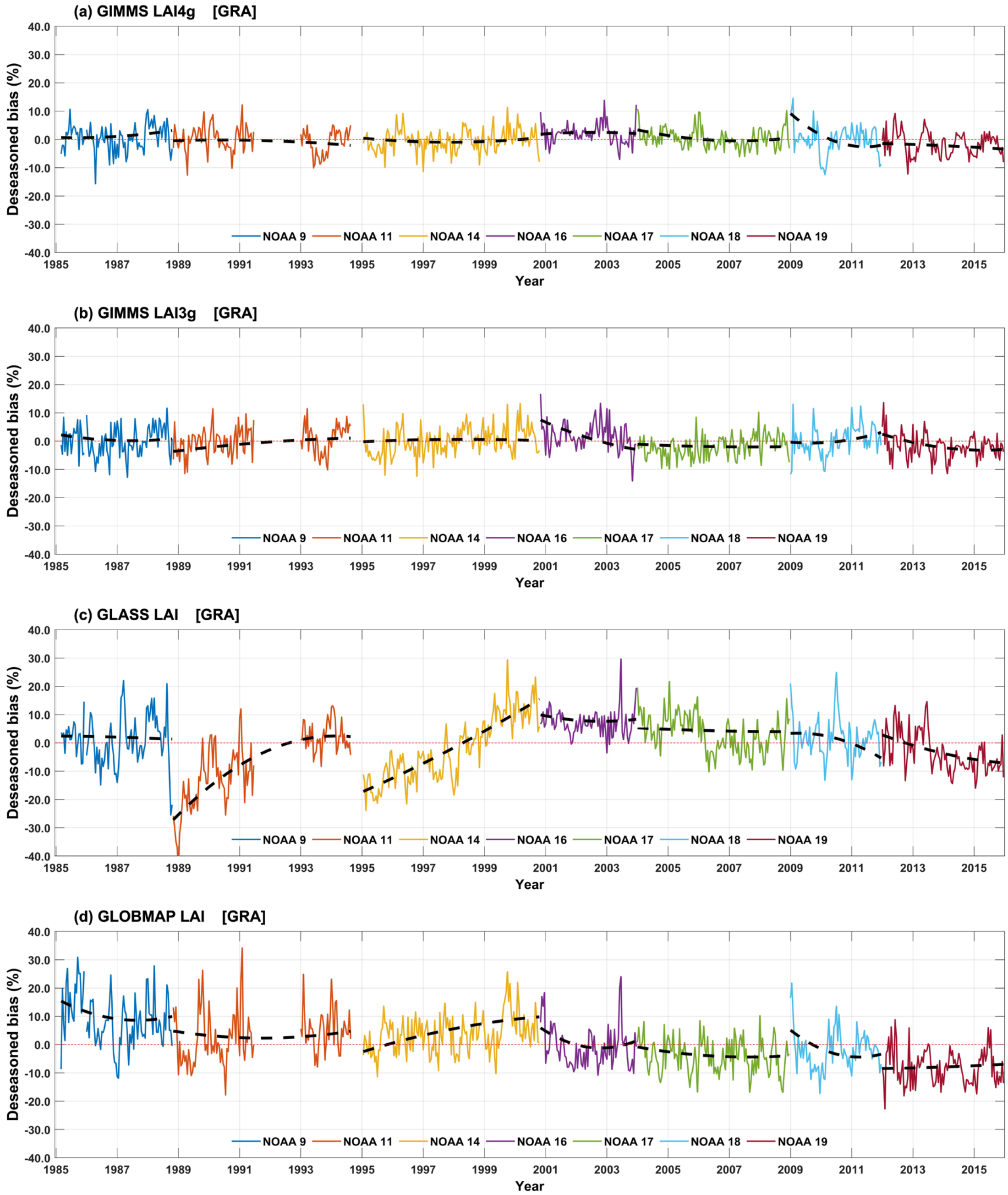

Figure S13. Temporal variations of LAI bias% in **GRA** for (a) the GIMMS LAI4g, (b) GIMMS LAI3g, (c) GLASS LAI, and (d) GLOBMAP LAI. The black dash line represents the interannual trend extracted by the EEMD method. Values from different NOAA satellite missions were distinguished with colors.

