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Supplement of

Forest–atmosphere exchange of reactive nitrogen in a remote region – Part II: Modeling annual budgets

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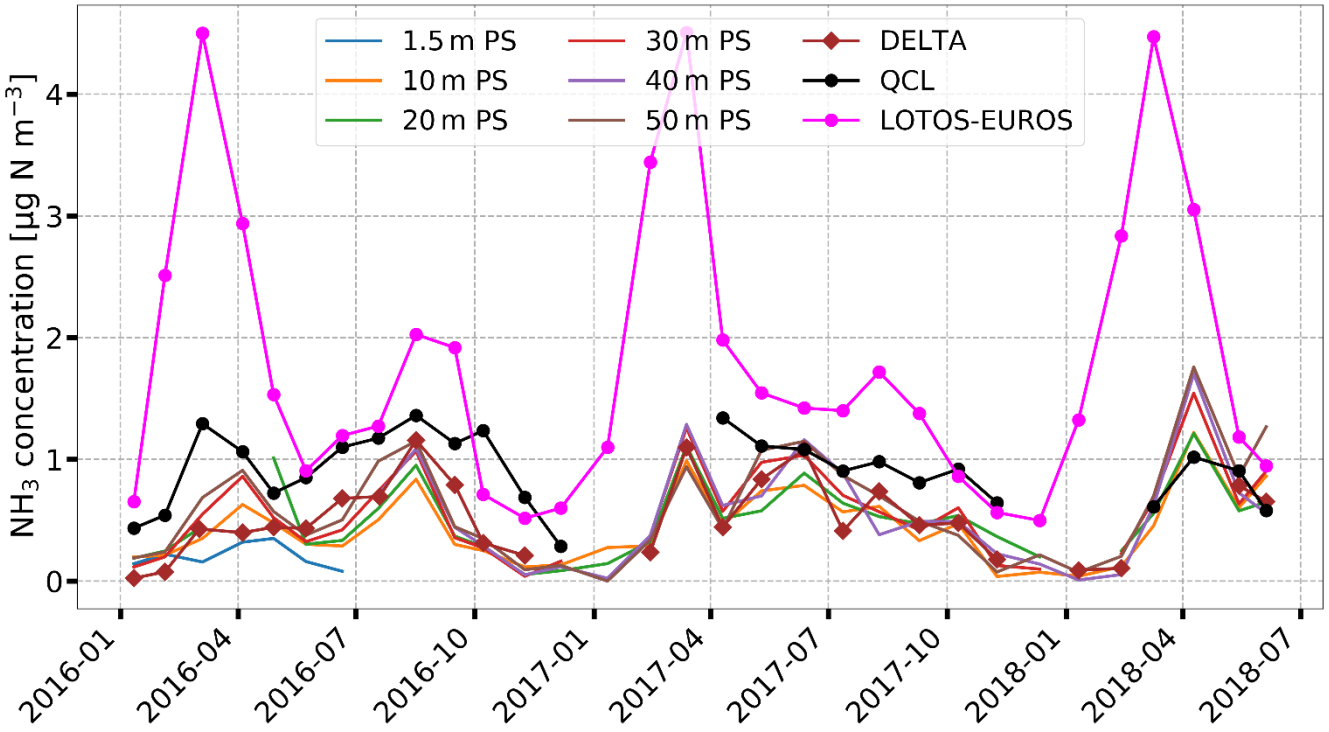

Figure S1. Concentrations of NH_3 obtained from DELTA and passive samplers, LOTOS-EUROS, and the QCL in µg N m^{-3}. NH_3 of the QCL and LOTOS-EUROS was averaged to the exposition period of the long-term sampling methods. Colors of the passive samplers indicate different exposition heights.

