



Supplement of

Gas exchange velocities (k_{600}), gas exchange rates (K_{600}), and hydraulic geometries for streams and rivers derived from the NEON Reaeration field and lab collection data product (DP1.20190.001)

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Table S1. Priors used in Bayesian multilevel models. Priors are given as a distribution (μ, σ).

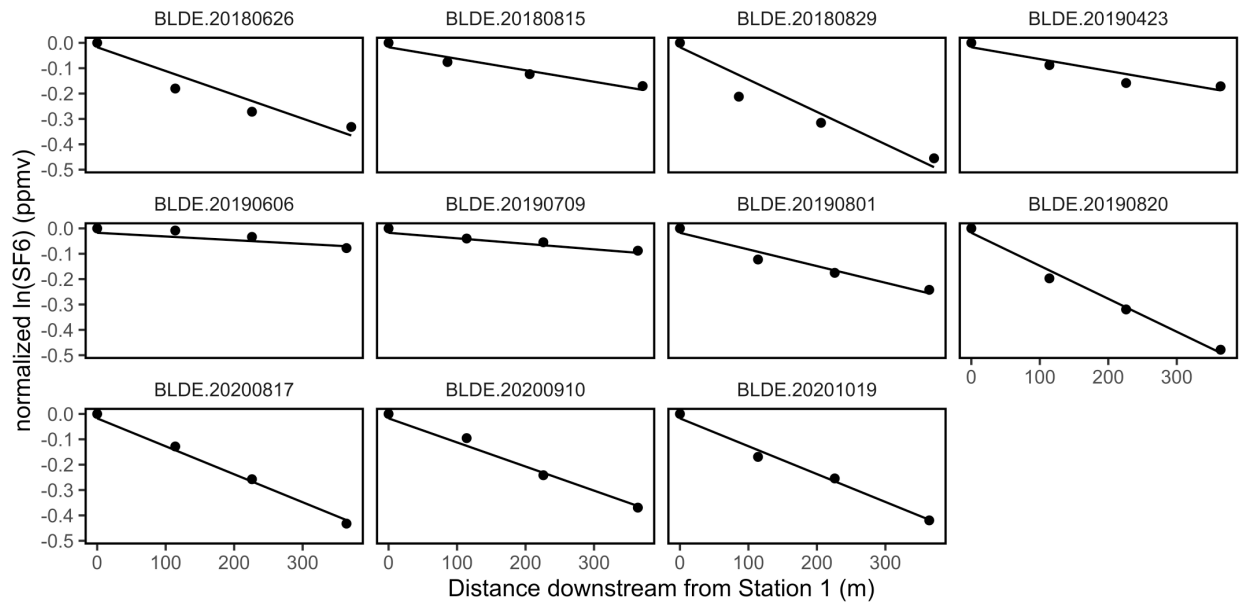
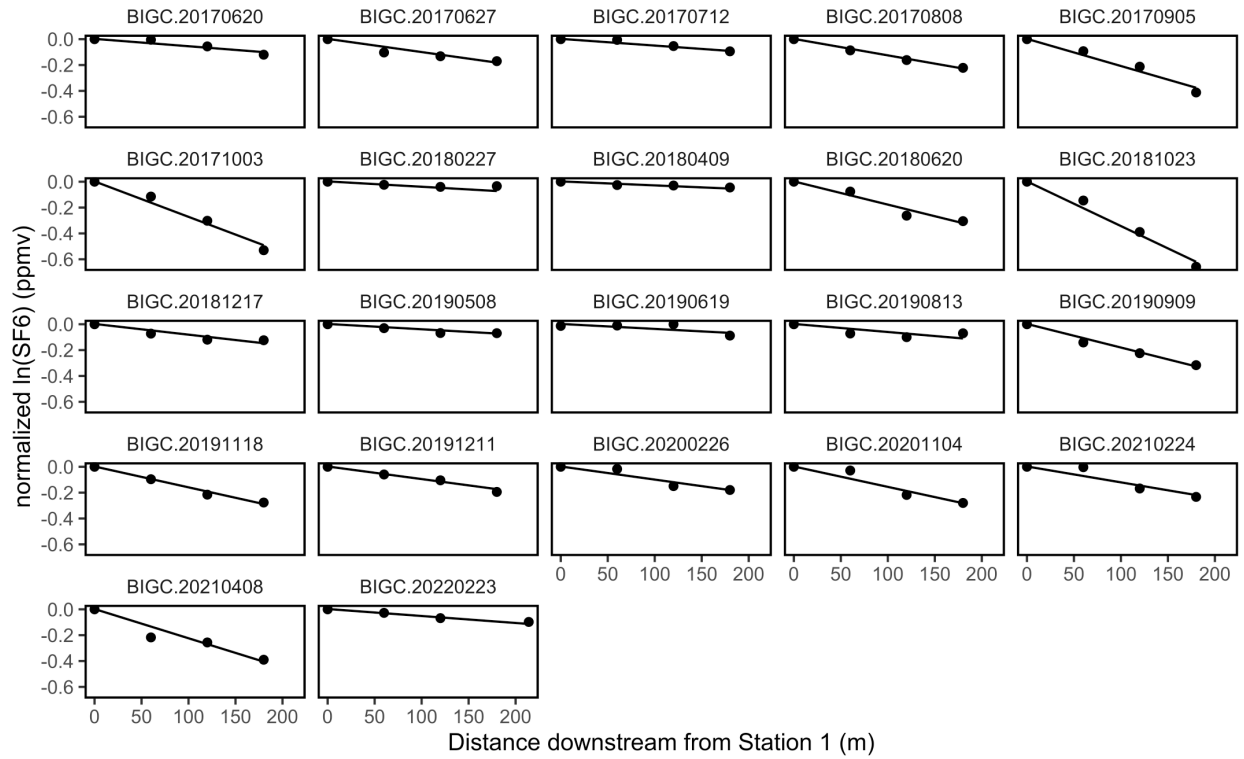
Site	K_{600}						K_{600}					
	intercept	sigma	a	b	sigma_expt	intercept	sigma	a	b	sigma_expt		
BIGC	(0,0.2)	(0, 0.1)	(-3.4,10)	(0.5,1)	(0,2)	(0,0.2)	(0, 0.1)	(0.6,10)	(0.3,1)	(0,2)		
BLDE	(0,0.2)	(0, 0.1)	(-0.9,10)	(0.4,1)	(0,2)	(0,0.2)	(0, 0.1)	(4.2,10)	(0.1,1)	(0,2)		
CARI	(0,0.2)	(0, 0.1)	(-0.4,10)	(0.3,1)	(0,2)	(0,0.2)	(0, 0.1)	(5.9,10)	(-0.2,1)	(0,2)		
COMO	(0,0.2)	(0, 0.1)	(0.7,10)	(0.4,1)	(0,2)	(0,0.2)	(0, 0.1)	(6.1,10)	(-0.1,1)	(0,2)		
CUPE	(0,0.2)	(0, 0.1)	(0.9,10)	(0.2,1)	(0,2)	(0,0.2)	(0, 0.1)	(8.3,10)	(-0.3,1)	(0,2)		
GUJL	(0,0.2)	(0, 0.1)	(-1.7,10)	(0.4,1)	(0,2)	(0,0.2)	(0, 0.1)	(3.2,10)	(0,1)	(0,2)		
HOPB	(0,0.2)	(0, 0.1)	(-1.3,10)	(0.4,1)	(0,2)	(0,0.2)	(0, 0.1)	(3.5,10)	(0.1,1)	(0,2)		
KING	(0,0.2)	(0, 0.1)	(-6.4,10)	(0.5,0.3)	(0,2)	(0,0.2)	(0, 0.1)	(-2.9,4)	(0.4,0.4)	(0,2)		
LECO	(0,0.2)	(0, 0.1)	(-0.5,10)	(0.4,1)	(0,2)	(0,0.2)	(0, 0.1)	(5.1,10)	(0,1)	(0,2)		
LEWI	(0,0.2)	(0, 0.1)	(-2.1,10)	(0.4,1)	(0,2)	(0,0.2)	(0, 0.1)	(2.8,10)	(0.1,1)	(0,2)		
MART	(0,0.2)	(0, 0.1)	(-1.3,10)	(0.4,1)	(0,2)	(0,0.2)	(0, 0.1)	(3.2,10)	(0.2,1)	(0,2)		
MAYF	(0,0.2)	(0, 0.1)	(-3.3,10)	(0.4,1)	(0,2)	(0,0.2)	(0, 0.1)	(0.7,10)	(0.1,1)	(0,2)		
MCDI	(0,0.2)	(0, 0.1)	(-4.4,10)	(0.7,1)	(0,2)	(0,0.2)	(0, 0.1)	(-2.1,10)	(0.6,1)	(0,2)		
MCRA	(0,0.2)	(0, 0.1)	(-0.3,10)	(0.4,1)	(0,2)	(0,0.2)	(0, 0.1)	(5.2,10)	(0.1,1)	(0,2)		
OKSR	(0,0.2)	(0, 0.1)	(-3.1,10)	(0.5,1)	(0,2)	(0,0.2)	(0, 0.1)	(0.5,10)	(0.3,1)	(0,2)		
POSE	(0,0.2)	(0, 0.1)	(-0.6,10)	(0.4,1)	(0,2)	(0,0.2)	(0, 0.1)	(5.6,10)	(0,1)	(0,2)		
PRIN	(0,0.2)	(0, 0.1)	(-2.8,1)	(0.4,0.3)	(0,2)	(0,0.2)	(0, 0.1)	(2.2,1)	(0,0.5)	(0,2)		
REDB	(0,0.2)	(0, 0.1)	(-0.4,10)	(0.4,1)	(0,2)	(0,0.2)	(0, 0.1)	(4.6,10)	(0.1,1)	(0,2)		
SYCA	(0,0.2)	(0, 0.1)	(-0.6,10)	(0.3,1)	(0,2)	(0,0.2)	(0, 0.1)	(5.0,10)	(0.0,1)	(0,2)		
TECR	(0,0.2)	(0, 0.1)	(-0.5,10)	(0.5,1)	(0,2)	(0,0.2)	(0, 0.1)	(3.6,10)	(0.2,1)	(0,2)		
WALK	(0,0.2)	(0, 0.1)	(-1.2,10)	(0.5,1)	(0,2)	(0,0.2)	(0, 0.1)	(3.9,10)	(0.2,1)	(0,2)		
WLOU	(0,0.2)	(0, 0.1)	(-0.3,10)	(0.4,1)	(0,2)	(0,0.2)	(0, 0.1)	(4.4,10)	(0.1,1)	(0,2)		

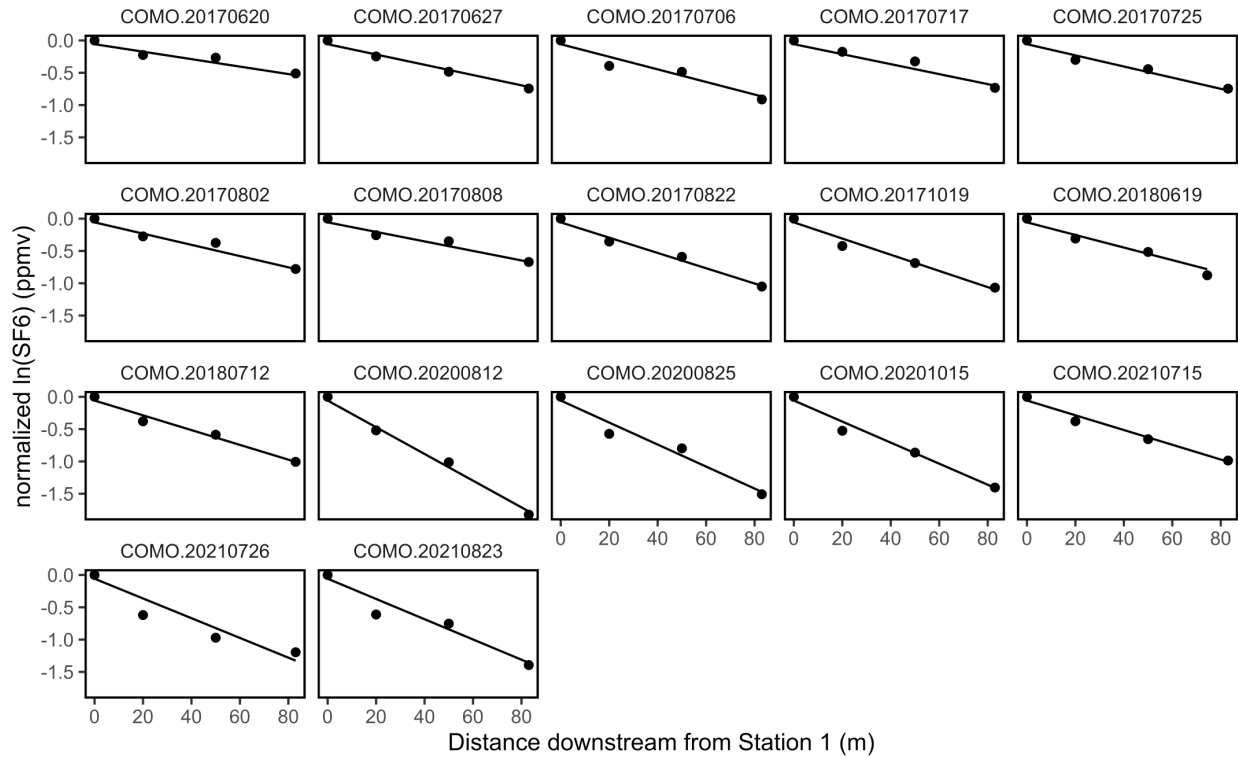
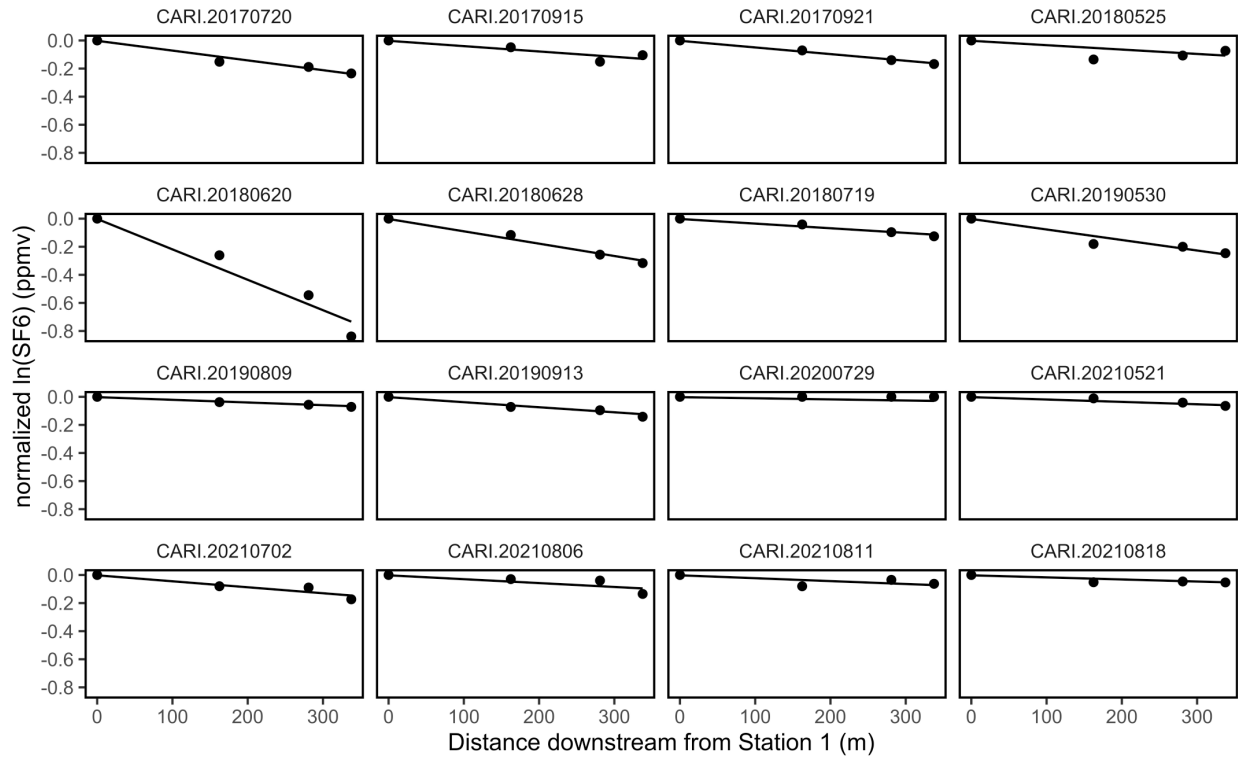
Table S2. Issue log summarizing issues precluding estimates of gas exchange.