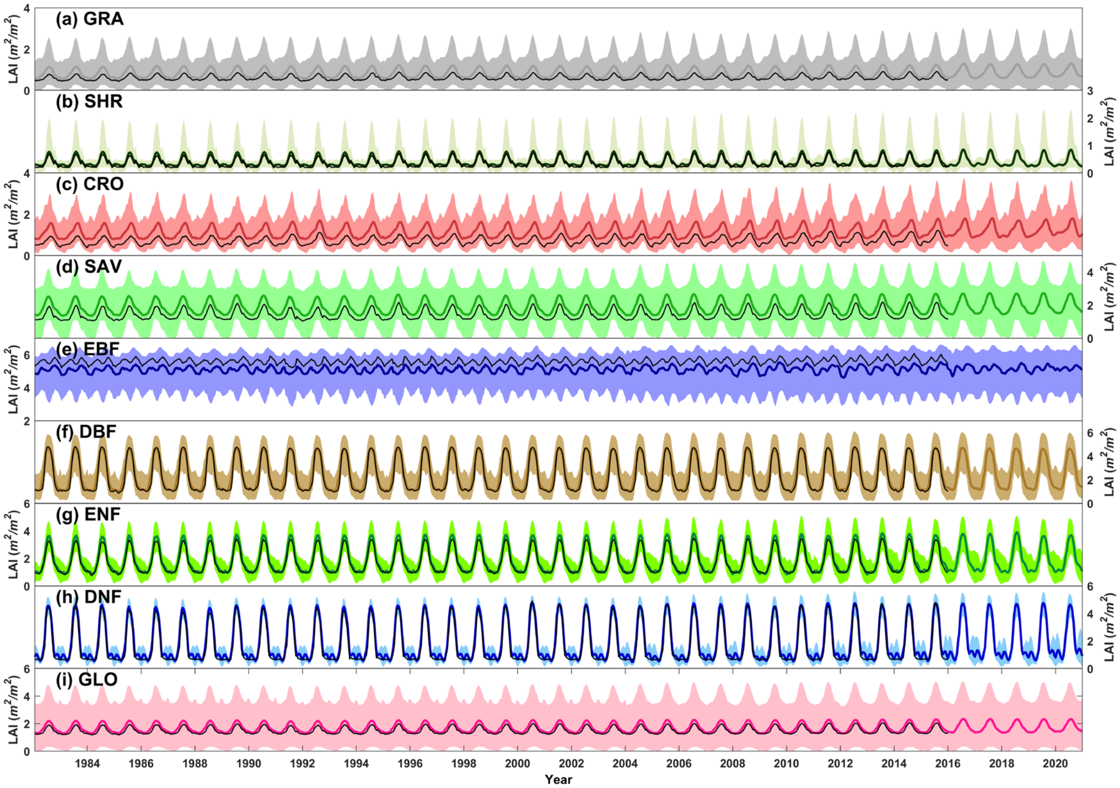

Figure S14. Temporal variations of the GIMMS LAI4g for different vegetation biome types during 1982−2020. GLO represents the global vegetation biome. The bold colored line represents the LAI average of GIMMSLAI4g after data consolidation, with shadow covering the value range between 10% and 90% quantiles. 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.

