

Table S1: For each reference site, the correlation matrix percentages between meteorological turbulence variables and ammonia concentrations, divided into quartiles.

NH3		<Q1	Q1-Q2	Q2-Q3	Q3-Q4	NH3		<Q1	Q1-Q2	Q2-Q3	Q3-Q4
<b>1_RB</b>	Dir	1%	1%	1%	6%	<b>6_UB</b>	Dir	-3%	1%	0%	0%
	Prec	-3%	-3%	-2%	-2%		Prec	-2%	-1%	-2%	-2%
	Rad	3%	10%	5%	-9%		Rad	9%	0%	-4%	-9%
	Temp	26%	8%	-4%	-5%		Temp	19%	1%	-5%	-9%
	RH	-11%	-8%	2%	15%		RH	3%	-1%	6%	7%
	Vel	-14%	-2%	-2%	-13%		Vel	-10%	-2%	-3%	-9%
<b>2_SU</b>	Dir	8%	1%	1%	3%	<b>7_RB</b>	Dir	0%	-1%	1%	6%
	Prec	-1%	0%	1%	-3%		Prec	0%	4%	-2%	-3%
	Rad	8%	-4%	-1%	1%		Rad	0%	-2%	4%	6%
	Temp	0%	-3%	-4%	-11%		Temp	0%	3%	4%	10%
	RH	-15%	3%	-1%	-6%		RH	0%	0%	-4%	-1%
	Vel	18%	-6%	-2%	-7%		Vel	0%	6%	2%	6%
<b>3_RB</b>	Dir	-6%	0%	3%	3%	<b>8_UB</b>	Dir	2%	-1%	-3%	-15%
	Prec	-2%	-1%	-1%	-3%		Prec	0%	-2%	-4%	-2%
	Rad	7%	7%	4%	-18%		Rad	1%	7%	12%	19%
	Temp	21%	9%	2%	-7%		Temp	-9%	11%	12%	12%
	RH	-9%	-6%	1%	19%		RH	-6%	-11%	-9%	-8%
	Vel	-5%	-4%	-7%	-17%		Vel	5%	1%	2%	9%
<b>4_UB</b>	Dir	-6%	-3%	0%	7%	<b>9_UI</b>	Dir	4%	-4%	0%	2%
	Prec	5%	-1%	-1%	-3%		Prec	5%	-3%	-1%	1%
	Rad	12%	9%	3%	-7%		Rad	-8%	-5%	1%	10%
	Temp	8%	12%	4%	-13%		Temp	-29%	-2%	5%	13%
	RH	-10%	-7%	-3%	13%		RH	16%	5%	-2%	-7%
	Vel	12%	3%	-3%	-16%		Vel	-14%	4%	1%	-4%
<b>5_RB</b>	Dir	-3%	-4%	2%	3%	<b>10_RB</b>	Dir	6%	3%	2%	13%
	Prec	-3%	-1%	0%	-2%		Prec	2%	-1%	-1%	-1%
	Rad	10%	6%	5%	-4%		Rad	-4%	1%	5%	19%
	Temp	13%	9%	3%	-4%		Temp	-11%	3%	3%	6%
	RH	-15%	-6%	-2%	8%		RH	0%	0%	0%	-6%
	Vel	-7%	0%	0%	-8%		Vel	-1%	-2%	-3%	-5%