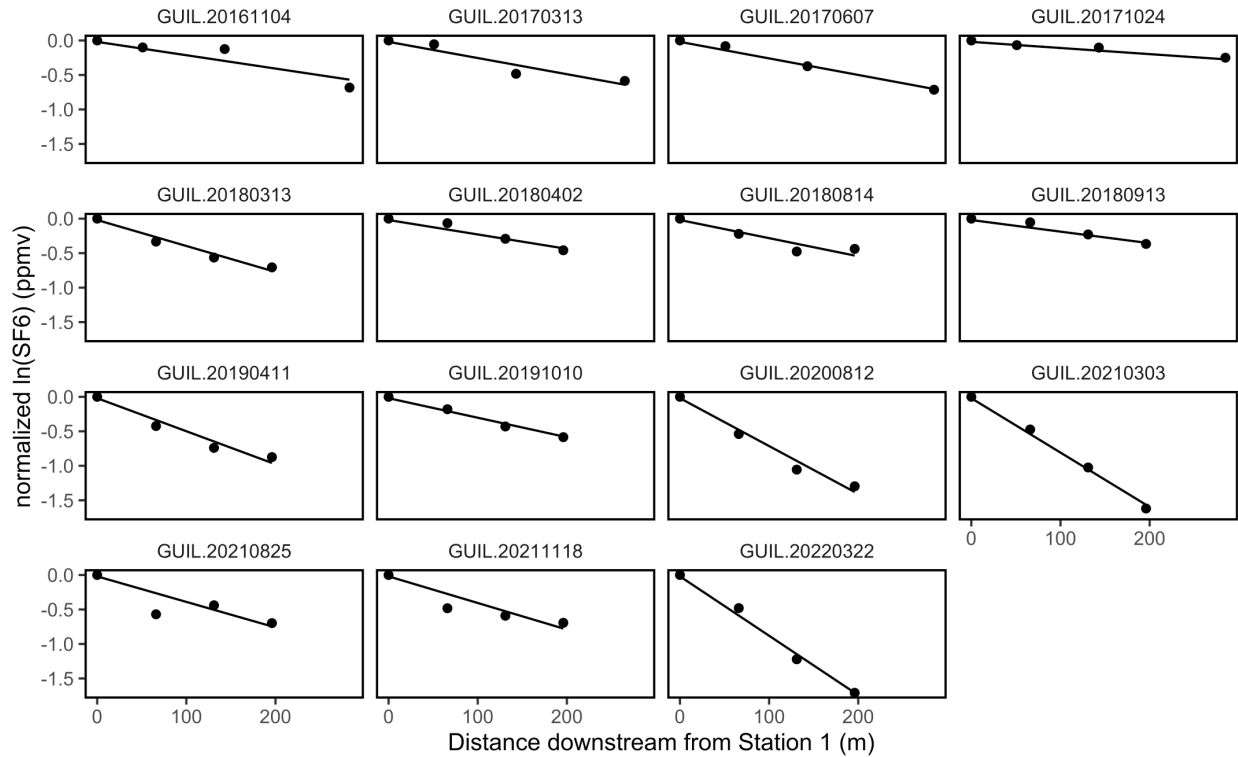
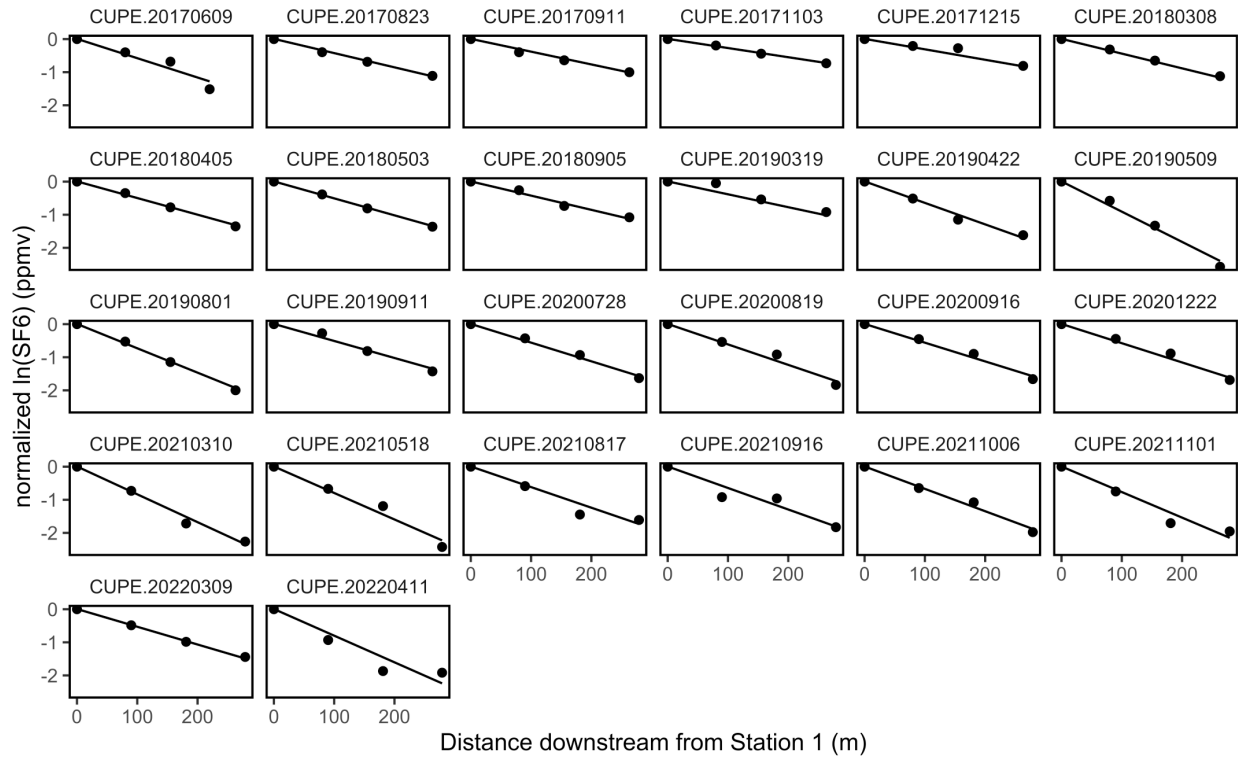
Issue	(n)
Travel time could not be calculated from conductivity timeseries	141
Outlier experiment	61
SF ₆ at Station 1 was lower than at any of Stations 2-4	56
Missing discharge measurement	42
Missing concentration data (SF ₆ , or NaCL or NaBr, when salt-correction needed)	25
SF ₆ was not detected at ≥ 1 station	10
Missing water temperature	2
Other (duplicate stations, no decline in SF ₆)	2
Missing width measurement	1

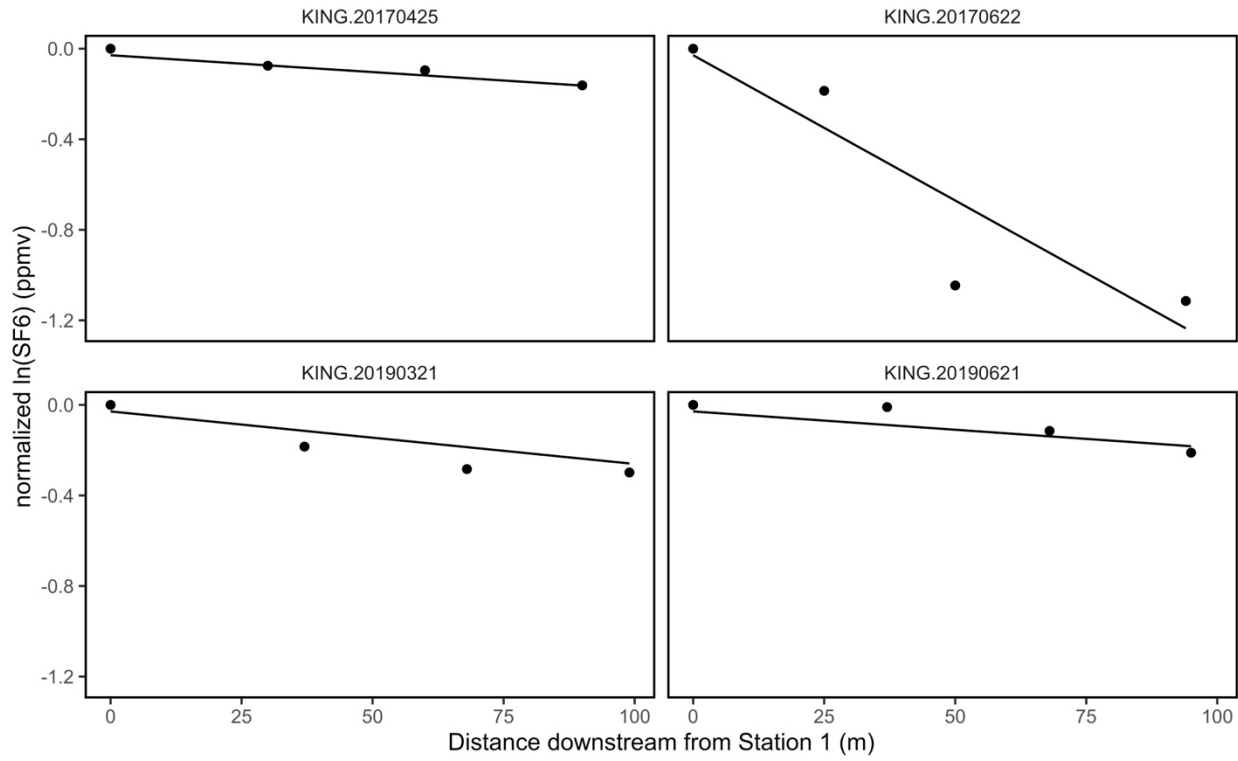
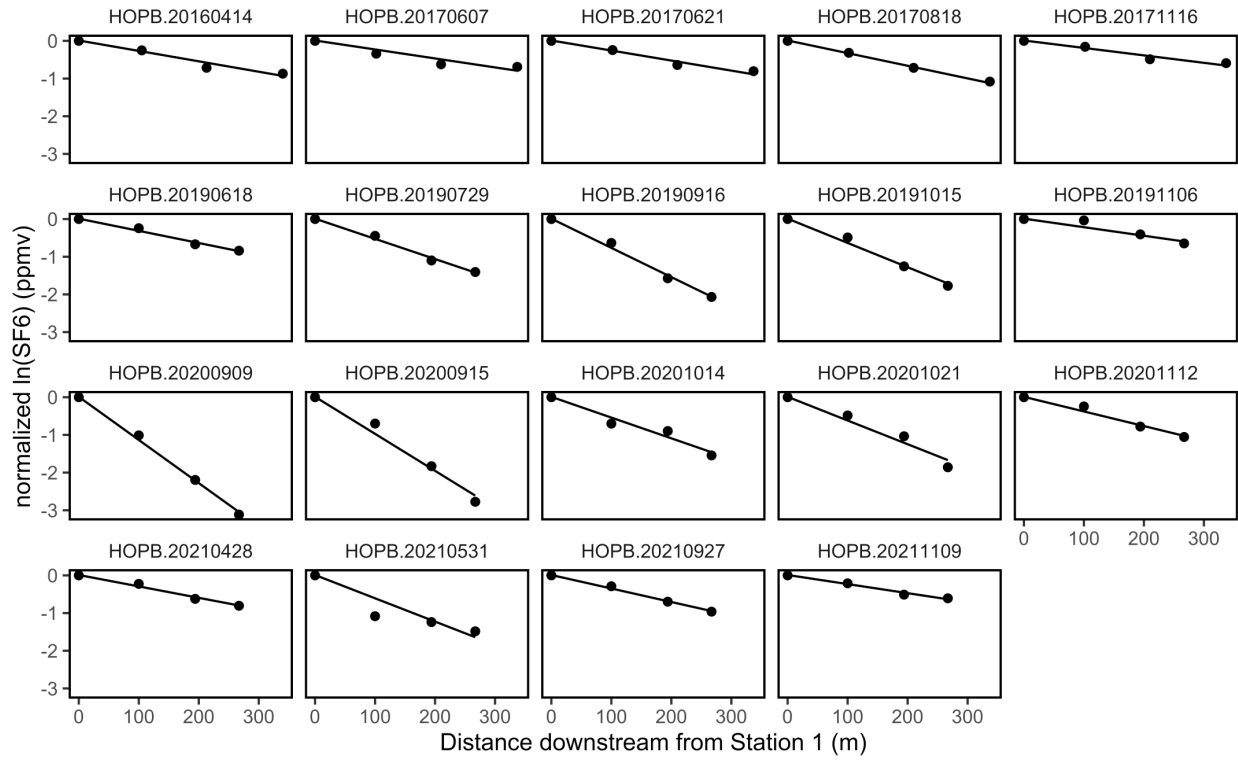
Table S3. Mean, standard deviation (s.d.), minimum, maximum, and range of stream discharges with a gas exchange by site.