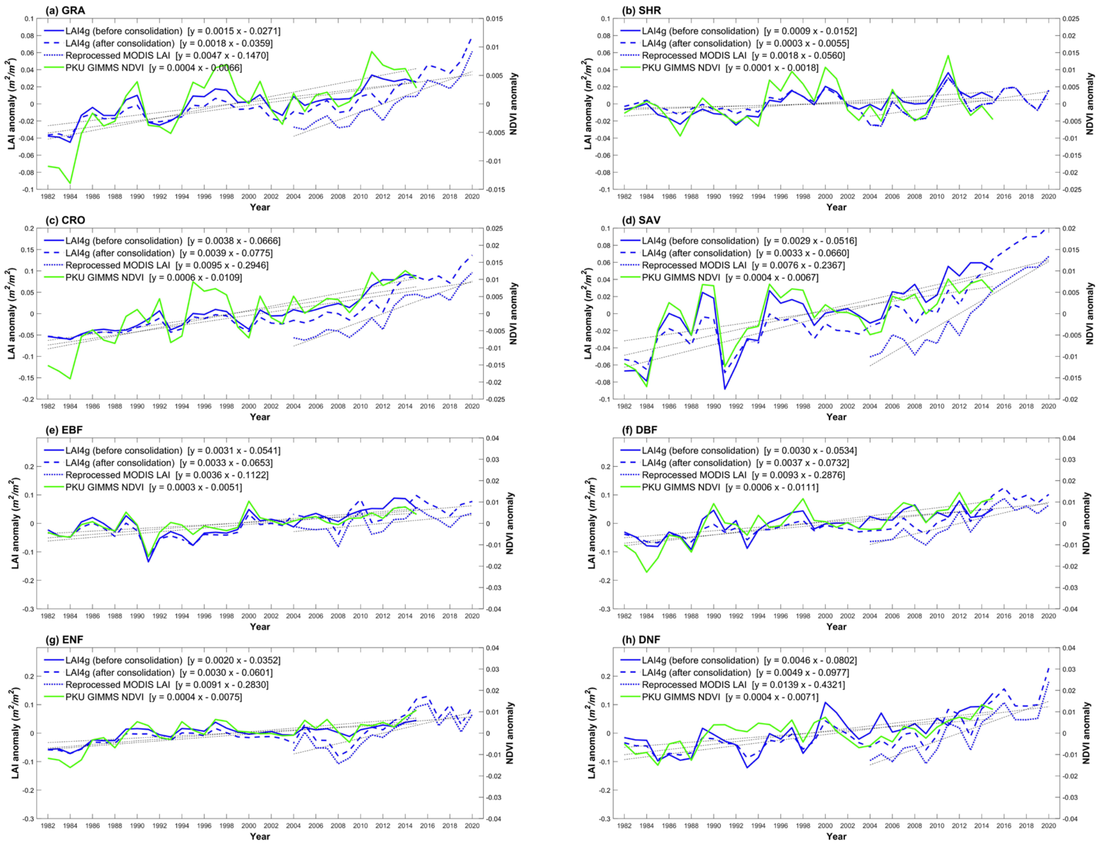

Figure S15. Annual anomalies (m^2m^{-2}) and trends of GIMMS LAI4g before consolidation (1982−2015), GIMMS LAI4g after consolidation (1982−2020), reprocessed MODIS LAI (2004−2020), and PKU GIMMS NDVI (1982−2015) for different vegetation biome types.

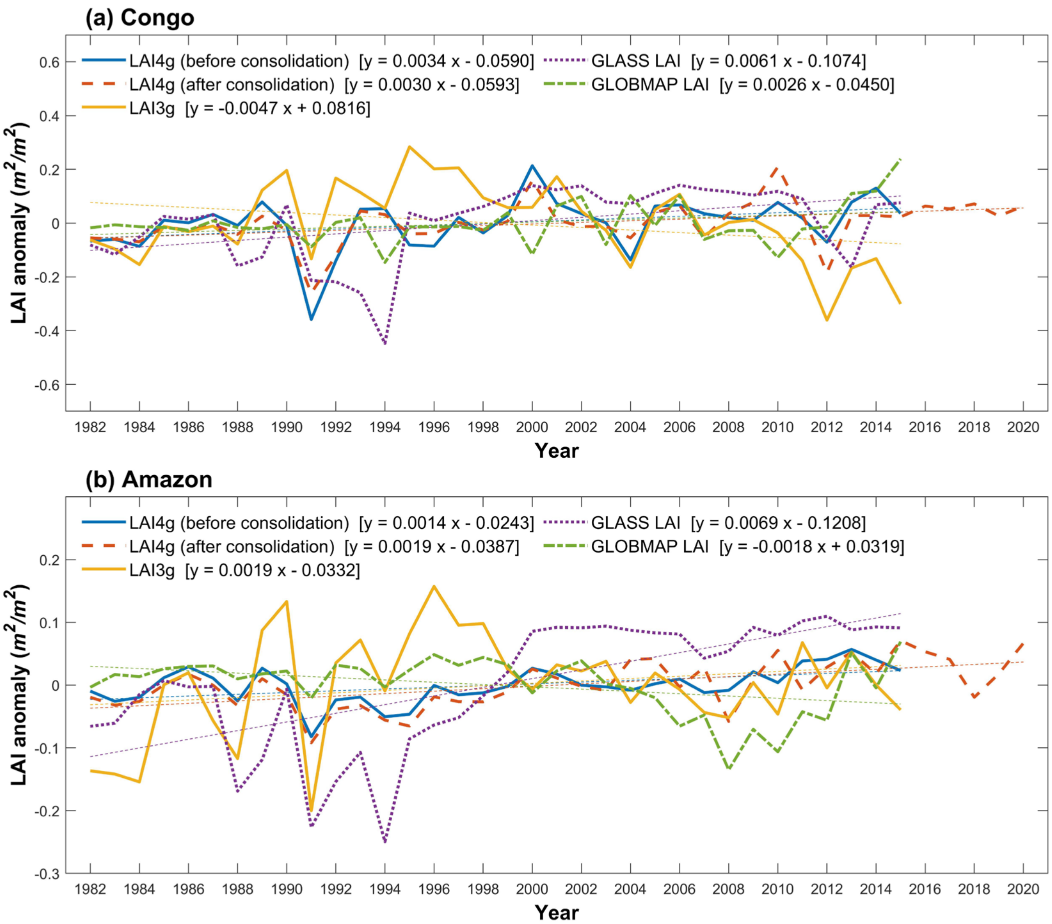

Figure S16. Annual anomalies (m^2m^{-2}) and trends of GIMMS LAI4g before consolidation (1982−2015), GIMMS LAI4g after consolidation (1982−2020), GIMMS LAI3g (1982−2015), GLASS LAI (1982−2015), and GLOBMAP LAI (1982−2015) in the Congo (a) and Amazon (b) forests.

Table S1. Information of field LAI (m^2m^{-2}) 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
Camerons	EBF	-32.60	116.25	B	2004	3	3	2.084
AGRO	Crops	40.01	-88.29	B & D	2000	7	4	2.56
AGRO	Crops	40.01	-88.29	B & D	2000	8	11	3.543
KONZ	Herb.	39.09	-96.57	B & D	2000	6	7	2.175
KONZ	Herb.	39.09	-96.57	B & D	2001	8	16	2.907
SEVI	Shrubs	34.35	-106.69	B & D	2002	9	9	0.402
SEVI	Shrubs	34.35	-106.69	B & D	2002	11	15	0.323
SEVI	Shrubs	34.35	-106.69	B & D	2003	6	23	0.061
SEVI	Shrubs	34.35	-106.69	B & D	2003	7	28	0.047
SEVI	Shrubs	34.35	-106.69	B & D	2003	9	15	0.05
SEVI	Shrubs	34.35	-106.69	B & D	2003	11	21	0.103
Larose2	Mixed F.	45.38	-75.17	B & D	2003	8	15	2.868
Barrax	Crops	39.07	-2.10	B & D	2005	7	13	0.37
Barrax	Crops	39.07	-2.10	B & D	2009	6	22	0.968
Barrax	Crops	39.07	-2.10	B & D	2010	6	16	0.5
Counami	EBF	5.35	-53.24	B & D	2001	9	26	4.929
Counami	EBF	5.34	-53.24	B & D	2002	10	13	4.373
Fundulea	Crops	44.41	26.58	B & D	2001	5	8	3.04
Fundulea	Crops	44.41	26.58	B & D	2002	5	24	1.476
