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New Gap-Filling Strategies for Long-Period Flux Data Gaps Using a Data-Driven Approach

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Received: 17 August 2019; Accepted: 19 September 2019; Published: date

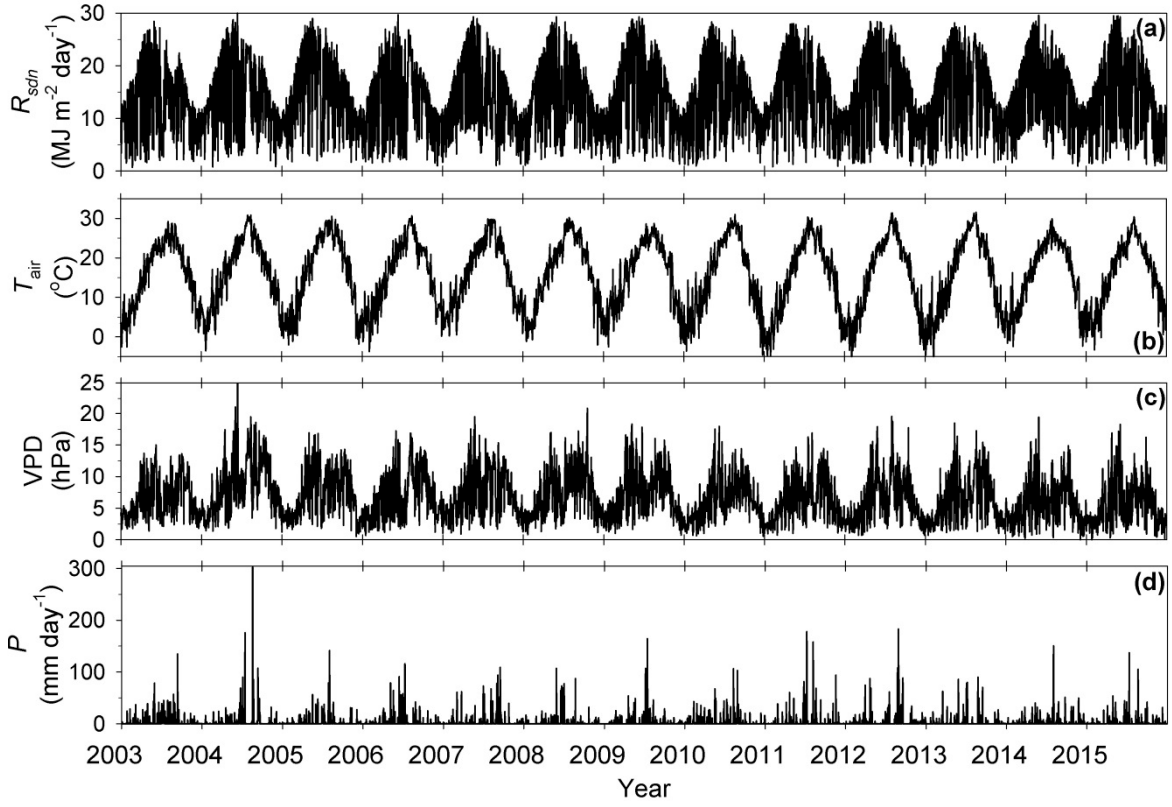

Figure S1. Time series of daily downward shortwave radiation (R_{sdn}, **a**), daytime air temperature (T_{air}, **b**), daytime vapor pressure deficit (VPD, **c**) and precipitation (P, **d**) at the flux tower.