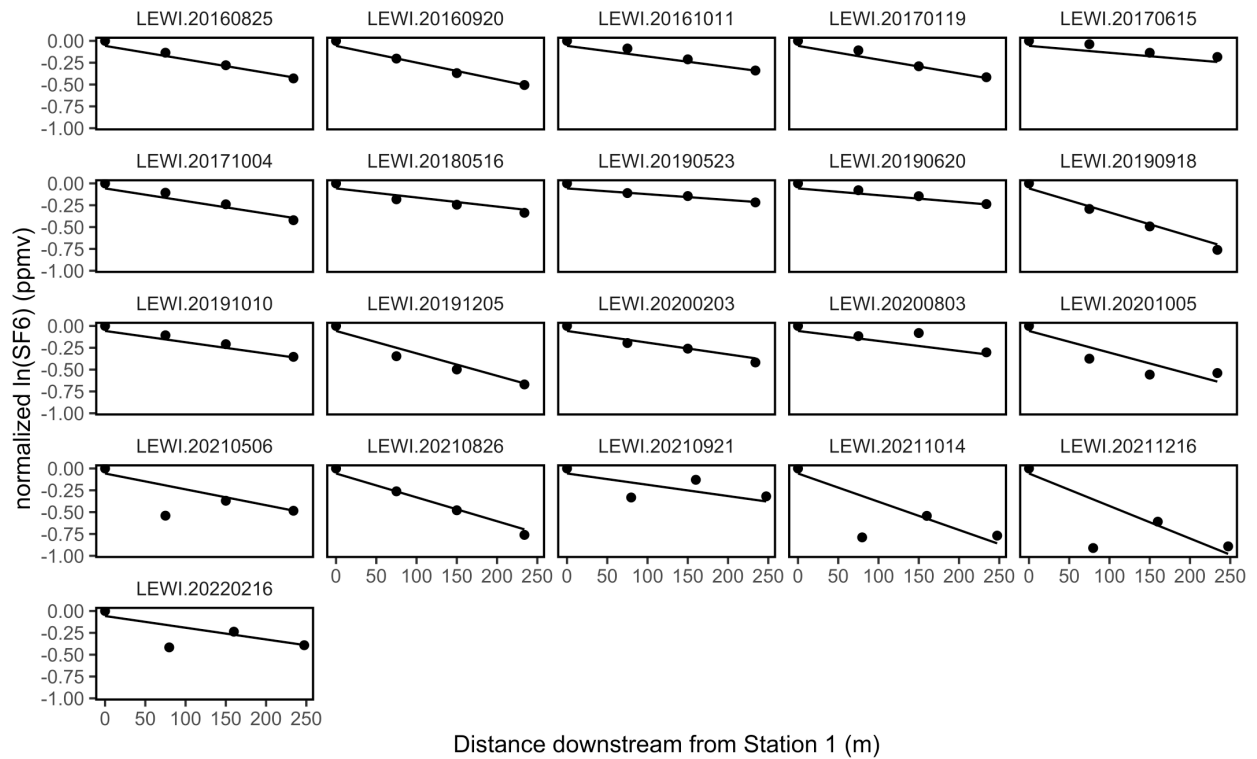
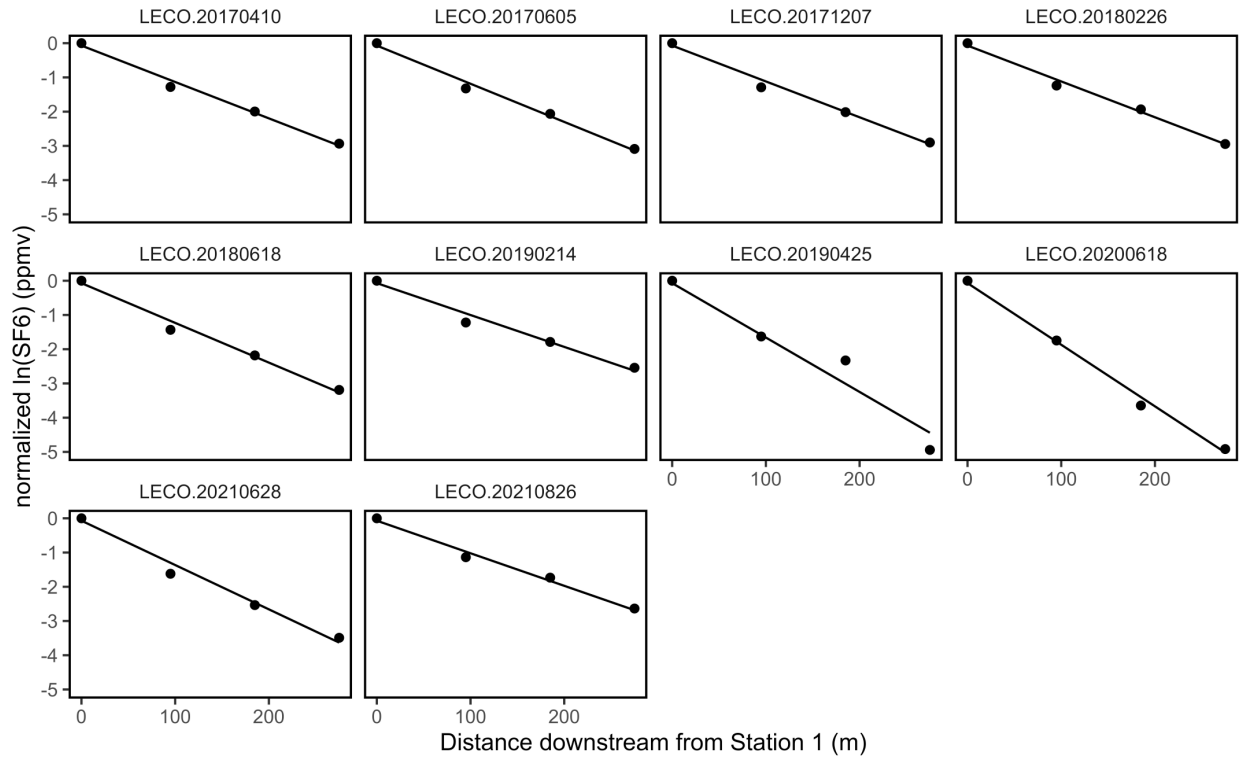
Site	Mean Q (lps)	s.d. Q (lps)	Min Q (lps)	Max Q (lps)	Range Q (lps)
BIGC	70.8	49.9	16.2	195.7	179.5
BLDE	287.4	375.3	60.9	1247.2	1186.3
CARI	443.2	292.6	181.7	1030.0	848.3
COMO	49.4	75.1	1.1	251.9	250.9
CUPE	66.0	64.1	17.5	313.0	295.5
GUIL	159.5	102.2	63.1	371.5	308.4
HOPB	165.7	250.7	4.7	869.9	865.3
KING	101.5	60.5	11.2	140.1	128.9
LECO	229.2	109.7	93.1	426.1	333.0
LEWI	41.6	37.7	15.4	159.5	144.1
MART	140.2	201.5	19.5	503.1	483.6
MAYF	172.7	80.4	86.1	329.4	243.3
MCDI	79.5	60.5	24.8	162.3	137.5
MCRA	179.2	206.3	8.4	751.5	743.1
OKSR	942.5	822.8	151.7	2512.7	2361.0
POSE	16.5	20.7	1.1	99.3	98.2
PRIN	107.2	46.0	61.0	170.6	109.6
REDB	105.8	127.1	12.2	525.3	513.1
SYCA	93.6	110.7	13.0	357.3	344.3
TECR	66.8	90.3	4.8	269.6	264.8
WALK	6.4	4.7	3.6	18.8	15.2
WLOU	90.5	119.4	11.5	525.4	513.9

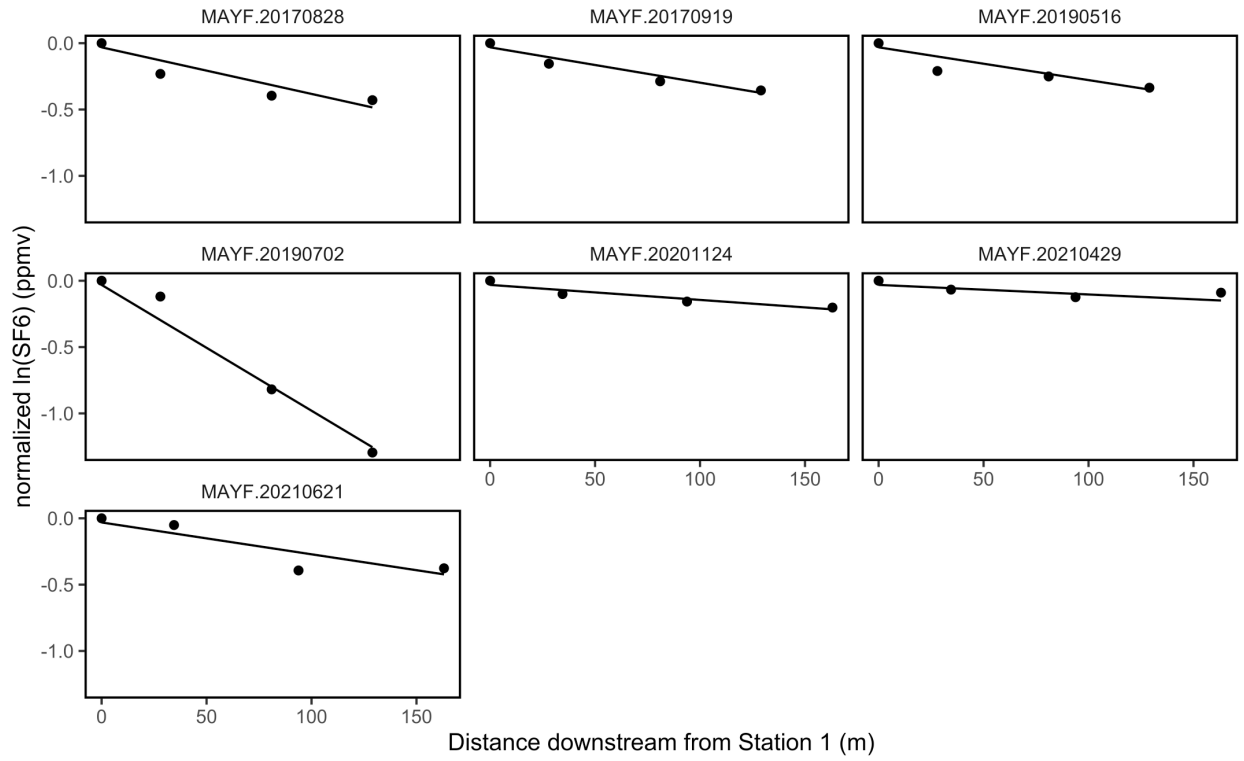
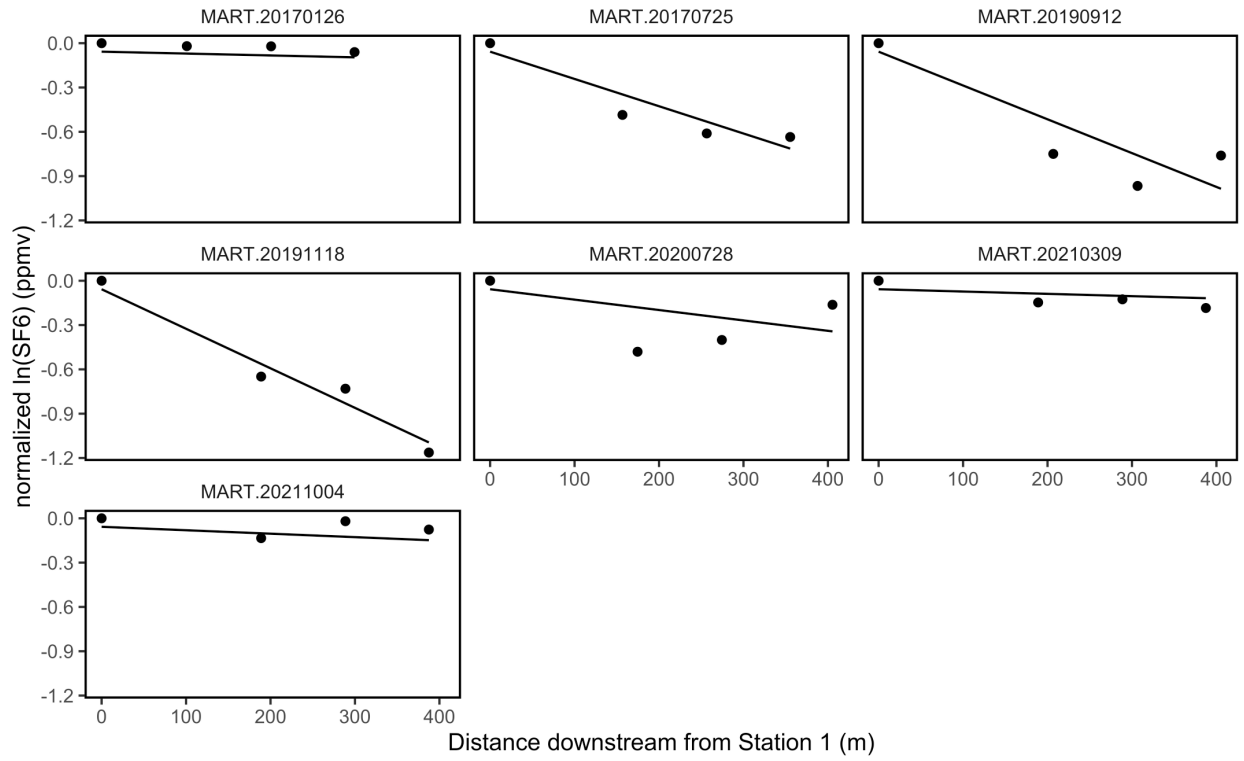