Gnangara	EBF	-31.53	115.88	B & D	2004	3	1	1.007
Larose	Mixed F.	45.38	-75.22	B & D	2003	8	7	5.858
Nezer	NLF	44.57	-1.04	B & D	2002	4	17	2.547
Plan_De_Dieu	Crops	44.20	4.95	B & D	2004	7	7	1.133
Turco	Shrubs	-18.24	-68.18	B & D	2001	7	27	0.03
Wankama	Herb.	13.65	2.64	B & D	2005	6	23	0.014
Zhang_Bei	Herb.	41.28	114.69	B & D	2002	8	9	1.263
Pandamatenga	DBF	-18.65	25.50	B & D	2000	3	4	1.579
Maun	Shrubs	-19.92	23.59	B & D	2000	3	8	1.24
Mongu	Shrubs	-15.44	23.25	B & D	1999	8	18	0.67
Mongu	Shrubs	-15.44	23.25	B & D	2000	2	29	2.34
Mongu	Shrubs	-15.44	23.25	B & D	2000	4	19	2.25
Mongu	Shrubs	-15.44	23.25	B & D	2000	5	17	1.84
Mongu	Shrubs	-15.44	23.25	B & D	2000	6	14	1.54
Mongu	Shrubs	-15.44	23.25	B & D	2000	9	1	1.12
Mongu	Shrubs	-15.44	23.25	B & D	2000	9	27	1.142
Mongu	Shrubs	-15.44	23.25	B & D	2000	10	17	1.22
Mongu	Shrubs	-15.44	23.25	B & D	2000	11	6	1.38

Mongu	Shrubs	-15.44	23.25	B & D	2000	11	20	1.66
Mongu	Shrubs	-15.44	23.25	B & D	2000	12	19	1.95
Harth Forest	DBF	47.81	7.45	B & D	2013	9	4	3.795
SouthWest_1	Crops	43.55	1.09	B & D	2013	7	10	1.01
SouthWest_1	Crops	43.55	1.09	B & D	2013	7	26	1.19
SouthWest_1	Crops	43.55	1.09	B & D	2013	8	18	1.7
25de Mayo_Alfalfa	Crops	-37.91	-67.75	B & D	2014	2	9	1.3
Barrax-LasTiesas	Crops	39.05	-2.10	B & D	2015	5	27	1.01
SanFernando	Crops	-34.72	-71.00	B & D	2015	1	19	1.96
Honghe_B	Rice	47.66	133.53	D	2012	6	19	0.578
Honghe_B	Rice	47.66	133.53	D	2012	6	24	1.720
Honghe_B	Rice	47.66	133.53	D	2012	6	29	2.888
Honghe_B	Rice	47.66	133.53	D	2012	7	25	5.183
Honghe_B	Rice	47.66	133.53	D	2012	8	13	3.293