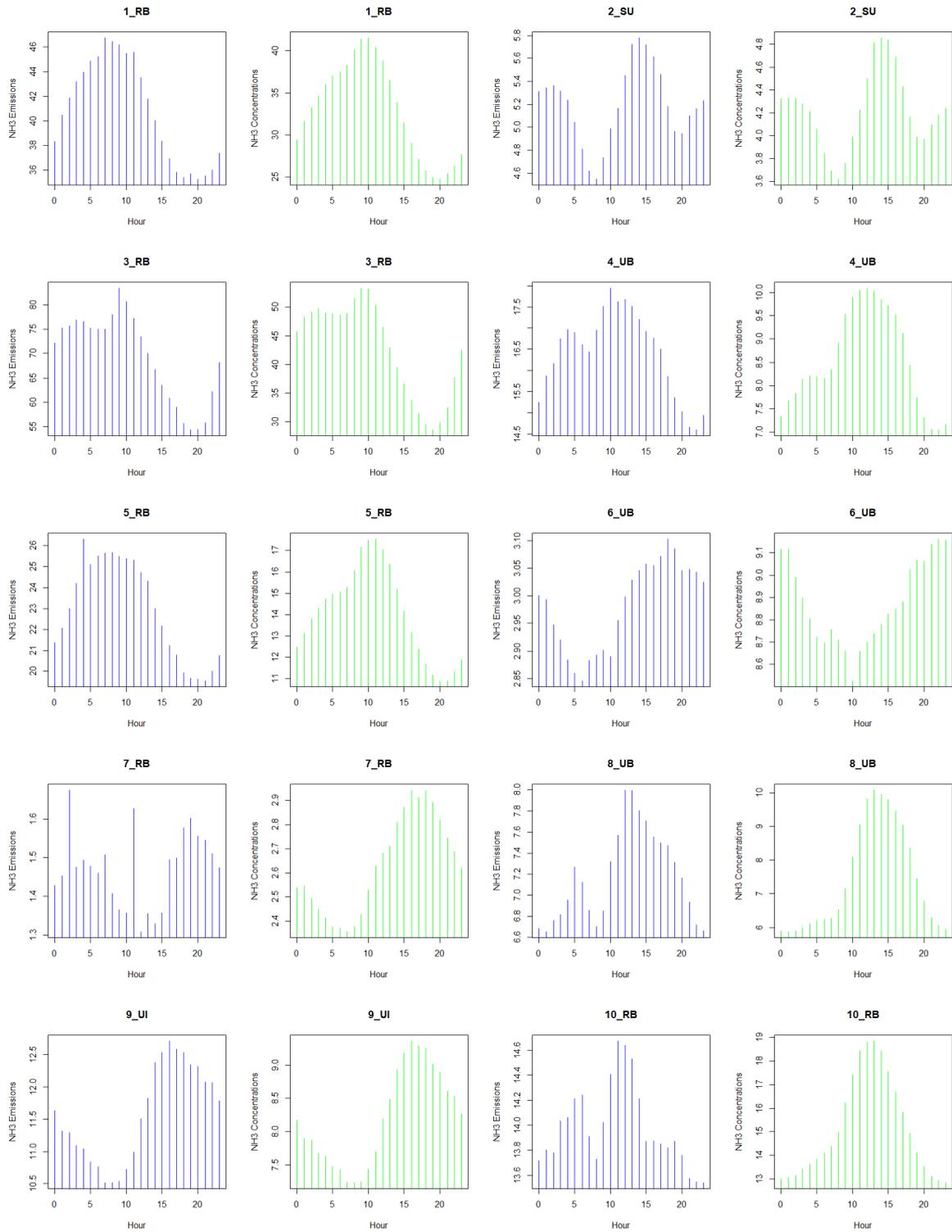


Figure S1: Average emission fluxes [kg/h] for each hour of the day compared to average measured ammonia concentrations [ $\mu\text{g}/\text{m}^3$ ].