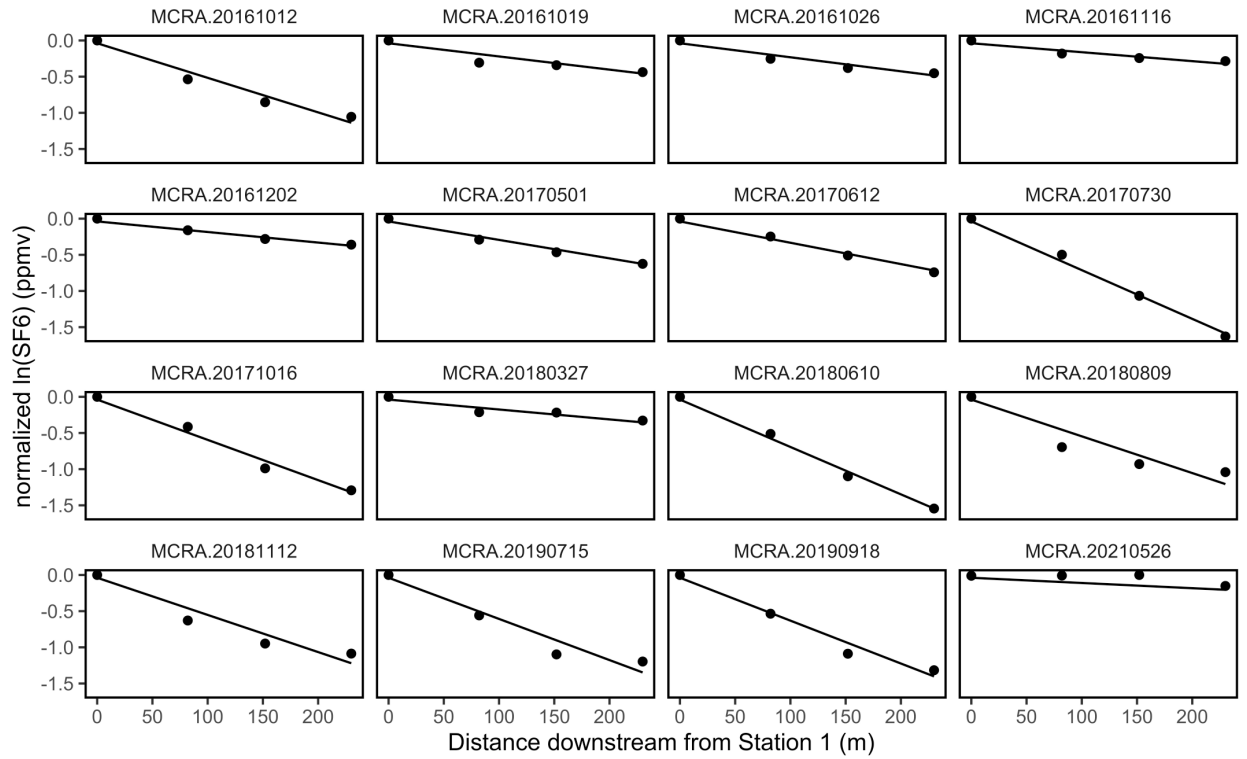
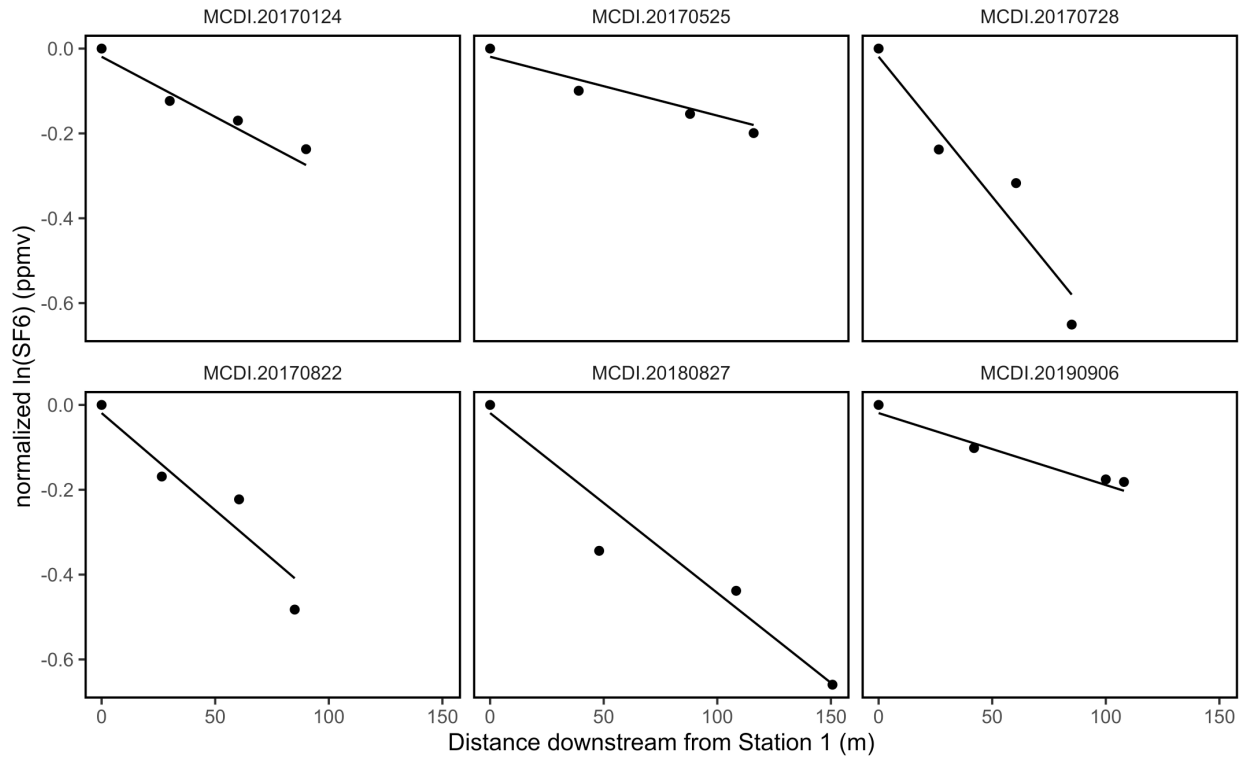


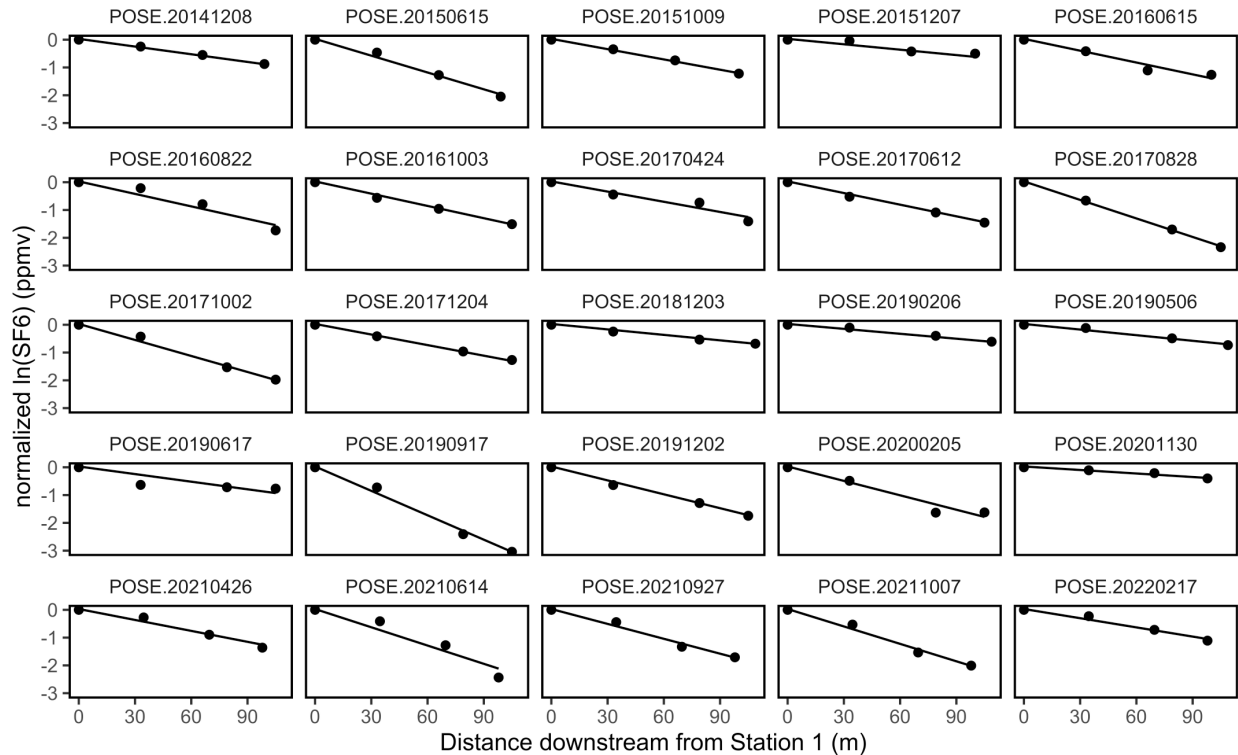
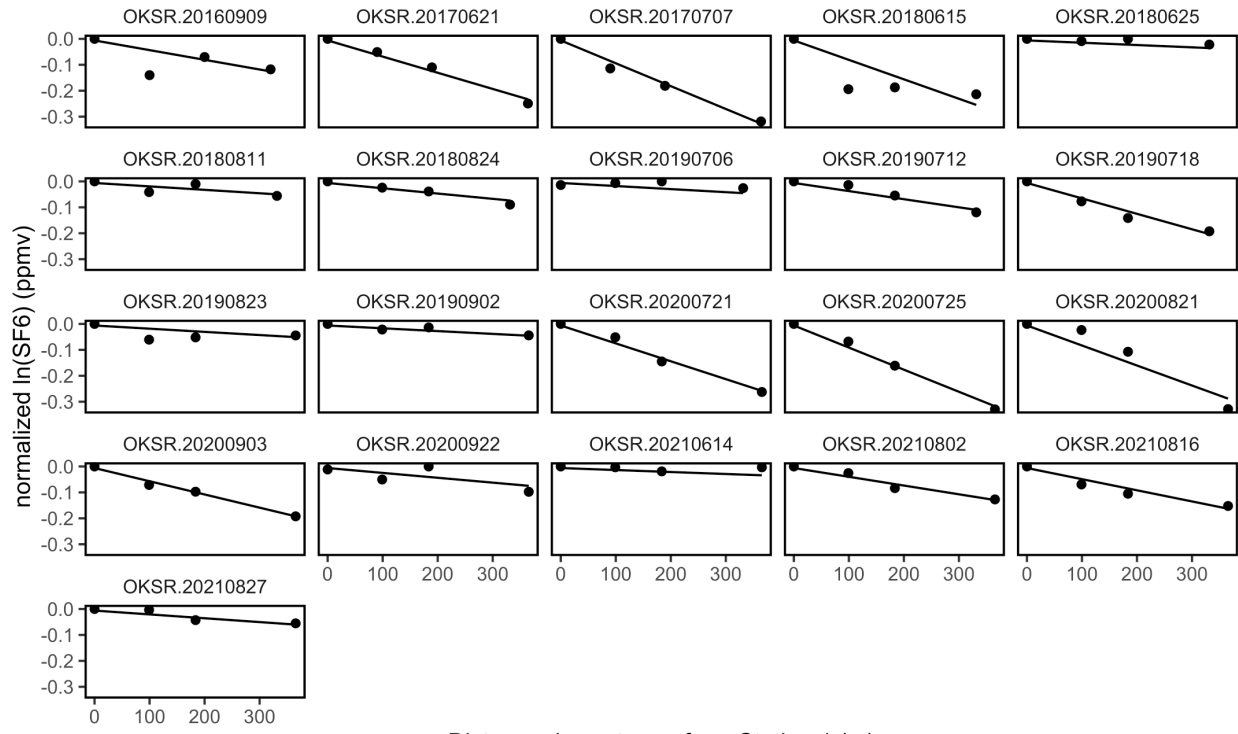


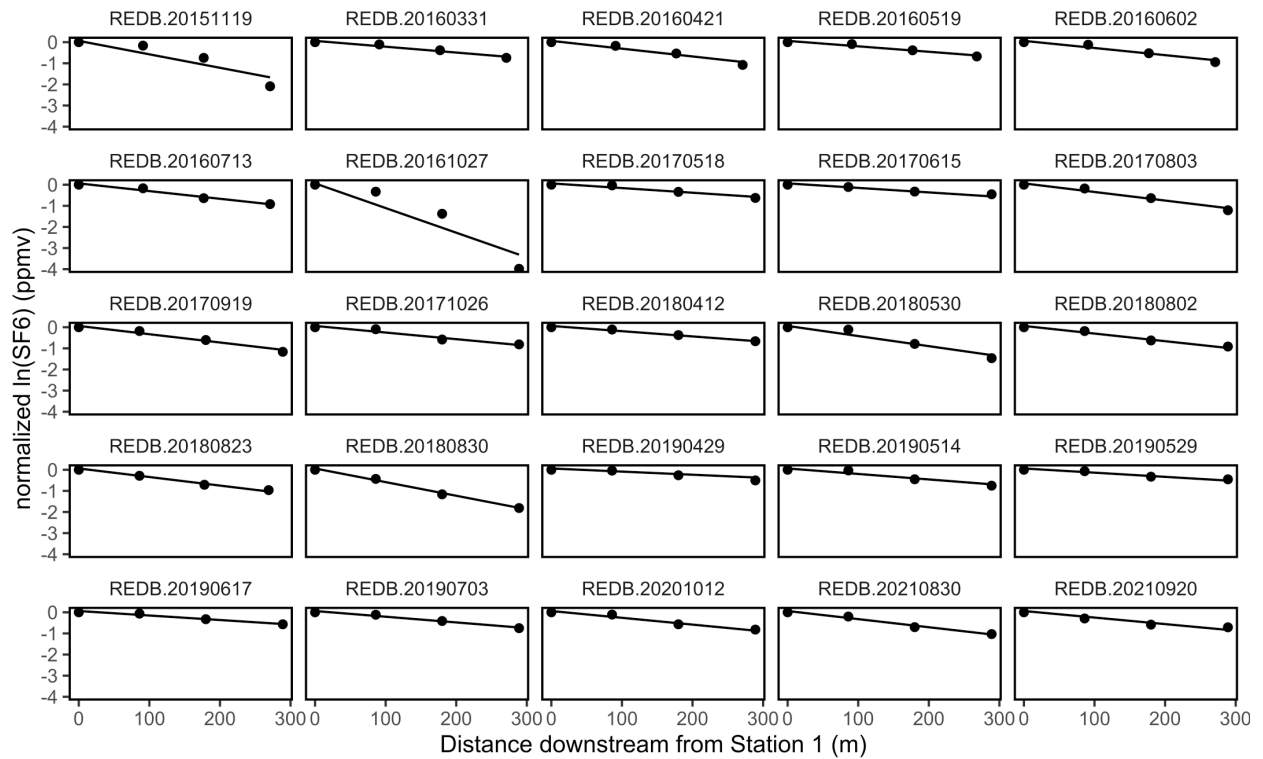
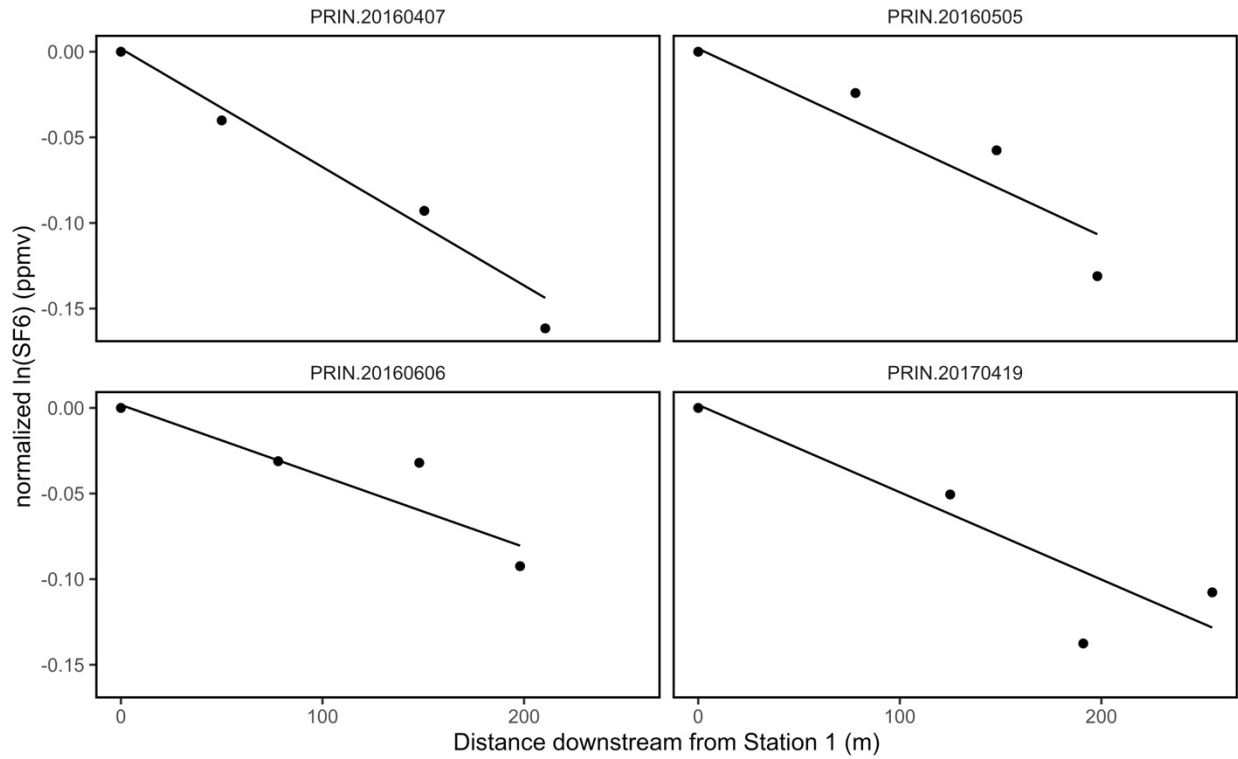