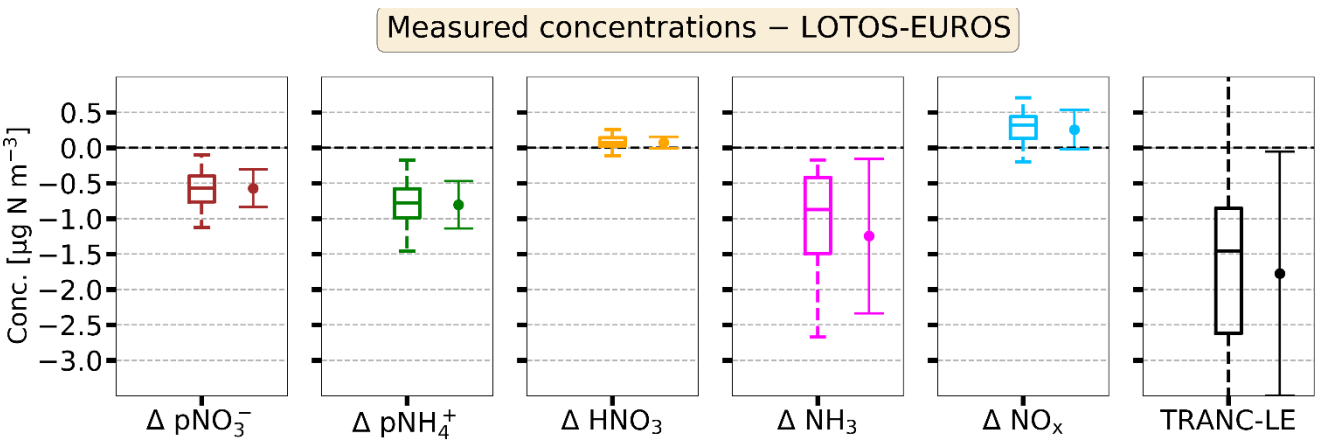

Figure S2. Differences in concentration between DELTA and LOTOS-EUROS for NO_x, NH_3, HNO_3, pNH_4^+, and pNO_3^- and in µg N m^{-3} depicted as boxplots (box frame = 25 % to 75 % interquartile range (IQR), bold line = median, whisker = 1.5*IQR)). In case of ΣN_r, the difference between TRANC and LOTOS averages for exposure periods of DELTA samplers is visualized. Colors indicate different N_r compounds. Negative difference indicates overestimation by LOTOS-EUROS, positive difference underestimation.