Honghe_B	Rice	47.66	133.53	D	2012	8	30	3.405
Honghe_B	Rice	47.66	133.53	D	2012	9	16	2.929
Honghe_B	Rice	47.66	133.53	D	2013	8	27	4.672
Honghe_C	Rice	47.65	133.52	D	2012	6	19	0.615
Honghe_C	Rice	47.65	133.52	D	2012	6	24	1.778
Honghe_C	Rice	47.65	133.52	D	2012	6	29	2.850
Honghe_C	Rice	47.65	133.52	D	2012	7	25	5.110
Honghe_C	Rice	47.65	133.52	D	2012	8	13	3.100
Honghe_C	Rice	47.65	133.52	D	2012	8	30	3.395
Honghe_C	Rice	47.65	133.52	D	2012	9	16	3.037
Honghe_C	Rice	47.65	133.52	D	2013	8	27	4.636
Honghe_D	Rice	47.64	133.52	D	2012	6	19	0.675
Honghe_D	Rice	47.64	133.52	D	2012	6	24	1.883
Honghe_D	Rice	47.64	133.52	D	2012	6	29	3.064
Honghe_D	Rice	47.64	133.52	D	2012	7	25	5.094
Honghe_D	Rice	47.64	133.52	D	2012	8	13	3.103
Honghe_D	Rice	47.64	133.52	D	2012	8	30	3.430
Honghe_D	Rice	47.64	133.52	D	2012	9	16	3.141
Honghe_D	Rice	47.64	133.52	D	2013	8	27	4.627
Honghe_E	Rice	47.64	133.53	D	2012	6	19	0.672
Honghe_E	Rice	47.64	133.53	D	2012	6	24	1.864
Honghe_E	Rice	47.64	133.53	D	2012	6	29	2.723
Honghe_E	Rice	47.64	133.53	D	2012	7	25	5.036
Honghe_E	Rice	47.64	133.53	D	2012	8	13	2.842
Honghe_E	Rice	47.64	133.53	D	2012	8	30	3.334
Honghe_E	Rice	47.64	133.53	D	2012	9	16	2.796
Honghe_E	Rice	47.64	133.53	D	2013	8	27	4.484
HLJ_barley_1	Crops	46.80	131.81	D	2007	6	14	1.135
HLJ_barley_2	Crops	46.80	131.90	D	2007	6	14	1.338

HLJ_barley_3	Crops	46.79	131.89	D	2005	5	23	0.763
HLJ_barley_3	Crops	46.79	131.89	D	2006	6	2	0.702
HLJ_barley_3	Crops	46.79	131.89	D	2007	6	14	1.202
HLJ_barley_4	Crops	46.79	131.98	D	2005	5	23	0.466
HLJ_barley_4	Crops	46.79	131.98	D	2006	6	2	0.812