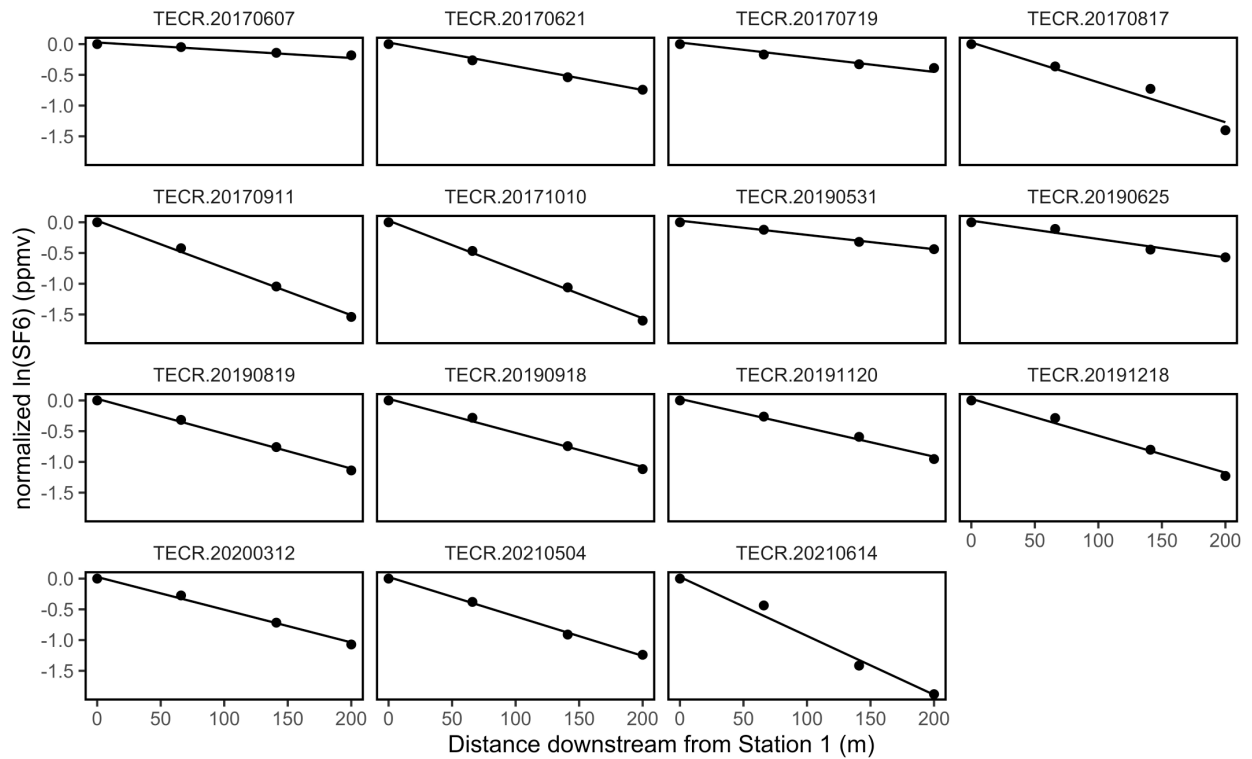
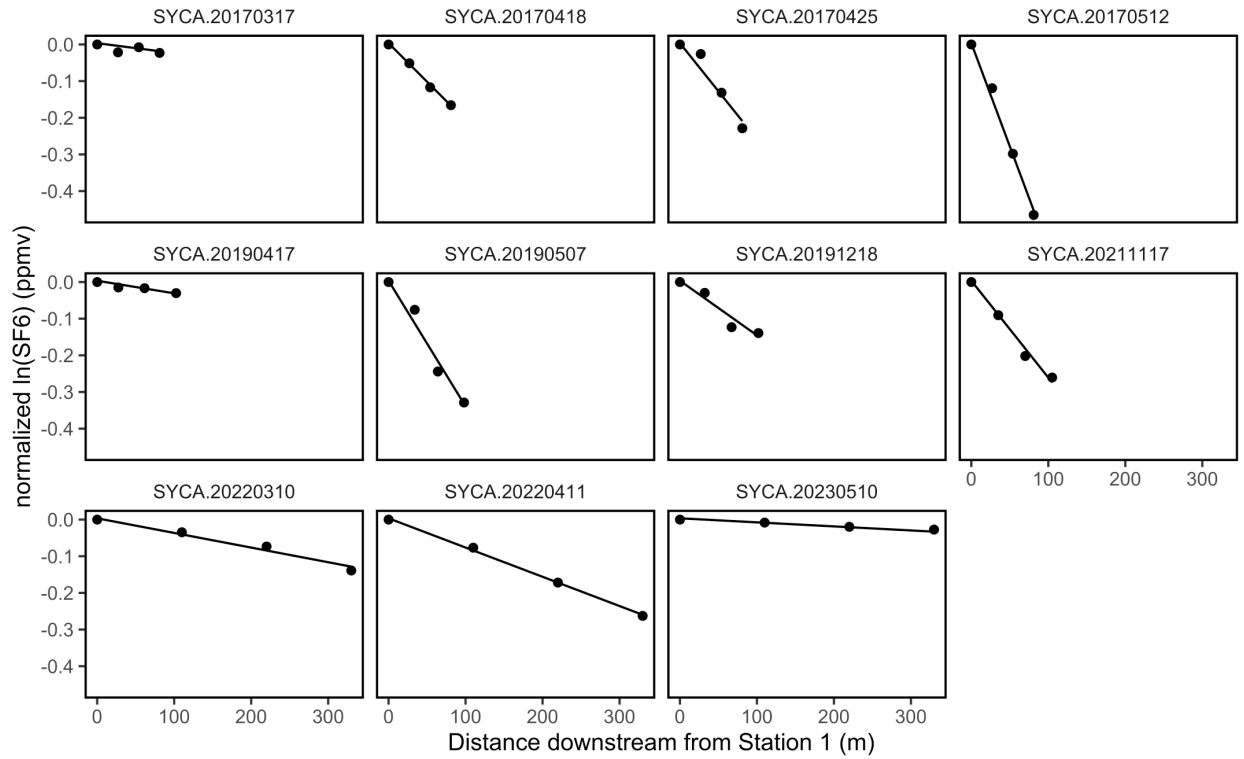