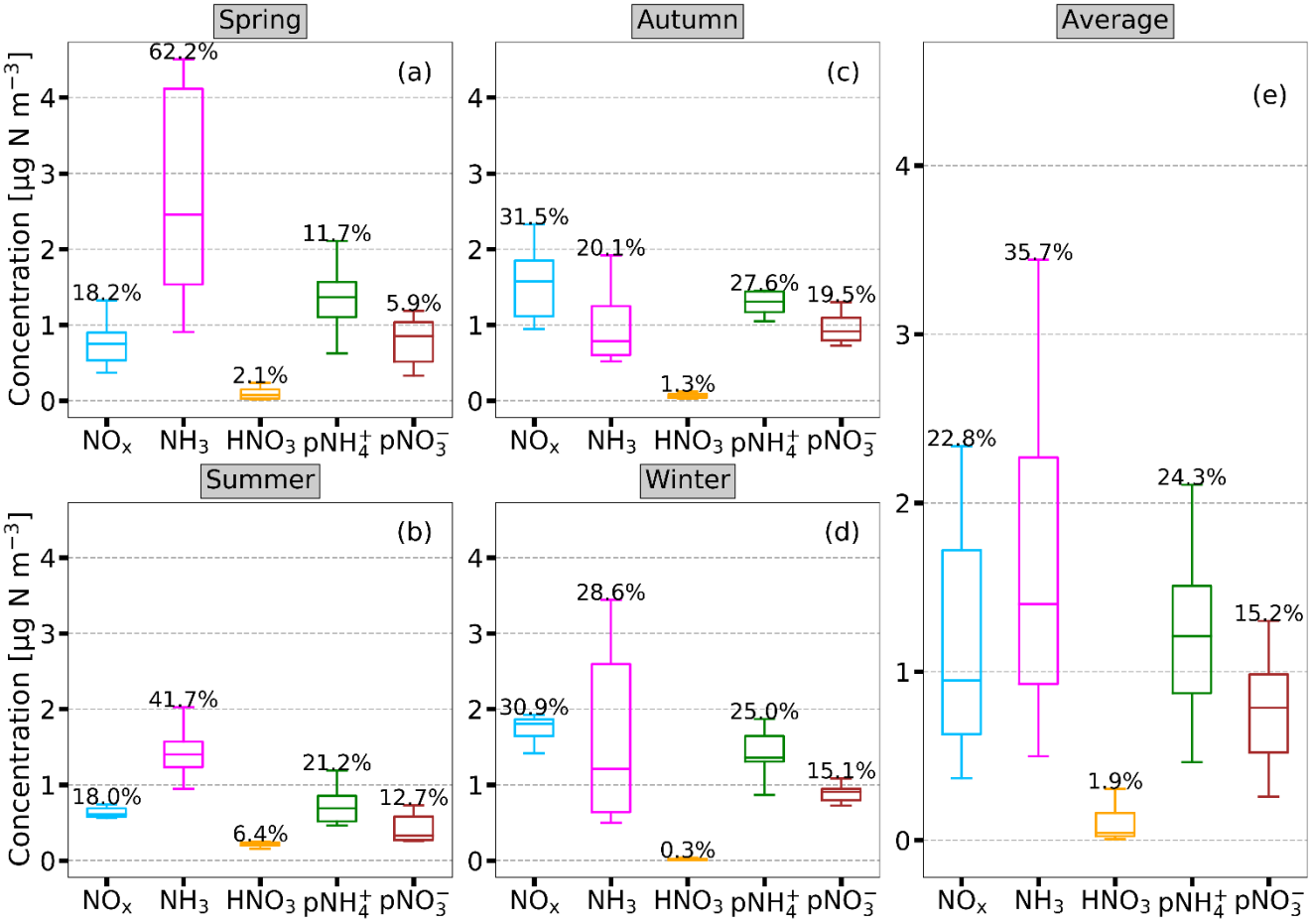

Figure S3. LOTOS-EUROS concentrations of NO_x, NH_3, HNO_3, pNH_4^+, and pNO_3^- in µg N m^{-3} for each season ((a), (b), (c), (d)) and the entire period (e) depicted as boxplots (box frame = 25 % to 75 % interquartile range (IQR), bold line = median, whisker = 1.5*IQR)). Colors indicate different N_r compounds. Numbers above whiskers show the relative contributions of each compound to ΣN_r for the respective period. Values based on the average concentrations.