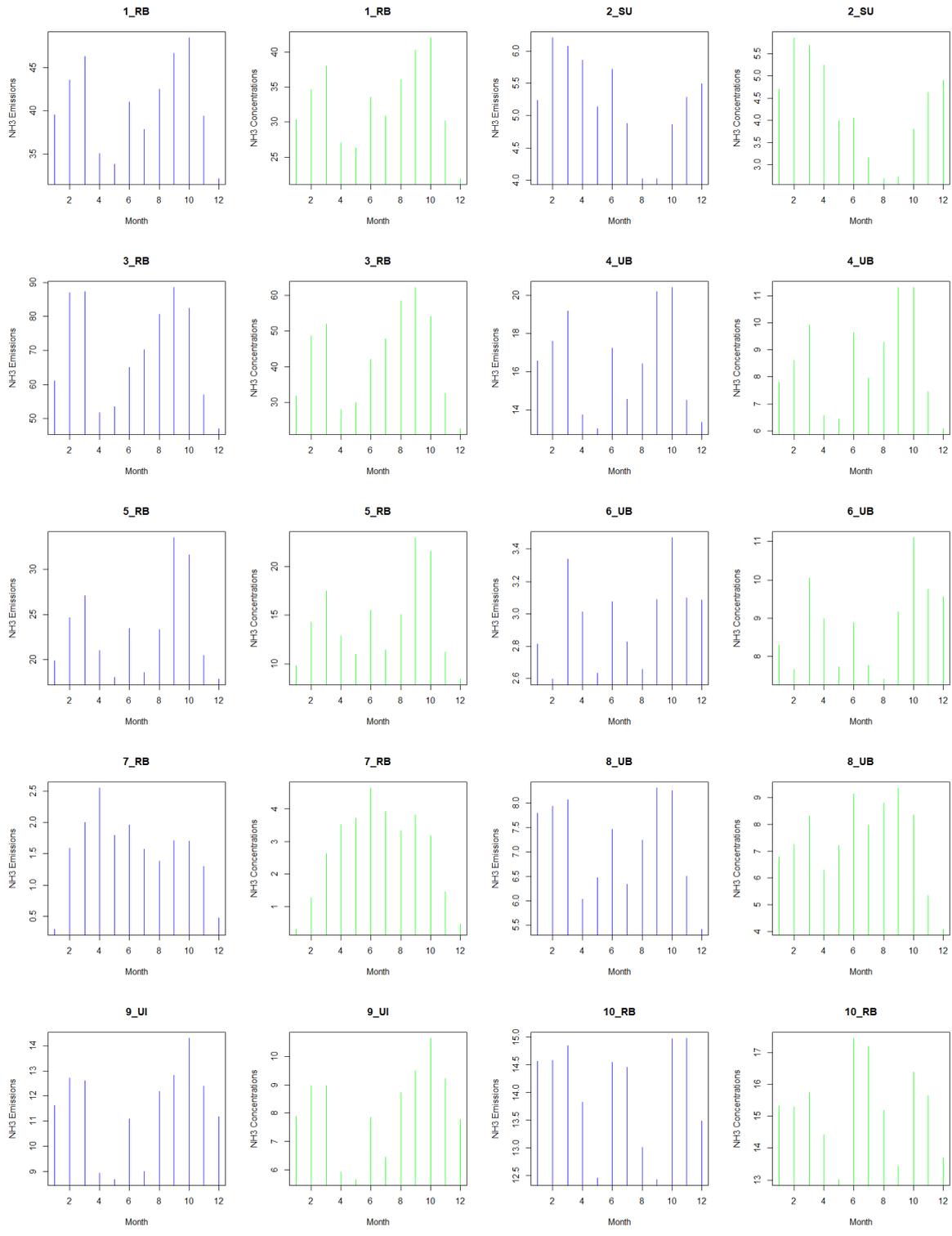


Figure S2: Average emission fluxes [kg/h] for each month of the year compared to average measured ammonia concentrations [ $\mu\text{g}/\text{m}^3$ ].