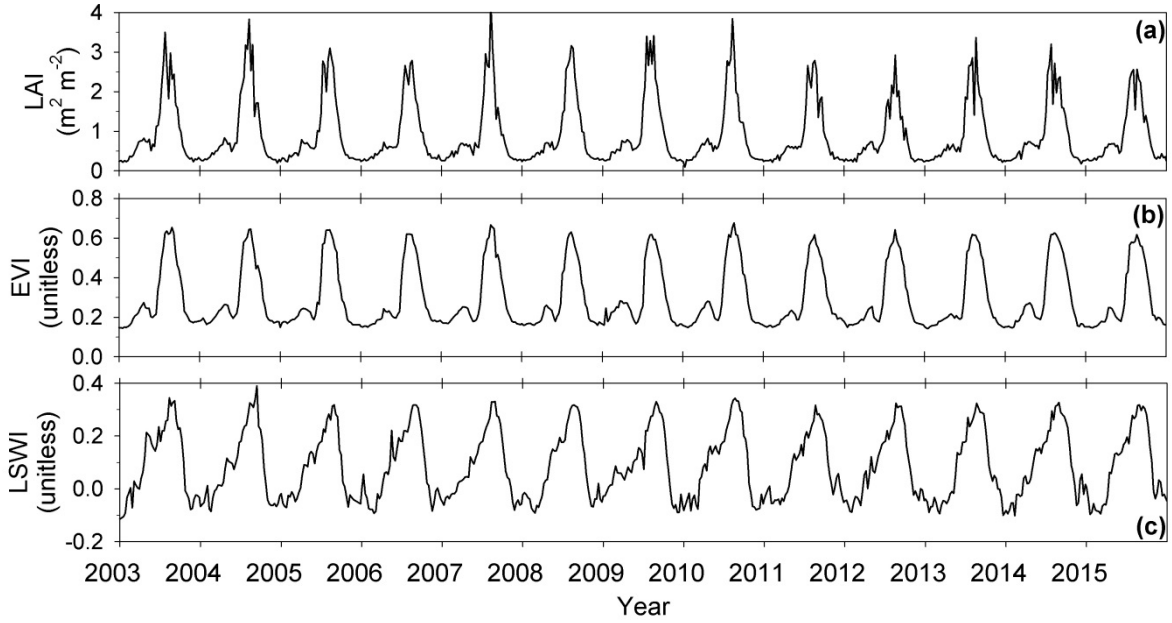

Figure S2. Time series of daily leaf area index (LAI, **a**), enhanced vegetation index (EVI, **b**), and land-surface water index (LSWI, **c**) from the eight-day moderate resolution imaging spectroradiometer (MODIS) data products (MOD15A2 and MCD43A4 version 6) for the study site.

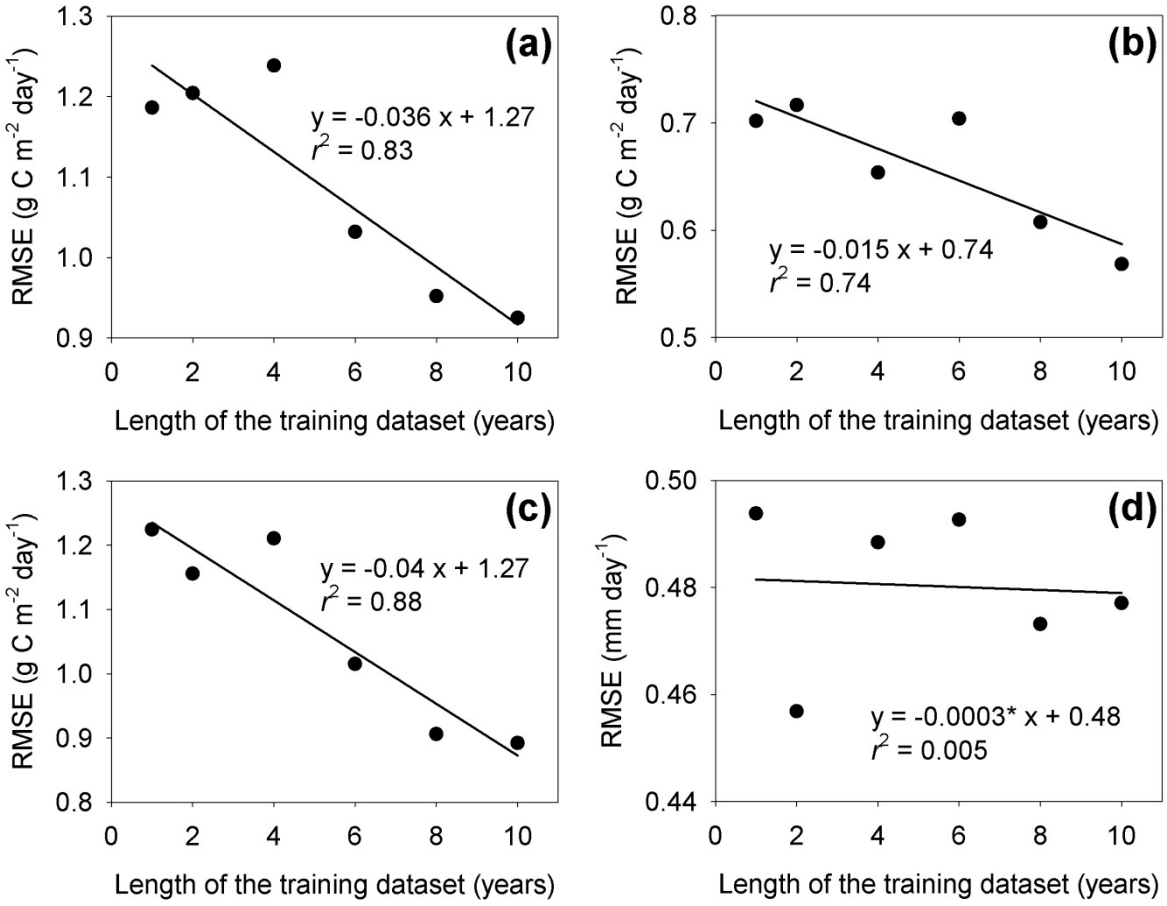

Figure S3. Relationships between the length of the training dataset and the root-mean-square error (RMSE) for error assessment of Experiments 3-1, 3-2, 3-3, 3-4, 3-5, and 3-6 (**a**: gross primary production, **b**: ecosystem respiration, **c**: net ecosystem exchange, **d**: evapotranspiration).

