



**Figure S1.** Spatial pattern of global GPP simulated by the AOD-LUE model during 2000–2019: (a) averaged annual GPP; (b) trend of annual GPP ( $\text{g C m}^{-2}\text{yr}^{-1}$ ).

**Table S1.** Information of the eddy covariance (EC) sites used in this study for model calibration and validation.

<i>Model calibration</i>				
Site name	Latitude	Longitude	Vegetation Type	Available years
AU-Dry	-15.2588	132.3706	WSA	2008-2014
AU-How	-12.4943	131.1523	SAV	2001-2014
BE-Lon	50.5516	4.7461	CRO	2004-2014
BE-Vie	50.3050	5.9981	MF	2000-2014
BR-Sa1	-2.8567	-54.9589	EBF	2002-2011
CA-Gro	48.2167	-82.1556	MF	2003-2014
CA-NS3	55.9117	-98.3822	ENF	2001-2005
CA-TP1	42.6609	-80.5595	ENF	2003-2014
CA-TP2	42.7744	-80.4588	ENF	2003-2007
CZ-BK1	49.5021	18.5369	ENF	2004-2014
CZ-BK2	49.4944	18.5429	GRA	2006-2012
DE-Gri	50.9500	13.5126	GRA	2005-2014
DE-Kli	50.8931	13.5224	CRO	2004-2014
DK-ZaH	74.4733	-20.5503	GRA	2002-2014
FR-Gri	48.8442	1.9519	CRO	2004-2014
IT-Ro2	42.3903	11.9209	DBF	2004-2010
IT-Tor	45.8444	7.5781	GRA	2008-2014
MY-PSO	2.9730	102.3062	EBF	2003-2009
RU-Fyo	56.4615	32.9221	ENF	2000-2014
GF-Guy	5.2788	-52.9249	EBF	2004-2014
IT-Col	41.8494	13.5881	DBF	2001-2014
US-Blo	38.8953	-120.6328	ENF	2000-2007
US-GLE	41.3665	-106.2399	ENF	2005-2014
US-Goo	34.2547	-89.8735	GRA	2002-2006
US-IB2	41.8406	-88.2410	GRA	2004-2011
US-Los	46.0827	-89.9792	WET	2000-2014
US-Myb	38.0498	-121.7651	WET	2011-2014
US-NR1	40.0329	-105.5464	ENF	2000-2014
US-Oho	41.5545	-83.8438	DBF	2004-2013
US-SRG	31.7894	-110.8277	GRA	2008-2014
US-SRM	31.8214	-110.8661	SAV	2004-2014
US-Syv	46.2420	-89.3477	MF	2001-2014
US-UMd	45.5625	-84.6975	DBF	2007-2014
US-Var	38.4133	-120.9507	GRA	2000-2014
US-WCr	45.8059	-90.0799	DBF	2000-2006 2010-2014
<i>Model validation</i>				
Site name	Latitude	Longitude	Vegetation Type	Available years
AT-Neu	47.1167	11.3175	GRA	2002-2012
AU-ASM	-22.2830	133.2490	ENF	2010-2014

AU-DaP	-14.0633	131.3181	GRA	2007-2013
BE-Bra	51.3076	4.5198	MF	2000-2007
CA-Oas	53.6289	-106.1978	DBF	2000-2010
CA-Obs	53.9872	-105.1178	ENF	2000-2010
CA-Qfo	49.6925	-74.3421	ENF	2003-2010
CA-SF2	54.2539	-105.8775	ENF	2001-2005
CA-TP3	42.7068	-80.3483	ENF	2003-2014
CA-TP4	42.7102	-80.3574	ENF	2002-2014
CH-Cha	47.2102	8.4104	GRA	2005-2014
CH-Dav	46.8153	9.8559	ENF	2005-2014
CH-Fru	47.1158	8.5378	GRA	2005-2014
CN-Cha	47.2102	8.4104	GRA	2003-2005
CN-Dan	30.4978	91.0664	GRA	2004-2005
CZ-wet	49.0247	14.7704	WET	2006-2014
DE-Akm	53.8662	13.6834	WET	2009-2014
DK-NuF	64.1308	-51.3861	WET	2008-2014
FR-LBr	44.7171	-0.7693	ENF	2000-2008
FR-Pue	43.7413	3.5957	EBF	2000-2014
IT-Cpz	41.7053	12.3761	EBF	2000-2008
IT-Ro1	42.4081	11.9300	DBF	2000-2008
US-ARM	36.6058	-97.4888	CRO	2003-2012
US-Ha1	42.5378	-72.1715	DBF	2000-2012
US-KS2	28.6086	-80.6715	CSH	2003-2006
US-Me3	44.3154	-121.6078	ENF	2004-2009
US-MMS	39.3232	-86.4131	DBF	2000-2014
US-Ne1	41.1651	-96.4766	CRO	2001-2013
US-Ne2	41.1649	-96.4701	CRO	2001-2013
US-Ne3	41.1797	-96.4397	CRO	2001-2013
US-SRC	31.9083	-110.8395	OSH	2008-2014
US-Ton	38.4316	-120.9660	SAV	2001-2014
US-Twt	38.1087	-121.6530	CRO	2009-2014
US-UMB	45.5598	-84.7138	DBF	2000-2014
US-Whs	31.7438	-110.0522	OSH	2007-2014

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