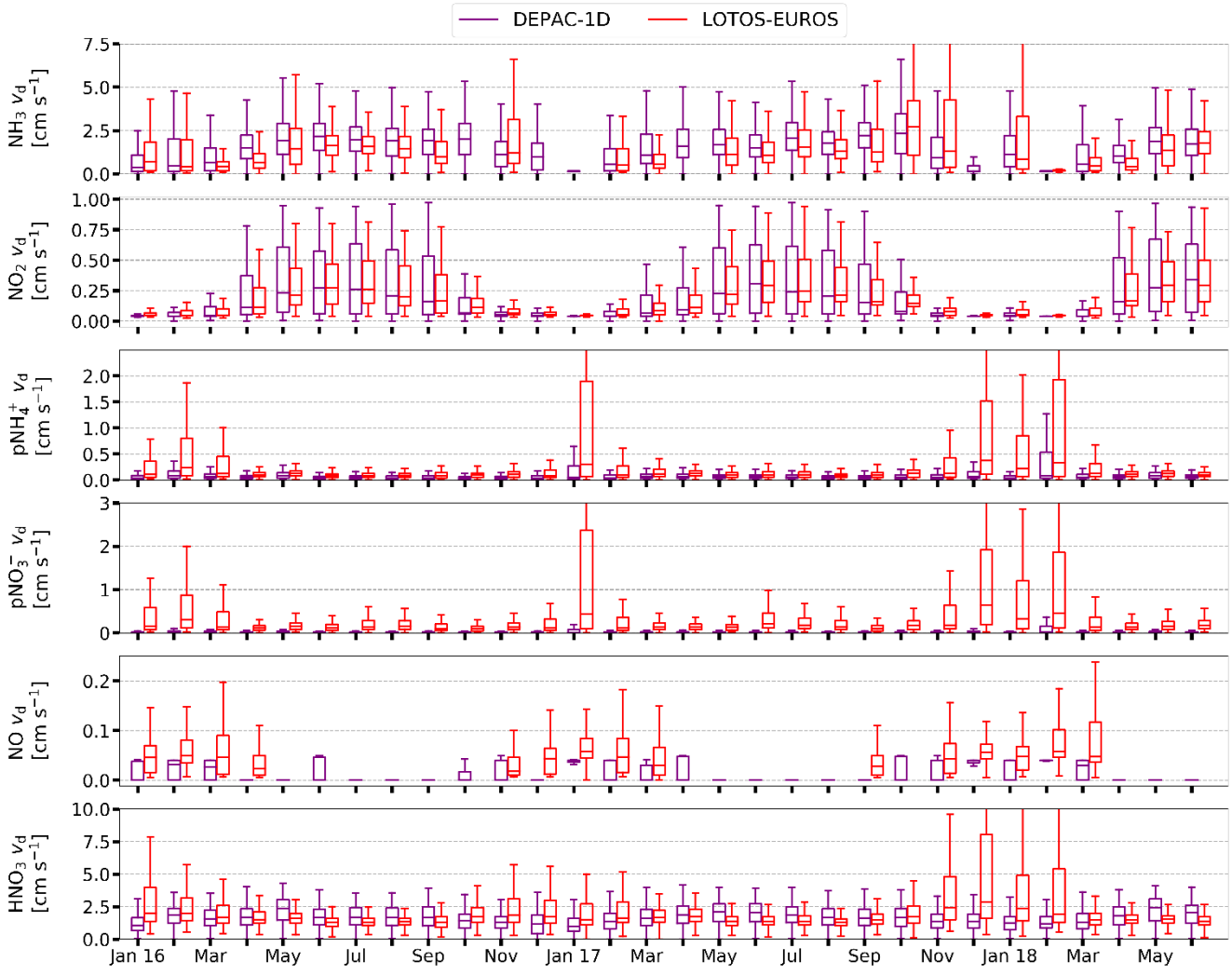

Figure S4. Deposition velocities of DEPAC-1D (purple) and LOTOS-EUROS (red) for NH_3, NO_2, pNH_4^+, pNO_3^-, NO, and HNO_3 in cm s^{-1} as monthly boxplots (box frame = 25 % to 75 % interquartile range (IQR), bold line = median, whisker = 1.5*IQR)).