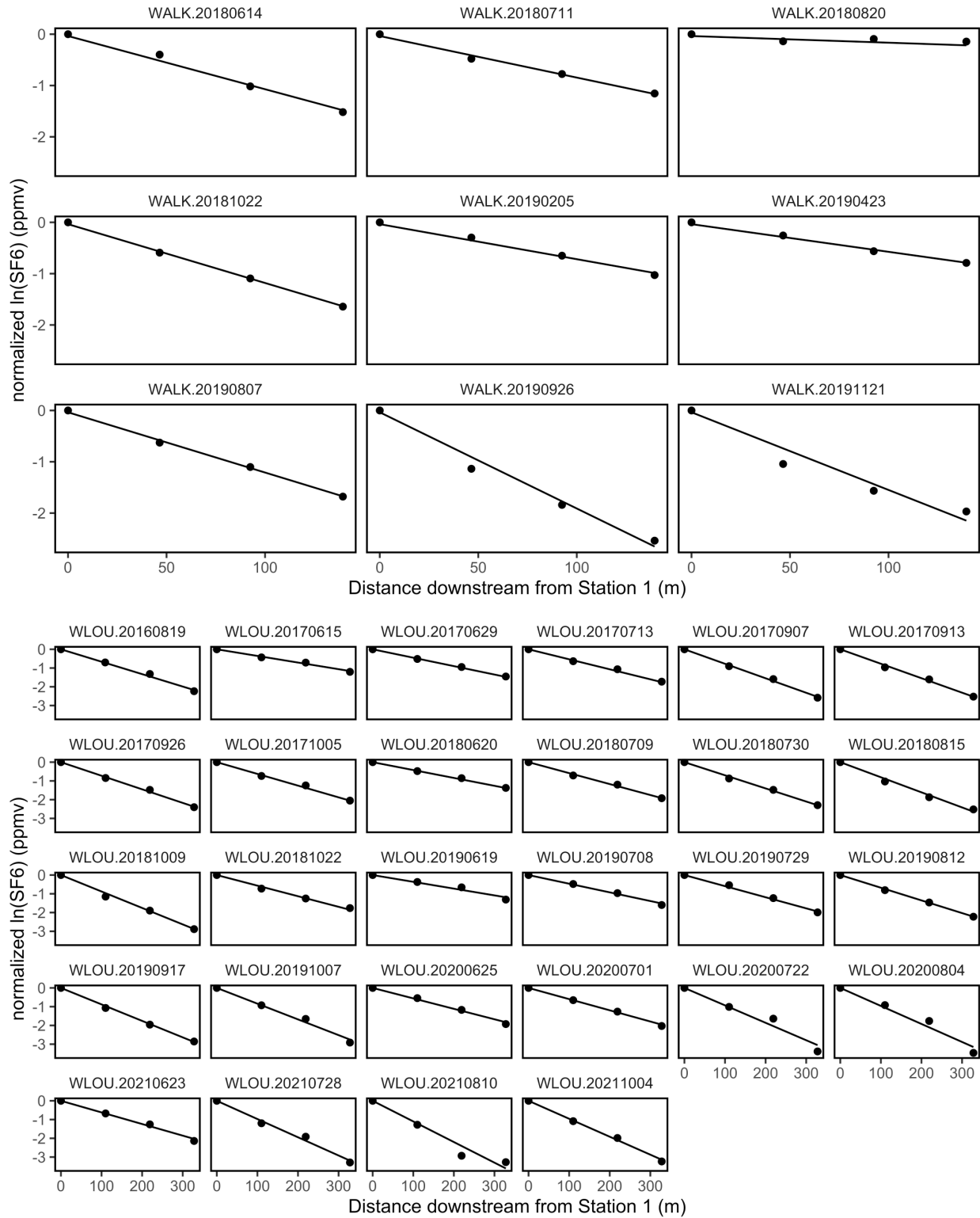
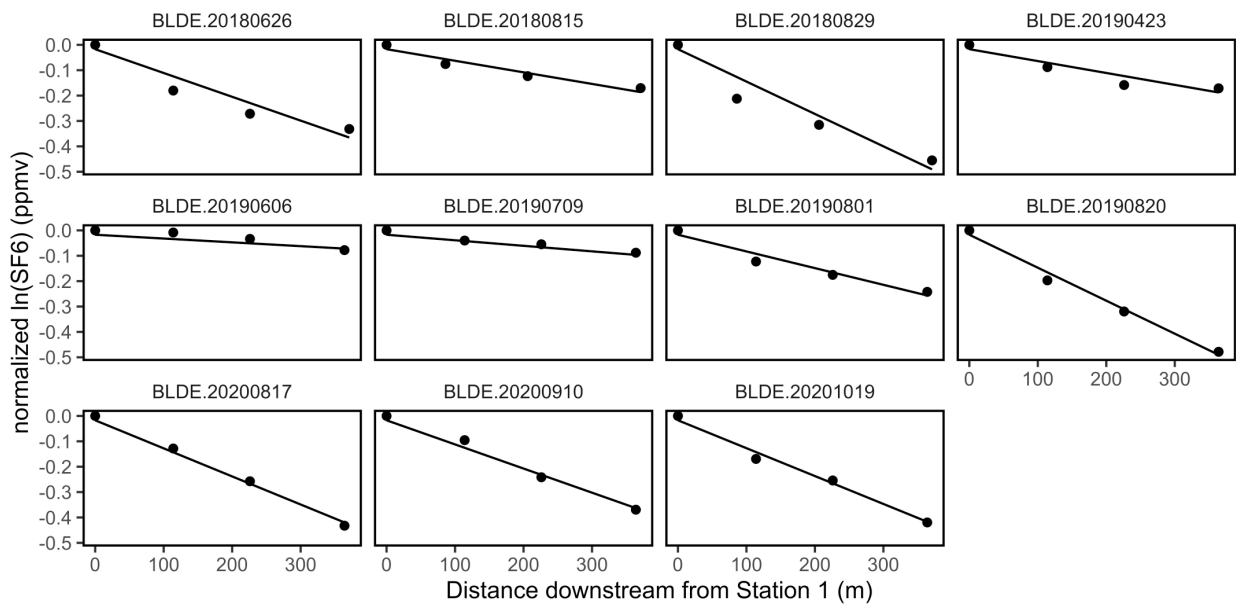
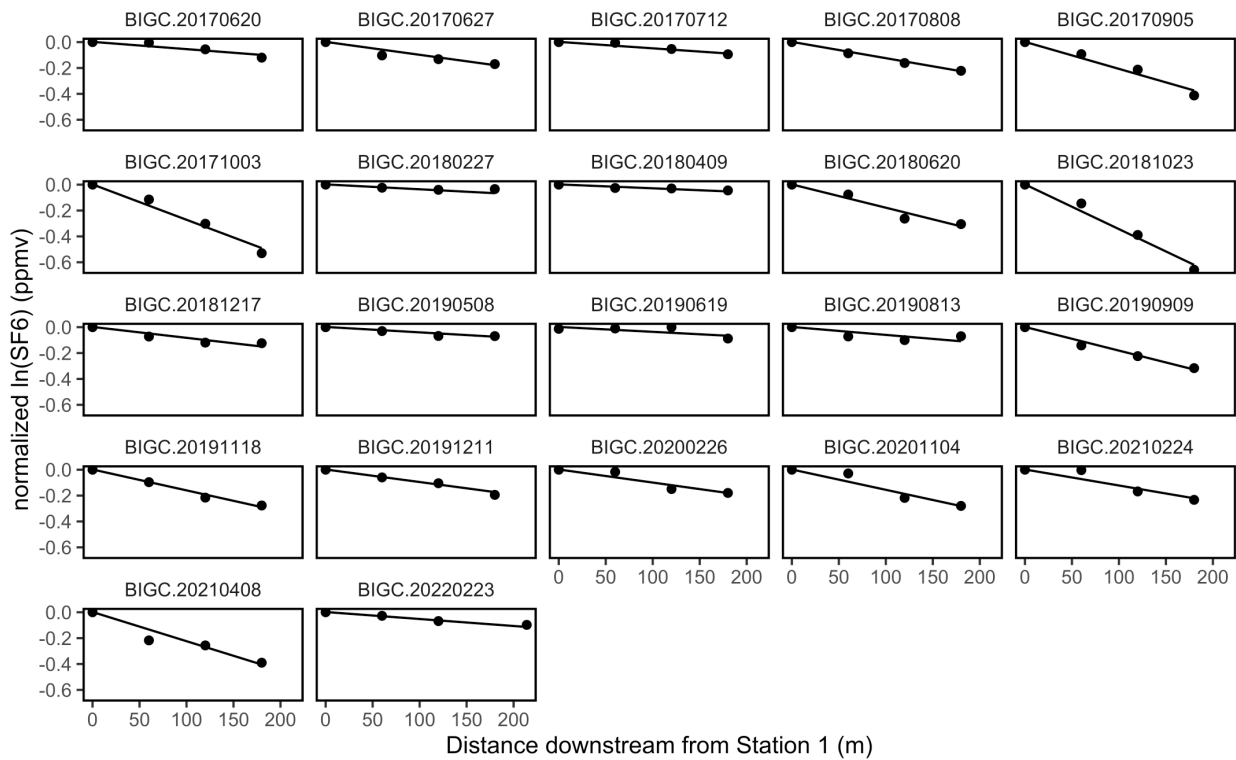
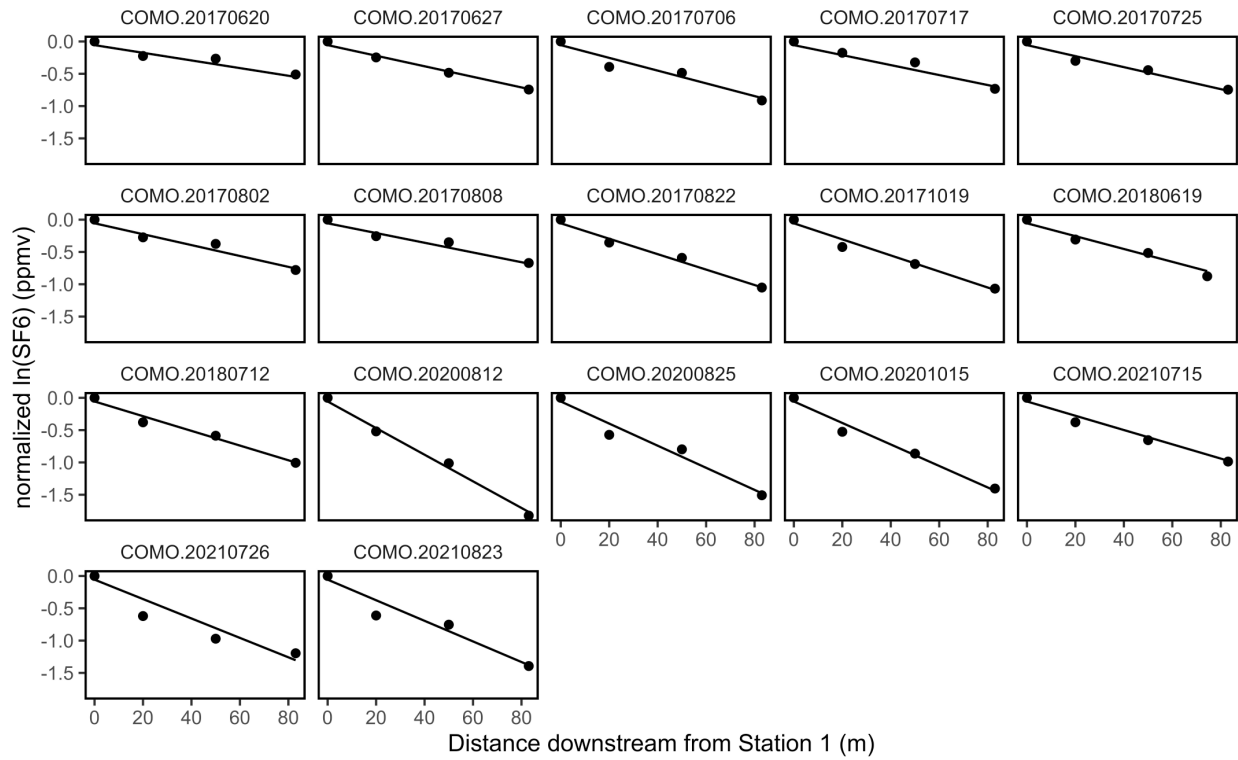
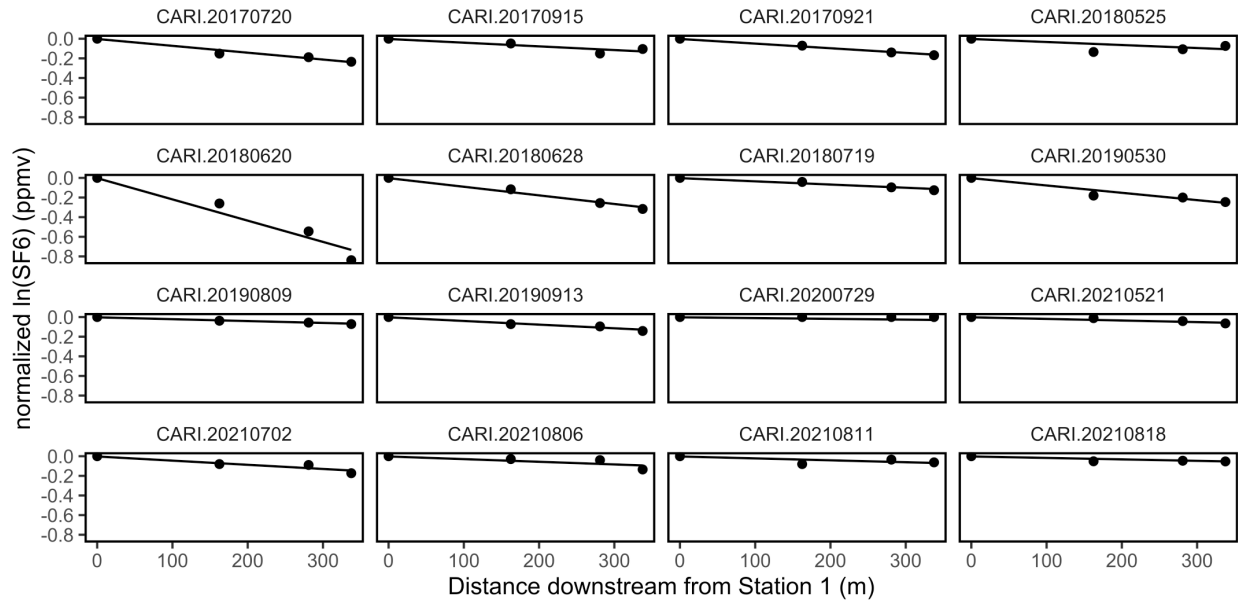
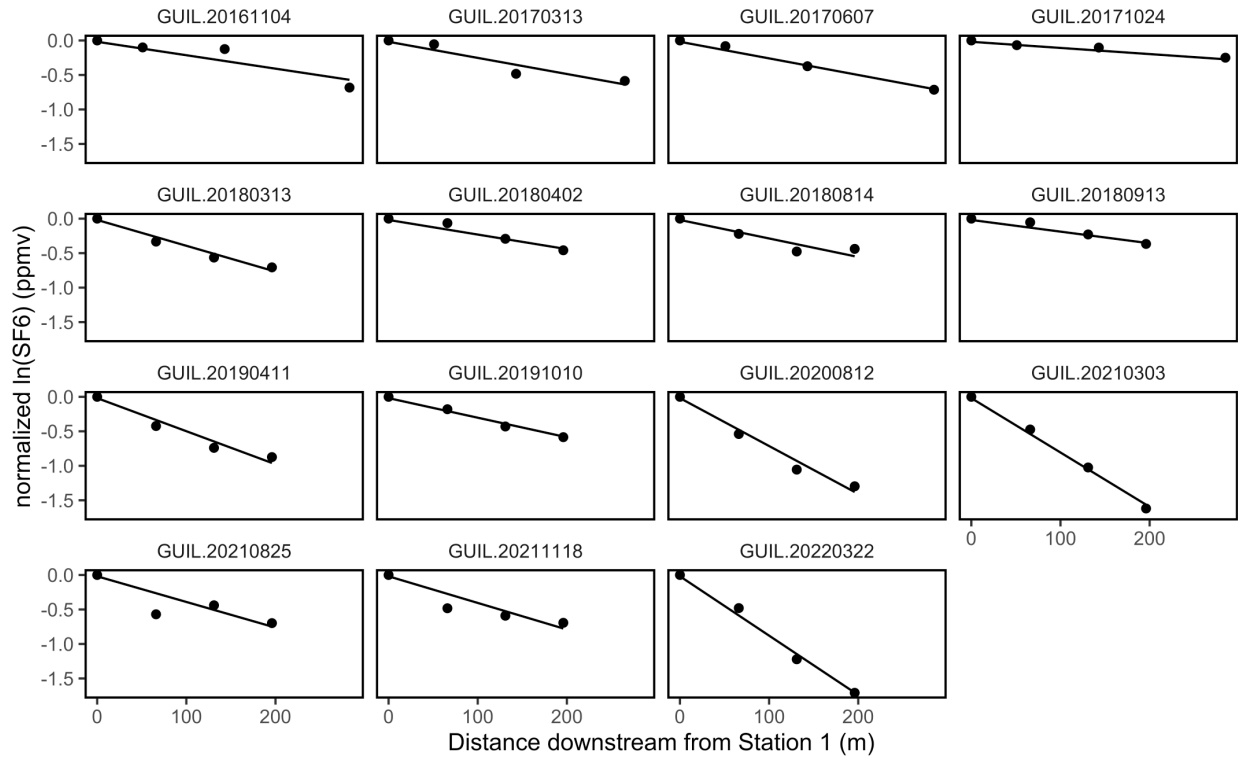
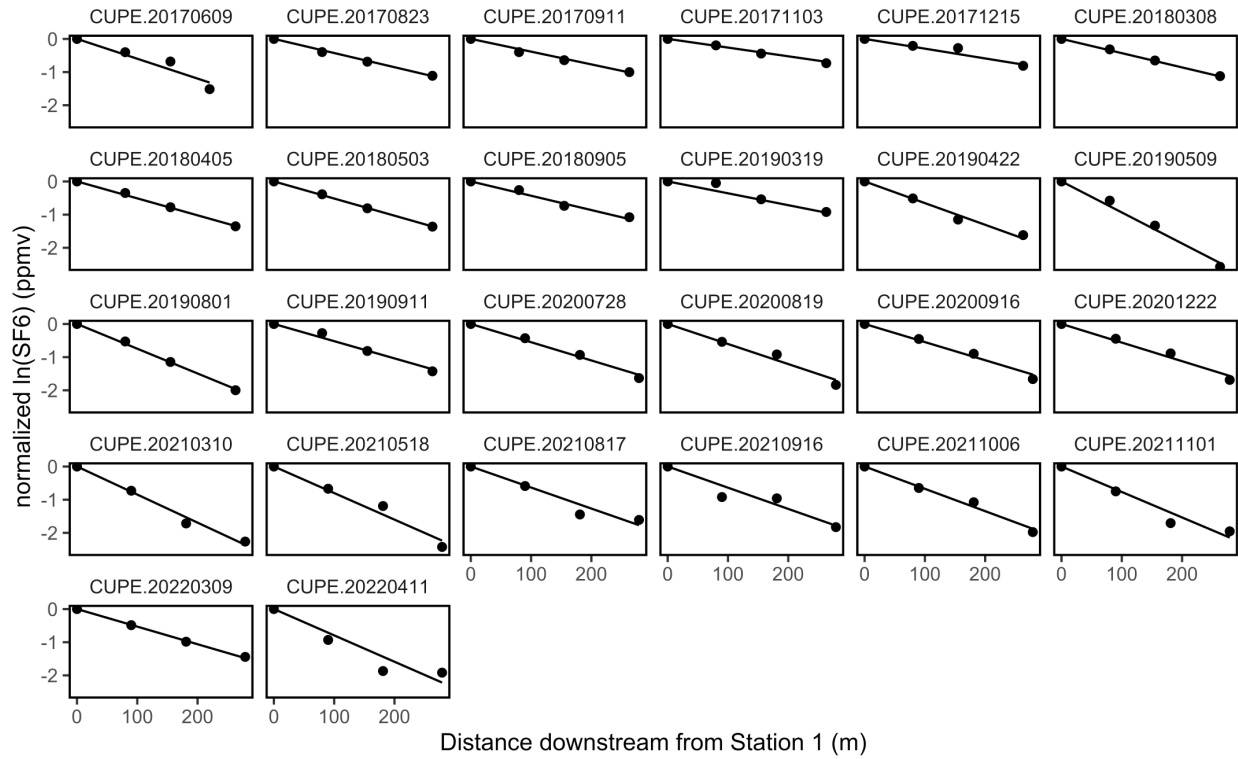
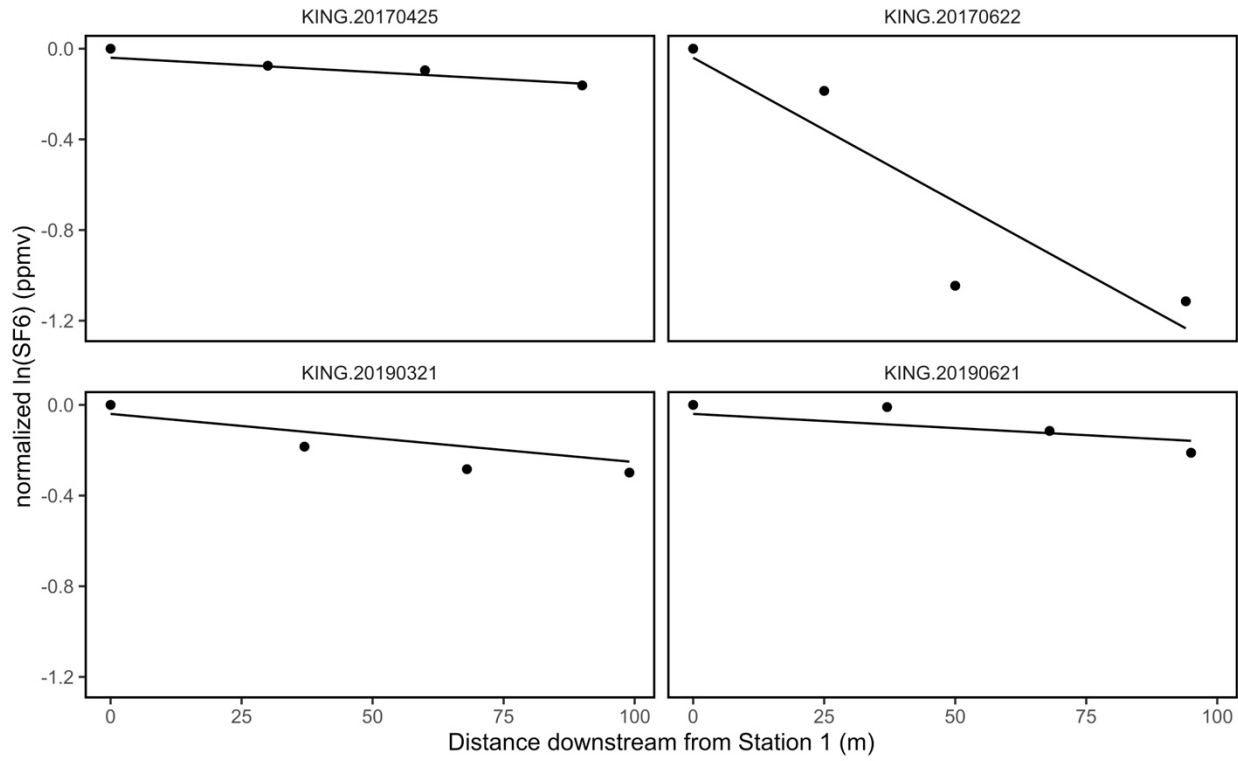
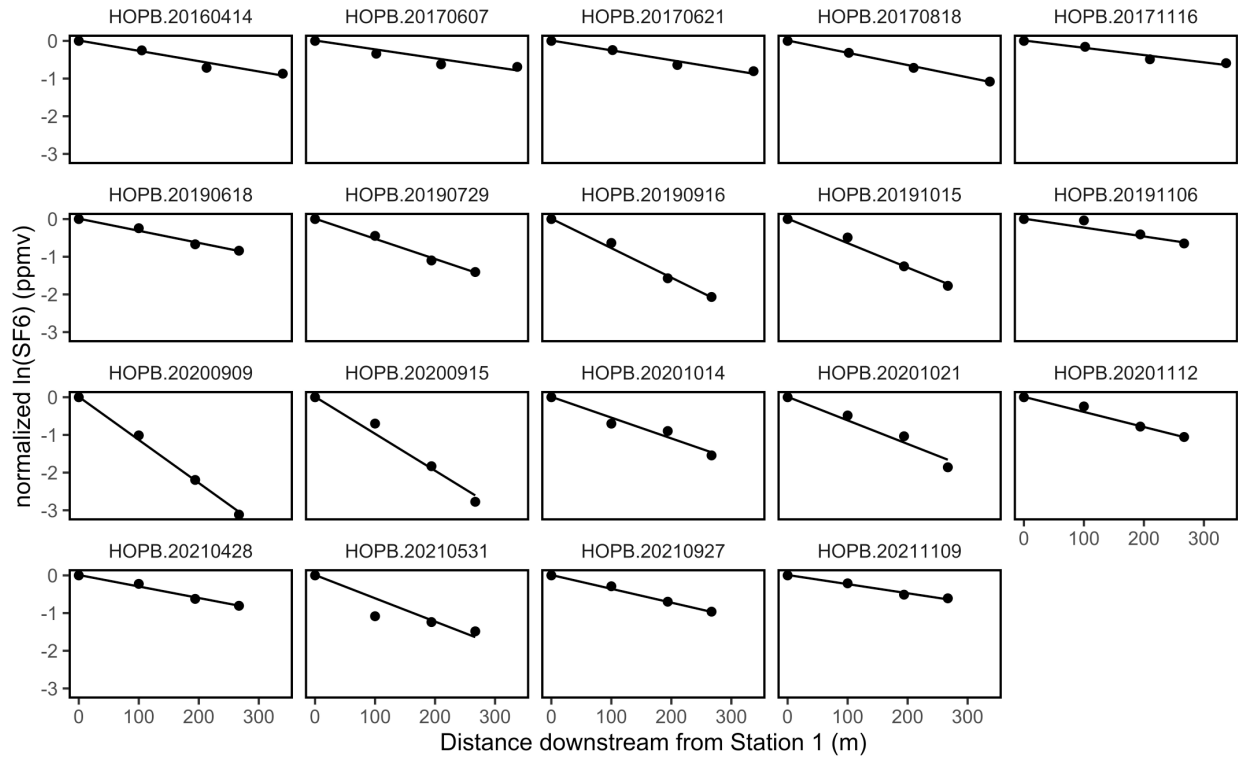