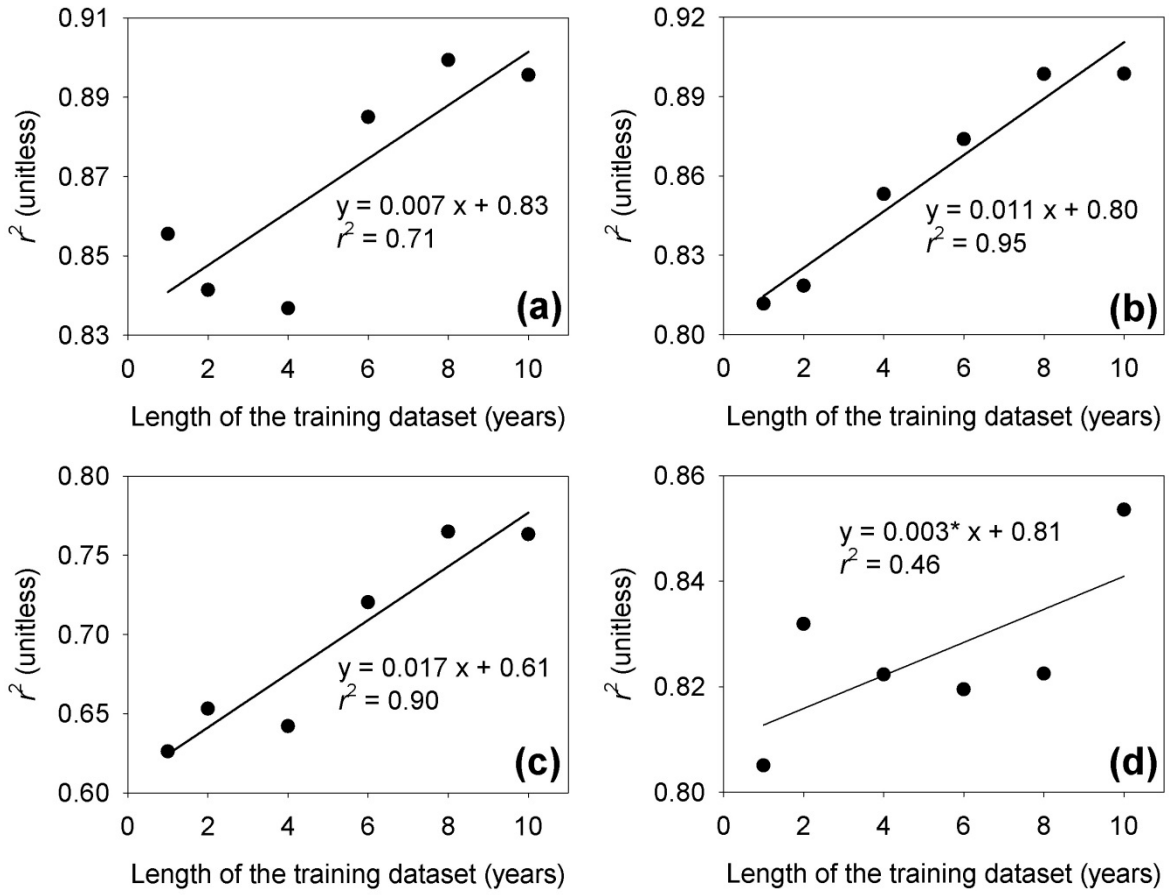

Figure S4. Same as Figure S3 (**a**: gross primary production, **b**: ecosystem respiration, **c**: net ecosystem exchange, **d**: evapotranspiration), but for r^2.

Table S1. Annual data retrieval rates, lengths of the first and second longest gaps, and total lengths of the long gaps[1] for CO_2 flux (F_{CO2}) and evapotranspiration (ET) from 2006–2015 for the Gwangneung deciduous forest in the Korea National Arboretum (GDK) site. AVG denotes average; STD denotes standard deviation.

Year	Data Retrieval Rate (%)		Length of the 1st Longest Gap (Day)		Length of the 2nd Longest Gap (Day)		Total Length of the Long Gaps (Day)	
	F_{CO2}	ET	F_{CO2}	ET	F_{CO2}	ET	F_{CO2}	ET
2006	68.7	69.8	6.6	6.5	5.4	5.4	0.0	0.0
2007	71.2	72.6	10.5	10.5	9.1	9.3	0.0	0.0
2008	73.2	75.2	14.2	14.1	2.5	2.5	0.0	0.0
2009	74.5	75.3	5.2	5.1	2.5	2.5	0.0	0.0
2010	67.3	68.0	14.6	14.7	5.3	4.9	0.0	0.0
2011	63.8	64.5	17.5	17.3	15.1	15.1	0.0	0.0
2012	73.7	75.7	8.8	8.8	7.8	7.8	0.0	0.0
2013	66.3	68.8	22.2	22.2	2.6	2.6	0.0	0.0
2014	70.6	71.5	28.3	28.3	2.0	2.1	0.0	0.0
2015	80.1	82.5	22.5	22.5	1.6	1.4	0.0	0.0
AVG	70.9	72.4	15.0	15.0	5.4	5.4	0.0	0.0
STD	4.7	5.1	7.6	7.6	4.3	4.3	0.0	0.0

[1] Longer than 30 days.