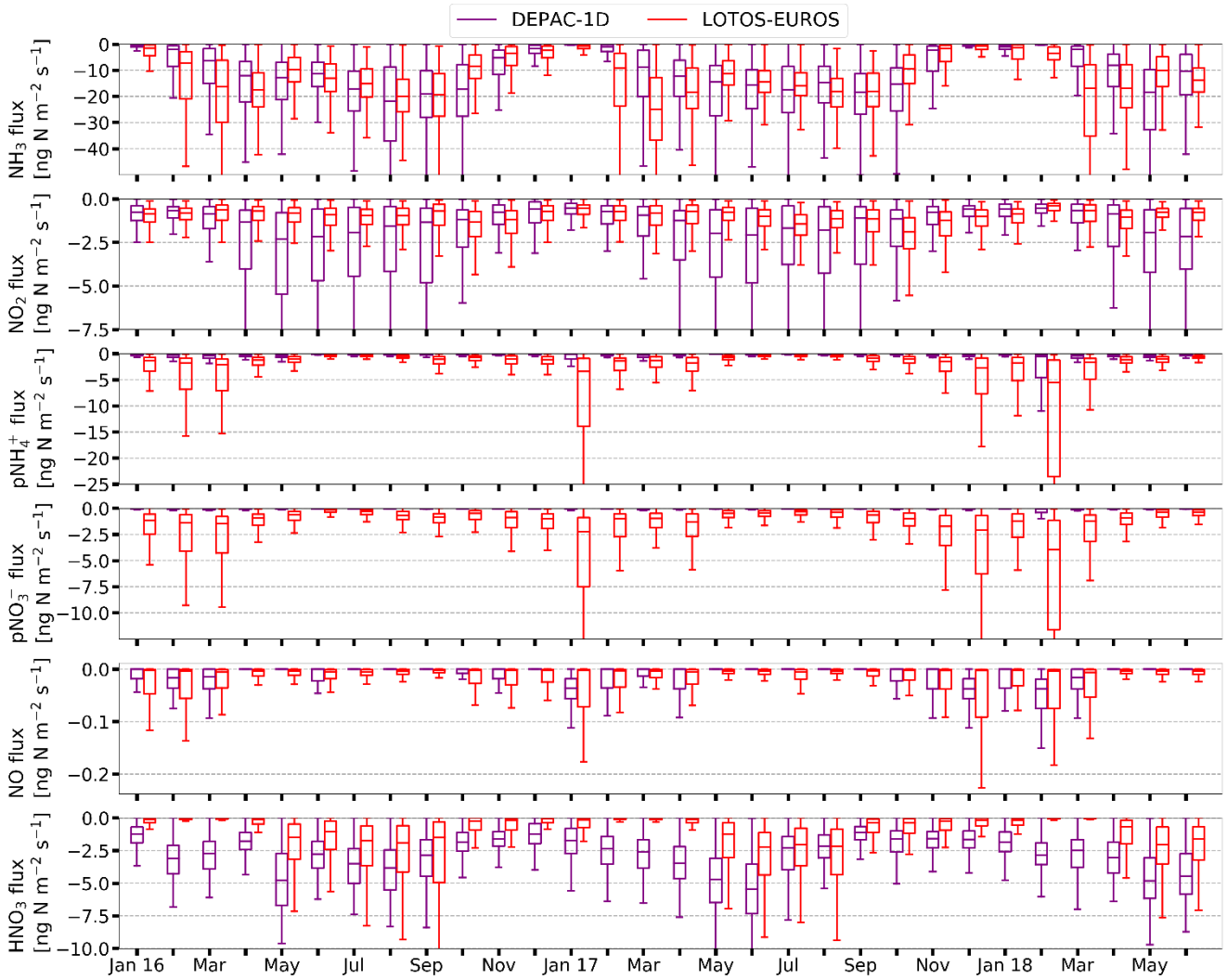

Figure S5. Fluxes of DEPAC-1D (purple) and LOTOS-EUROS (red) for NH_3, NO_2, pNH_4^+, pNO_3^-, NO, and HNO_3 in ng N m^{-2} s^{-1} as monthly boxplots (box frame = 25 % to 75 % interquartile range (IQR), bold line = median, whisker = 1.5*IQR)).