HLJ_barley_8	Crops	46.74	131.76	D	2006	6	2	0.812
HLJ_barley_13	Crops	46.71	131.72	D	2006	6	2	0.654
HLJ_barley_14	Crops	46.75	131.84	D	2005	5	23	0.375
HLJ_barley_16	Crops	46.73	131.90	D	2007	6	14	1.312
HLJ_barley_19	Crops	46.70	131.87	D	2005	5	23	0.293
HLJ_wheat_1	Crops	46.97	131.97	D	2006	6	2	0.521
HLJ_wheat_2	Crops	46.96	131.99	D	2006	6	2	0.569
HLJ_wheat_3	Crops	46.94	131.97	D	2006	6	2	0.565
HLJ_wheat_6	Crops	46.90	131.98	D	2006	6	2	0.483
HLJ_wheat_8	Crops	46.79	131.91	D	2005	5	23	0.709
HLJ_wheat_14	Crops	46.76	131.74	D	2005	5	23	0.505
HLJ_wheat_15	Crops	46.76	131.85	D	2005	5	23	0.438
HLJ_wheat_16	Crops	46.74	131.71	D	2005	5	23	0.492
Jadraas, plot C15	Forest / BoENL	60.82	16.50	O	1990	8	\	1.32
N/A	Forest / BoDBL	56.42	-98.07	O	1994	7	\	2.2
BOREAS NSA, Thompson	Forest / BoENL	55.92	-97.69	O	1994	7	\	0.95
BOREAS NSA, Thompson	Forest / BoENL	55.89	-99.03	O	1994	7	\	1.24
Tienhoven	Grassland	52.17	5.08	O	1987	5	6	1.02
Tienhoven	Grassland	52.17	5.08	O	1987	7	23	2.69
Tienhoven	Grassland	52.17	5.08	O	1987	6	11	2.06
Kioloa State Forest, NSW	Forest / TeEBL	-35.35	150.18	O	1988	2	25	3.46
Kioloa State Forest, NSW	Forest / TeEBL	-35.35	150.18	O	1986	10	1	3.97
Kioloa State Forest, NSW	Forest / TeEBL	-35.35	150.18	O	1986	2	19	4.95
Kioloa State Forest, NSW	Forest / TeEBL	-35.35	150.18	O	1985	6	24	3.4
Kioloa State Forest, NSW	Forest / TeEBL	-35.35	150.18	O	1985	8	11	3.44
Kioloa State Forest, NSW	Forest / TeEBL	-35.35	150.18	O	1984	7	7	3.94
Kioloa State Forest, NSW	Forest / TeEBL	-35.35	150.18	O	1983	7	13	2.22
Kioloa State Forest, NSW	Forest / TeEBL	-35.35	150.18	O	1982	12	12	3.25