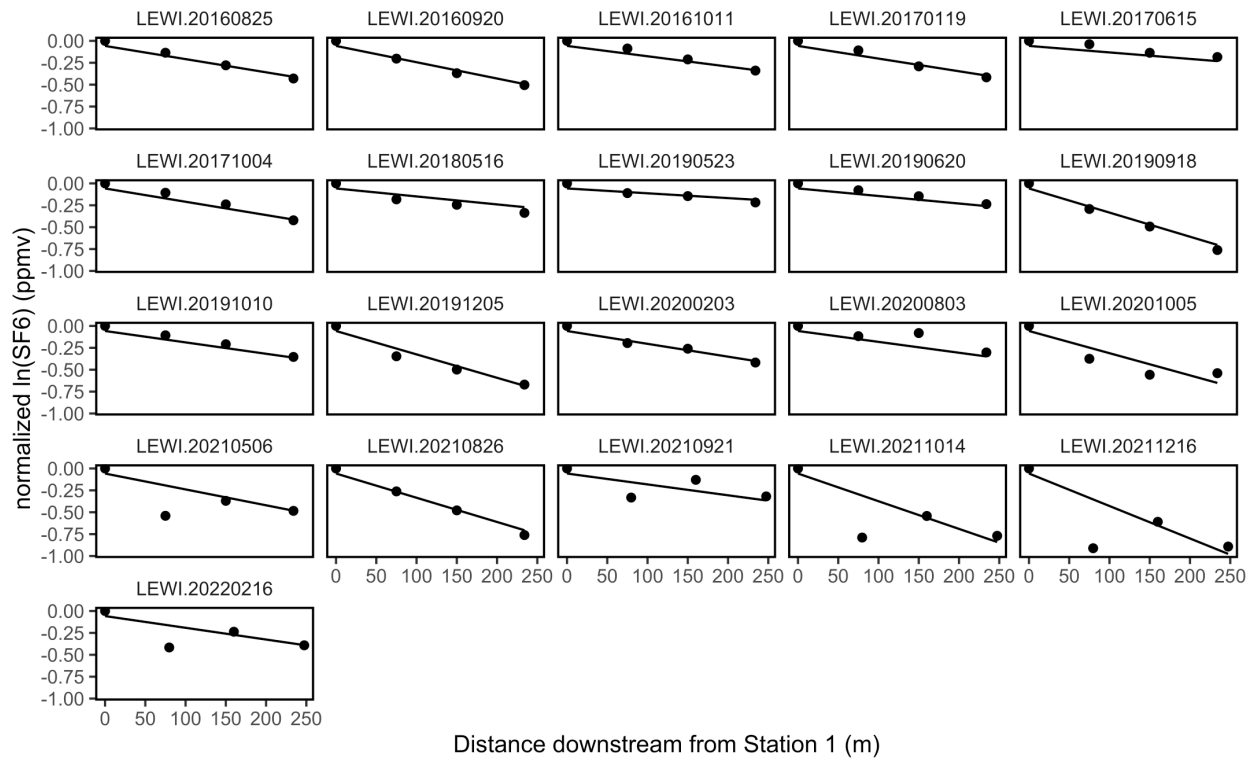
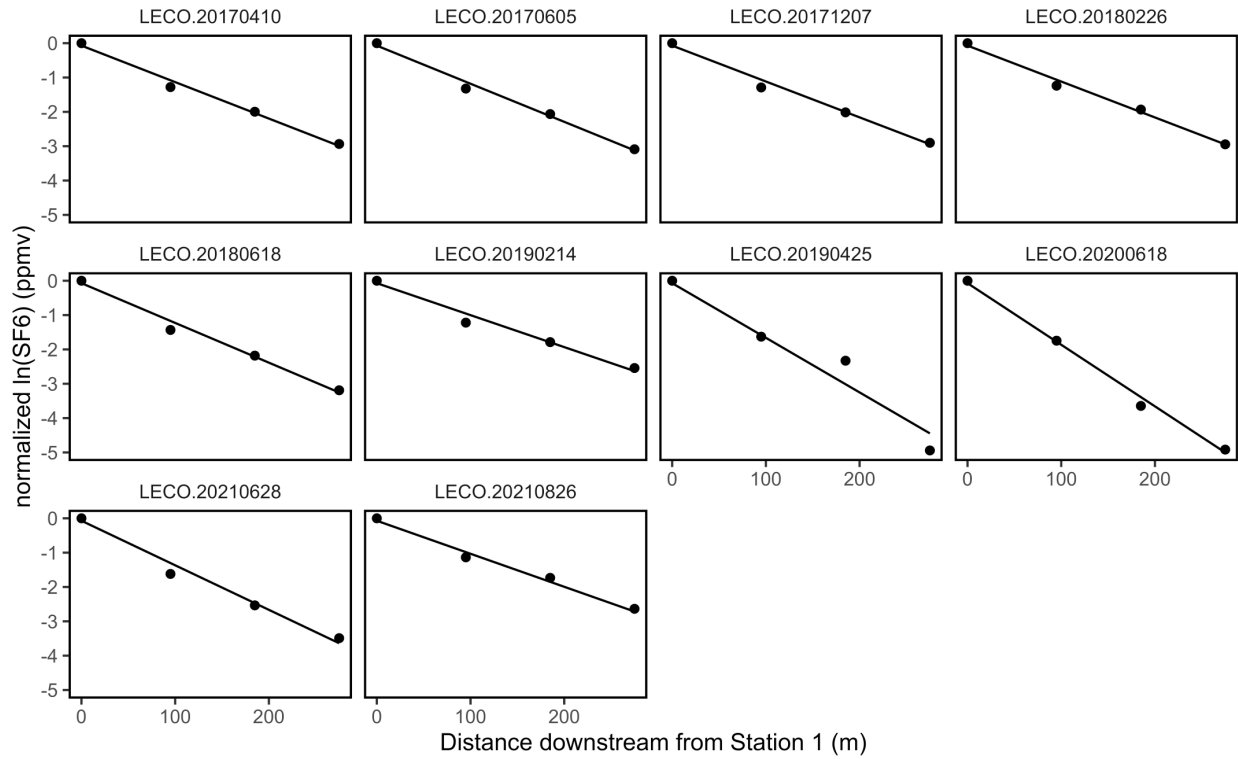
Figure S1. Model fits for Bayesian k_{600} models.

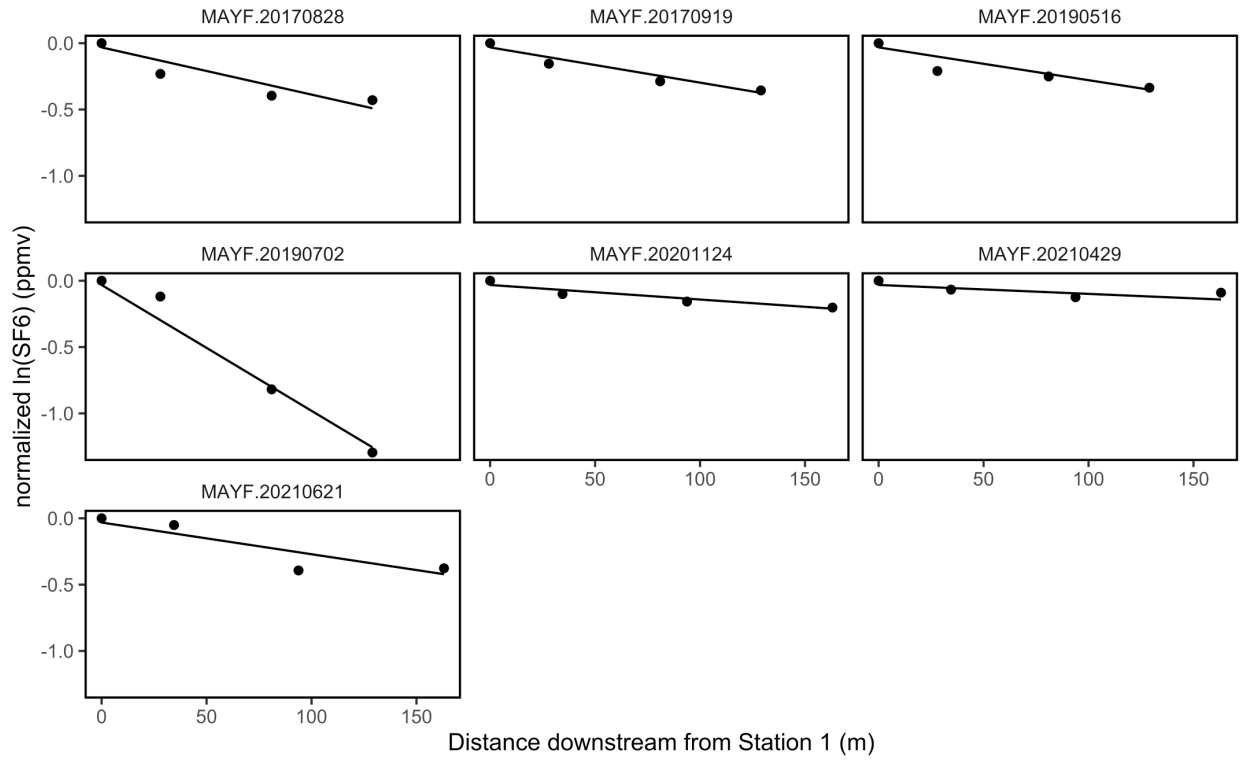
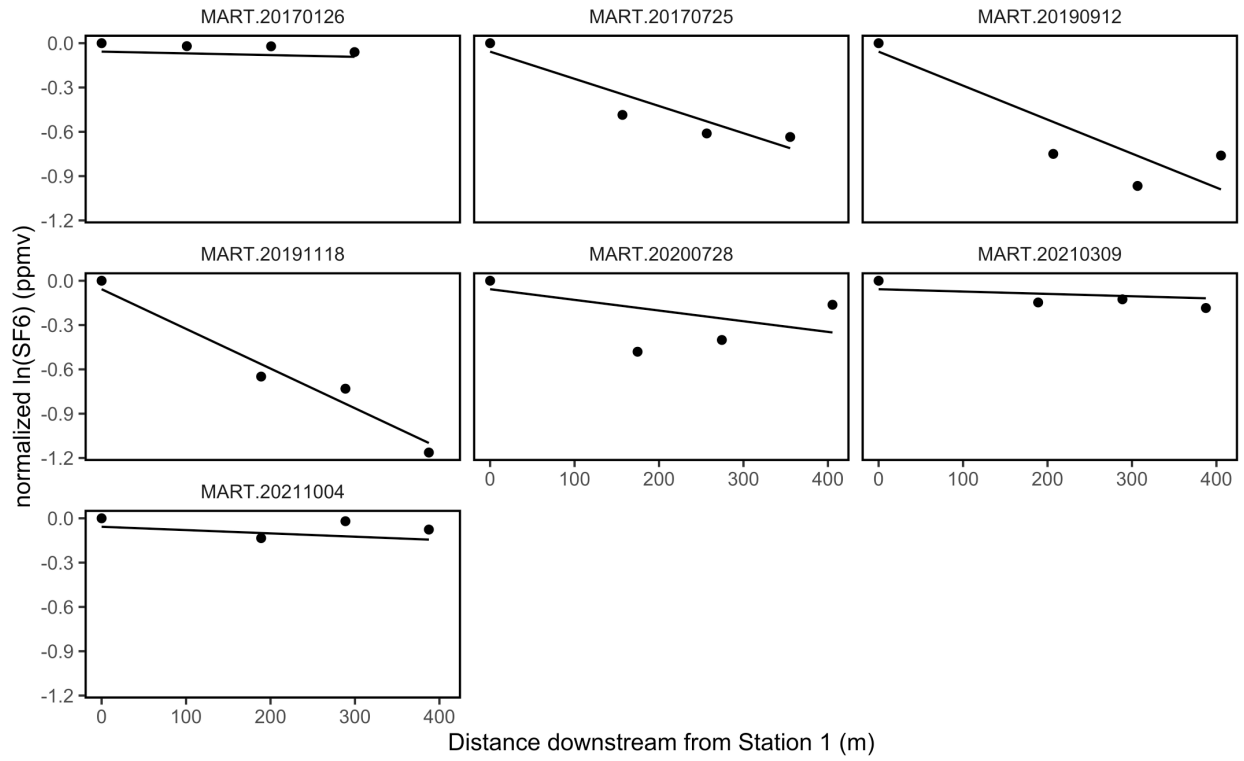