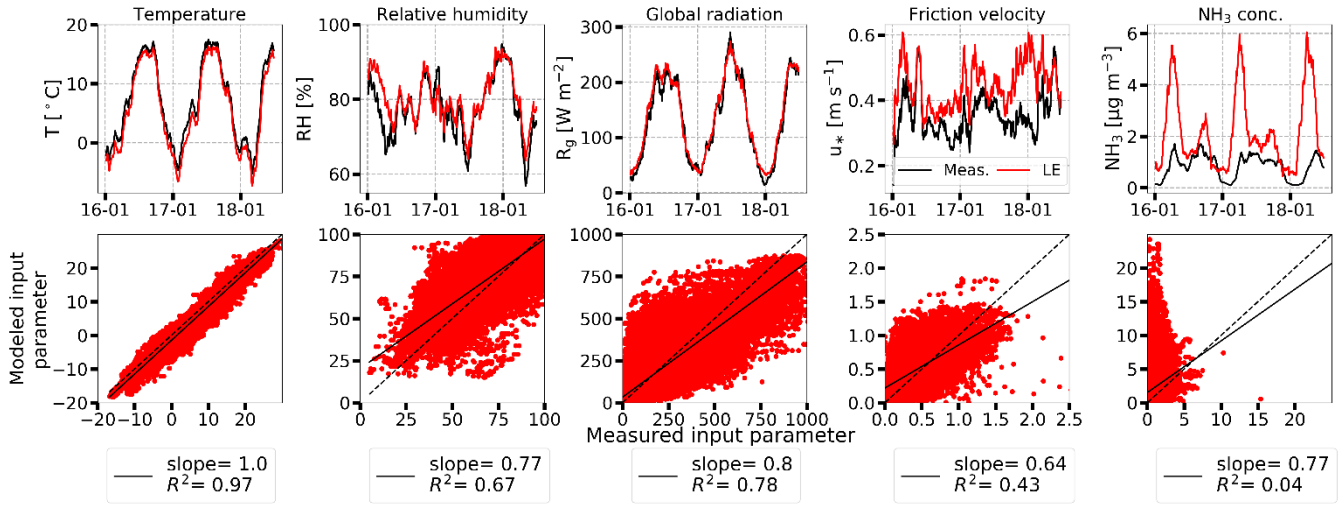

Figure S6. Comparison of LOTOS-EUROS (red) and measured (black) input data smoothed with a 30-day running average is applied to the input data for better visibility. The latter is applied to time series shown in the first row. In the second row, scatter plots of input data on half-hourly basis are shown for each input variable. Linear regressions are shown as black, solid lines, black, dashed lines represent 1:1 lines.

