

**Table 1. Main characteristics of the parks used as study areas. The surface cover statistics are based on the land cover product (Section 2.4) and the tree information comes from the city tree inventory (Baumkataster Zurich, 2024).**

	Bullingerhof	Hardaupark	Fritschiwiese	Heiligfeld
Surface cover fractions (%)				
Trees	54	29	38	41
Grass	39	53	51	52
Paved	7	18	11	7
Main tree species	<i>Platanus</i> sp.	<i>Platanus</i> sp.	<i>Tilia</i> sp.	diverse
Mean tree height (m)	29	14	16	20
Park age (years)	94	14	74	59

**Table 2: Overview of data inputs required by each model during the simulation period 01/2022–09/2023.**

Input	Time-step, aggregation	Location	diFUME	JSBACH	SUEWS	VPRM
Air temperature ( $T_{\text{air}}$ ), 2 m	Hourly, average	Kaserne	X	X	X	X
Global radiation	Hourly, average	Kaserne	X	X	X	X
Downward longwave radiation	Hourly, average	Hardau, ERA-5		X		
Relative humidity, 2 m	Hourly, average	Kaserne	X	X	X	
Wind speed, 35 m	Hourly, average	Kaserne		X	X	
Air pressure, 2 m	Hourly, average	Kaserne			X	
Precipitation	Hourly, total	Kaserne		X	X	
Atmospheric CO <sub>2</sub> concentration	Monthly, average	Hardau, Beromunster, ERA-5		X		
Soil temperature ( $T_{\text{soil}}$ )	Hourly, average	Parks	X			
Soil water content (SWC)	Hourly, average	Parks	X			
Land cover map	Static	City	X		X	X
DSM	Static	City	X		X	
Satellite LAI	Daily, linear interpolation	City	X			
	Daily, linear interpolation,					
Satellite EVI, LSWI	Savitzky-Golay filter	City				X

**Table 3. Monthly average fluxes ( $\mu\text{mol CO}_2 \text{ m}^{-2} \text{ s}^{-1}$ ) of the city central 2 km x 2 km domain (Fig. 1), considering the total anthropogenic emissions (building heating, industry, vehicle traffic, human respiration) and the biogenic CO<sub>2</sub> flux components (GPP, R<sub>eco</sub>, NEE) and uncertainties (unc., Section 3.3). The percentages (%) to the total monthly CO<sub>2</sub> balances are given in parentheses. The data are monthly averages of the years 2022 and 2023.**

	Total													
	anthr.	GPP			GPP unc.		R <sub>eco</sub>		R <sub>eco</sub> unc.		NEE		NEE unc.	
Jan	29.1	0.1	(0.4)	0.1	(0.3)	0.6	(1.9)	0.2	(0.6)	0.4	(1.5)	0.2	(0.6)	
Feb	27.0	0.3	(1.1)	0.2	(0.6)	0.6	(2.2)	0.2	(0.6)	0.3	(1.1)	0.2	(0.8)	
Mar	21.5	0.9	(4.0)	0.5	(2.2)	0.9	(4.0)	0.3	(1.2)	0.0	(0.0)	0.5	(2.2)	
Apr	18.4	1.8	(9.9)	0.8	(4.4)	1.2	(6.9)	0.3	(1.6)	-0.5	(-3.1)	0.8	(4.2)	
May	9.3	2.9	(34.2)	0.9	(10.2)	2.0	(23.3)	0.4	(4.5)	-0.9	(-10.8)	0.8	(9.5)	
Jun	8.7	2.9	(36.0)	0.8	(9.4)	2.4	(29.9)	0.3	(4.3)	-0.5	(-6.1)	0.8	(10.2)	
Jul	8.7	2.5	(28.6)	0.7	(8.2)	2.6	(30.1)	0.3	(3.7)	0.1	(1.6)	0.8	(9.2)	
Aug	8.7	1.9	(20.7)	0.6	(7.0)	2.5	(27.1)	0.4	(4.1)	0.6	(6.4)	0.7	(7.8)	
Sep	9.6	1.9	(19.6)	0.5	(5.3)	2.1	(21.6)	0.4	(4.5)	0.2	(2.1)	0.6	(6.1)	
Oct	10.2	1.2	(11.2)	0.4	(3.9)	1.6	(15.5)	0.1	(1.3)	0.5	(4.3)	0.4	(3.9)	
Nov	23.0	0.5	(2.2)	0.2	(1.0)	1.1	(4.5)	0.2	(0.8)	0.5	(2.3)	0.3	(1.2)	
Dec	29.0	0.1	(0.4)	0.1	(0.3)	0.6	(2.1)	0.2	(0.6)	0.5	(1.7)	0.2	(0.6)	