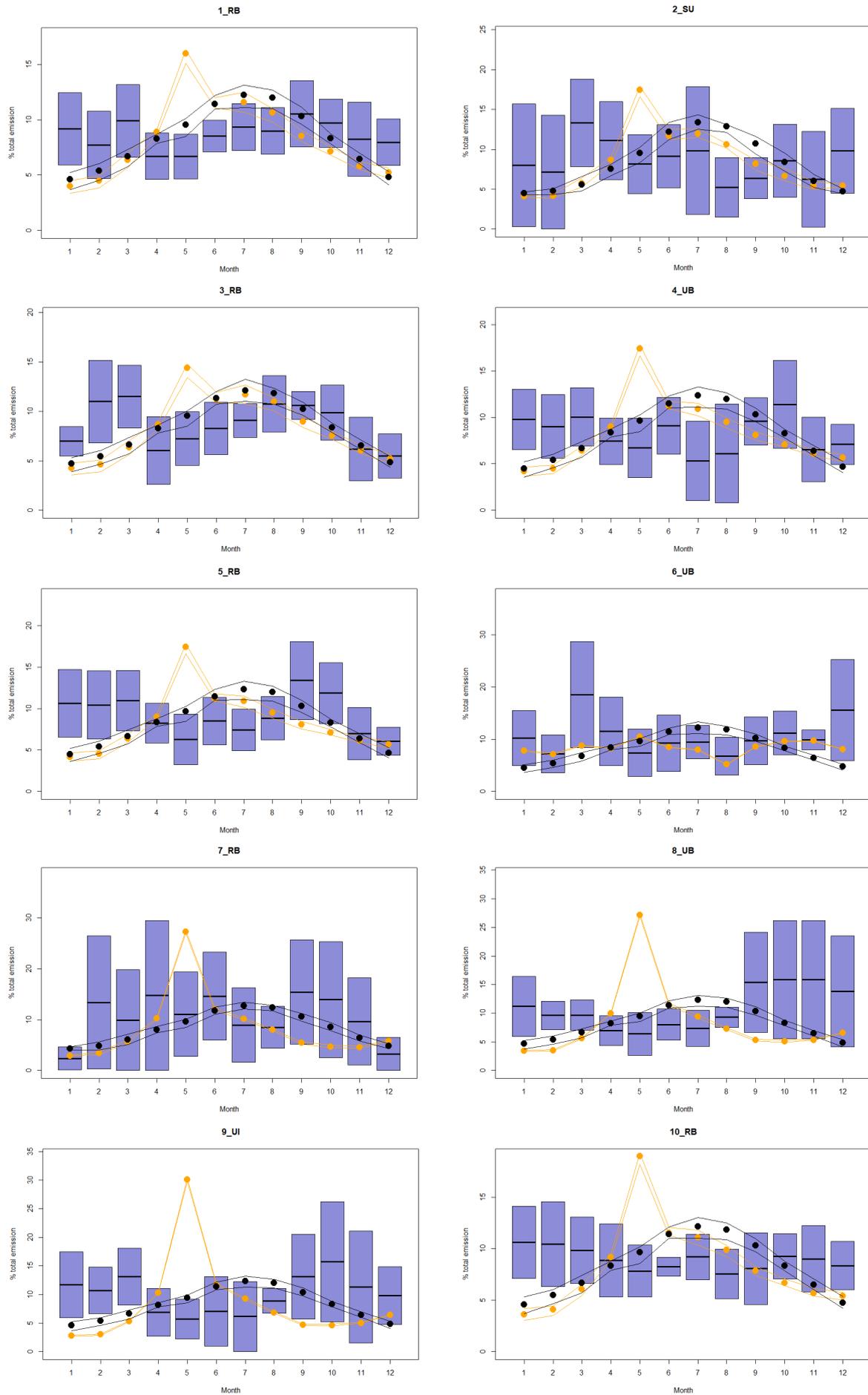


Figure S3: Comparison of NH<sub>3</sub> monthly emissions variability between this study (2014–2022) (blue bars), CAMS-GLOB-ANT (2014–2022) (orange) [61,65,66], and Livestock CAMS-REG-TEMPO (2014–2020) (black) [64,65]. Values are expressed as ratios between monthly and annual totals for each year.

Table S2: Correlation test between ammonia flux estimates and measured ammonia concentrations.

Id-Station	R squared
1_RB	0.68
2_SU	0.77
3_RB	0.61
4_UB	0.76
5_RB	0.54
6_UB	0.88
7_RB	0.20
8_UB	0.63
9_UI	0.90
10_RB	0.77

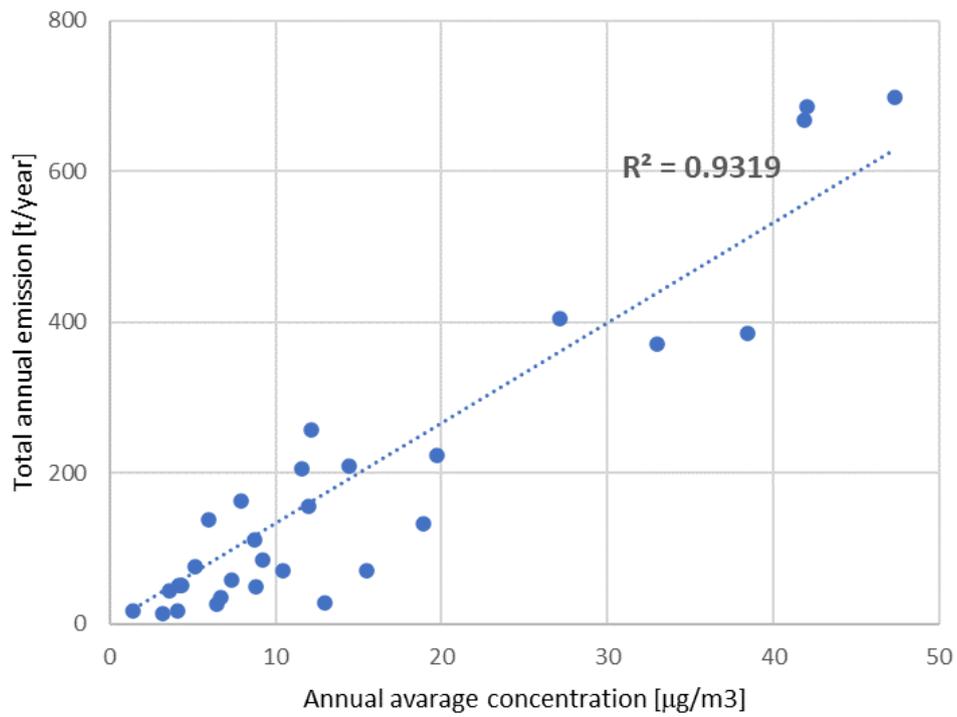


Figure S4: Calibration curve of the initial values of the emissions with the annual average concentrations of measured ammonia in different sites.