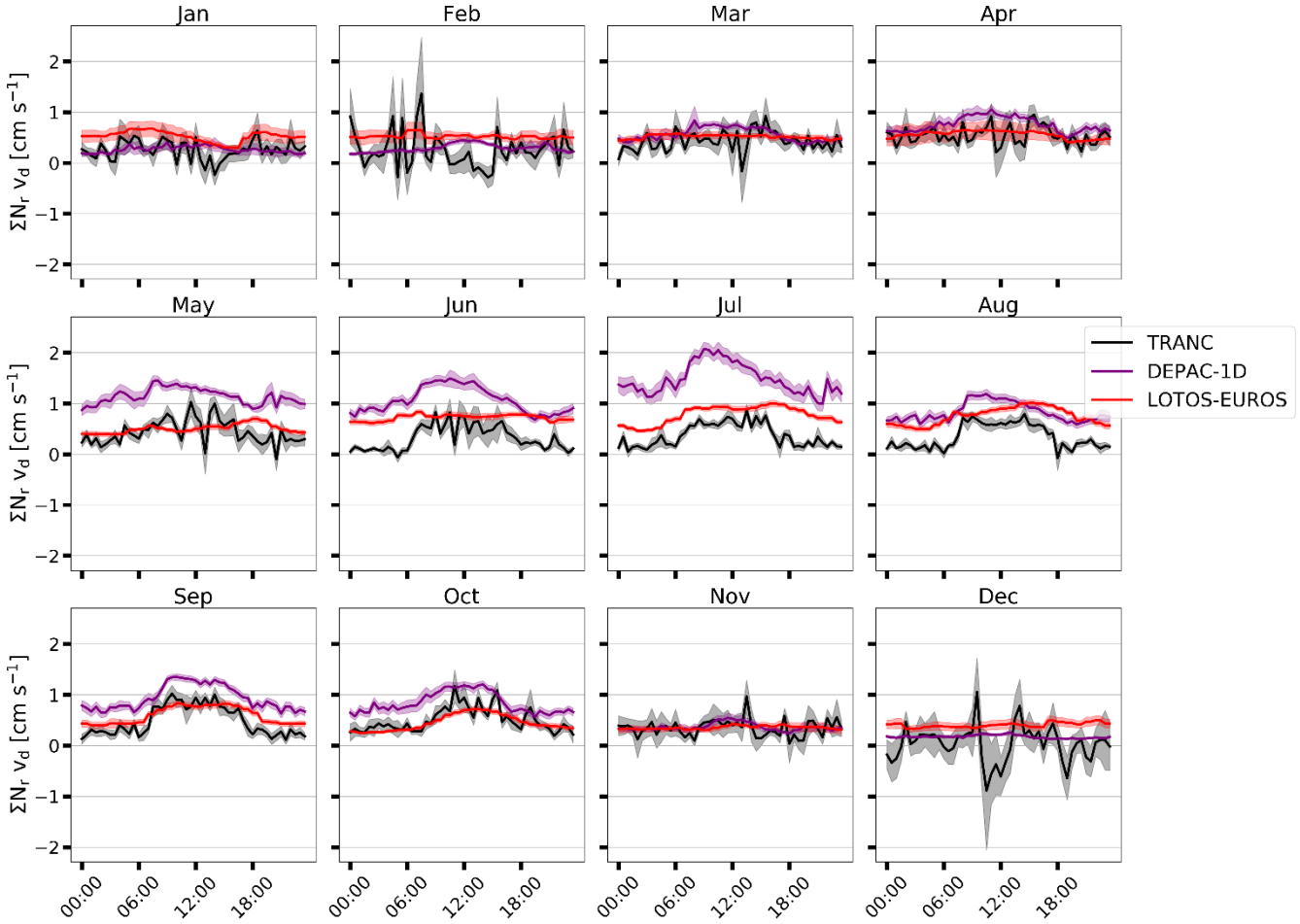

Figure S7. Mean diurnal cycles of ΣN_r deposition velocties for DEPAC-1D (purple), LOTOS-EUROS (red), and TRANC (black) in cm s^{-1} exemplarily shown for the year 2017. Shaded areas represent the standard error of the mean.

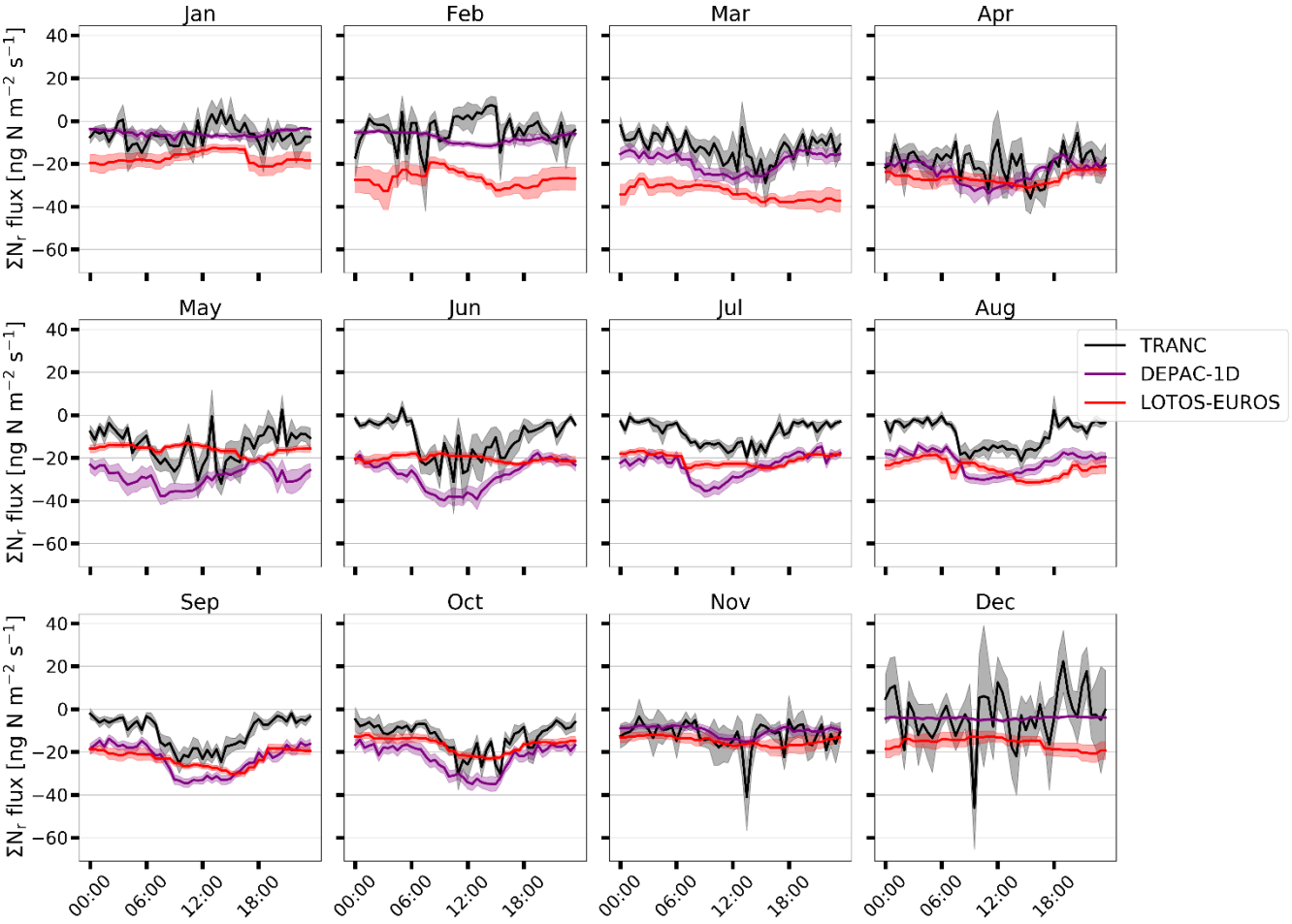

Figure S8. Mean diurnal cycles of ΣN_r fluxes for DEPAC-1D (purple), LOTOS-EUROS (red), and TRANC (black) in ng N m^{-3} s^{-1} exemplarily shown for the year 2017. Shaded areas represent the standard error of the mean.

Table S1. Medians and lower and upper quartile (LQ and UQ) of measured and modeled deposition velocities for each N_r compound. Values refer to the entire campaign duration.

Method		Deposition velocities [cm s^{-1}]						
		NH_3	NO_2	NO	HNO_3	pNO_3^-	pNH_4^+	ΣN_r
TRANC	UQ							0.73
	Median							**0.34**
	LQ							0.08
DEPAC-1D	UQ	2.4	0.27	0.04	2.3	0.03	0.10	1.0
	Median	**1.3**	**0.06**	**0.0**	**1.6**	**0.01**	**0.05**	**0.52**
	LQ	0.4	0.04	0.0	1.0	0.01	0.03	0.18
LOTOS-EUROS	UQ	2.1	0.24	0.07	2.2	0.32	0.19	0.71
	Median	**1.0**	**0.12**	**0.04**	**1.6**	**0.15**	**0.11**	**0.42**
	LQ	0.4	0.05	0.01	1.2	0.08	0.05	0.22

Table S2. Median fluxes of TRANC, DEPAC-1D and LOTOS-EUROS ng N m^{-2} s^{-1} in for different periods

Time	TRANC [ng N m^{-2} s^{-1}]	DEPAC-1D [ng N m^{-2} s^{-1}]	LOTOS-EUROS [ng N m^{-2} s^{-1}]
Winter	7.5	4.7	12.5
Spring	10.8	18.3	22.5
Summer	9.3	21.9	21.1
Autumn	9.5	20.3	17.5
Entire campaign	9.3	15.4	19.2