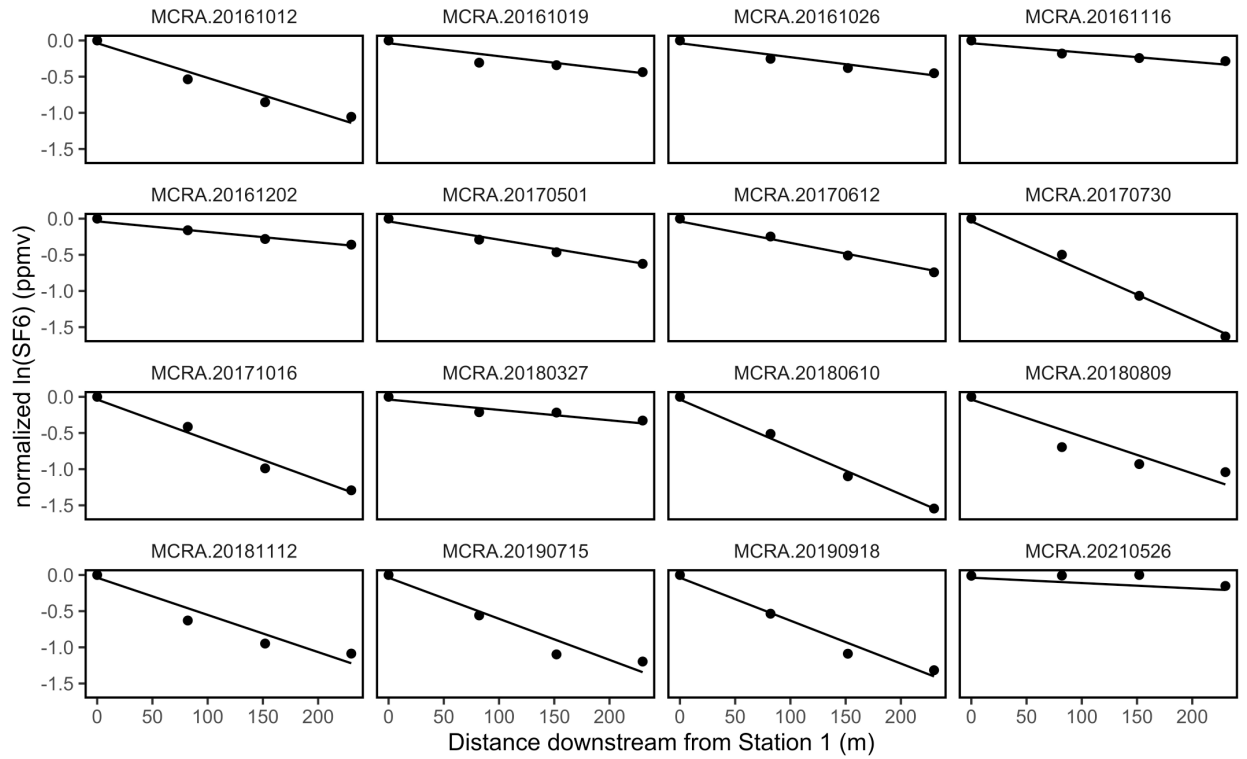
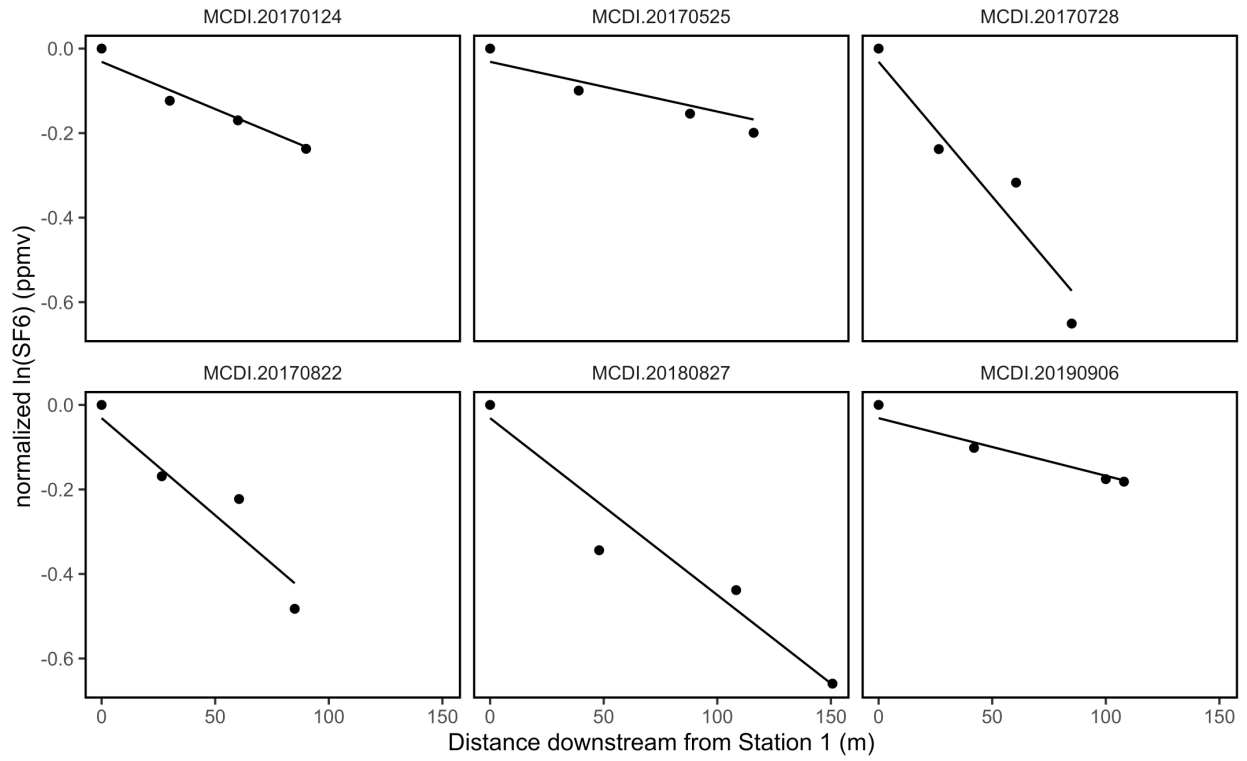


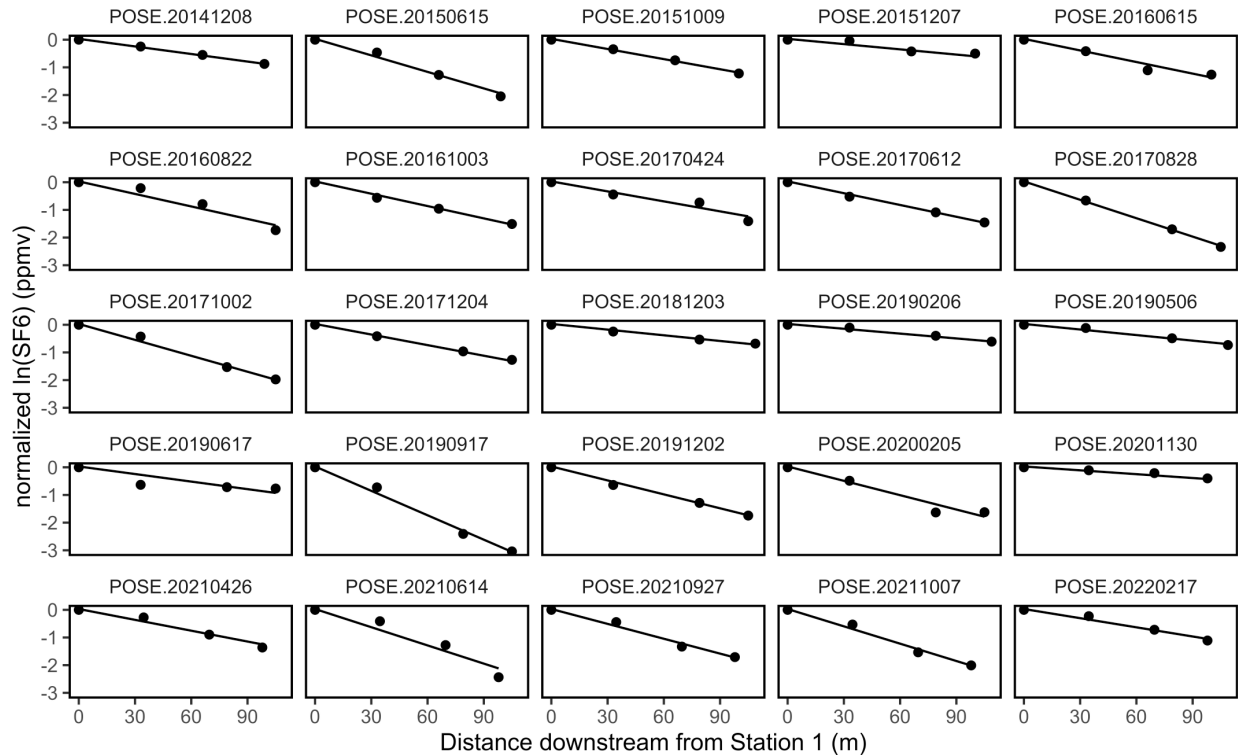
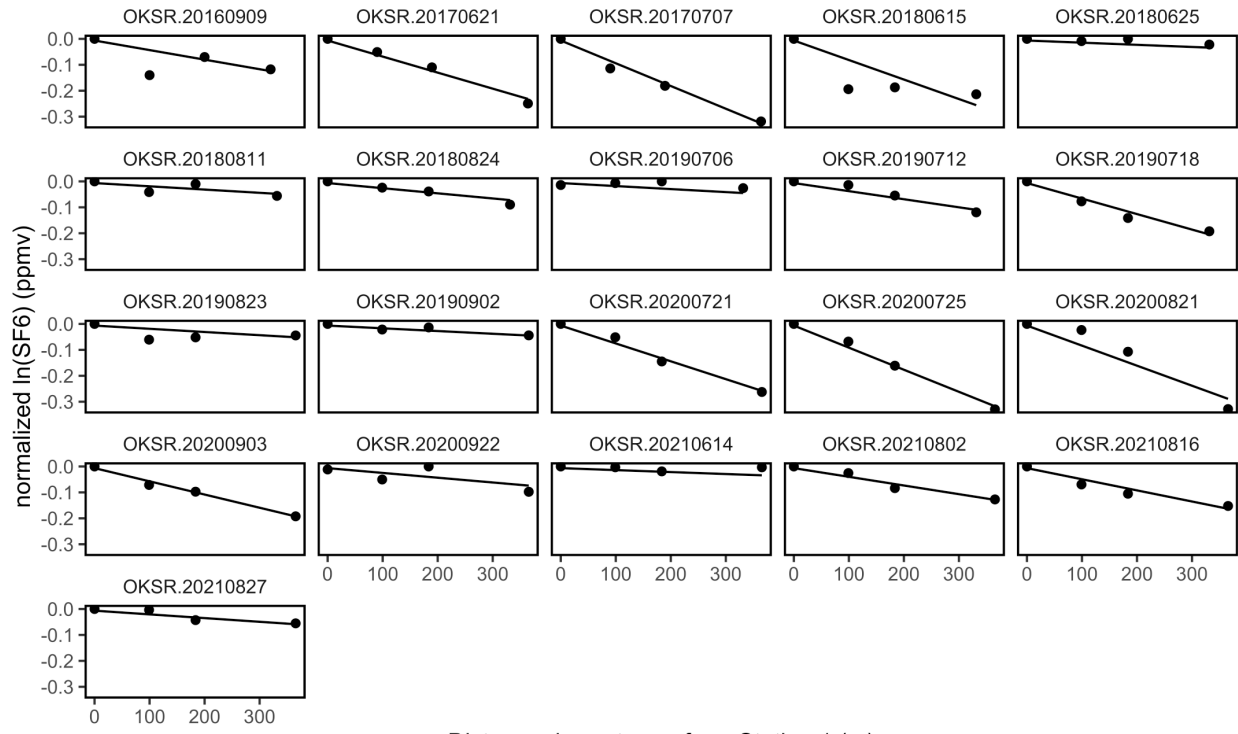


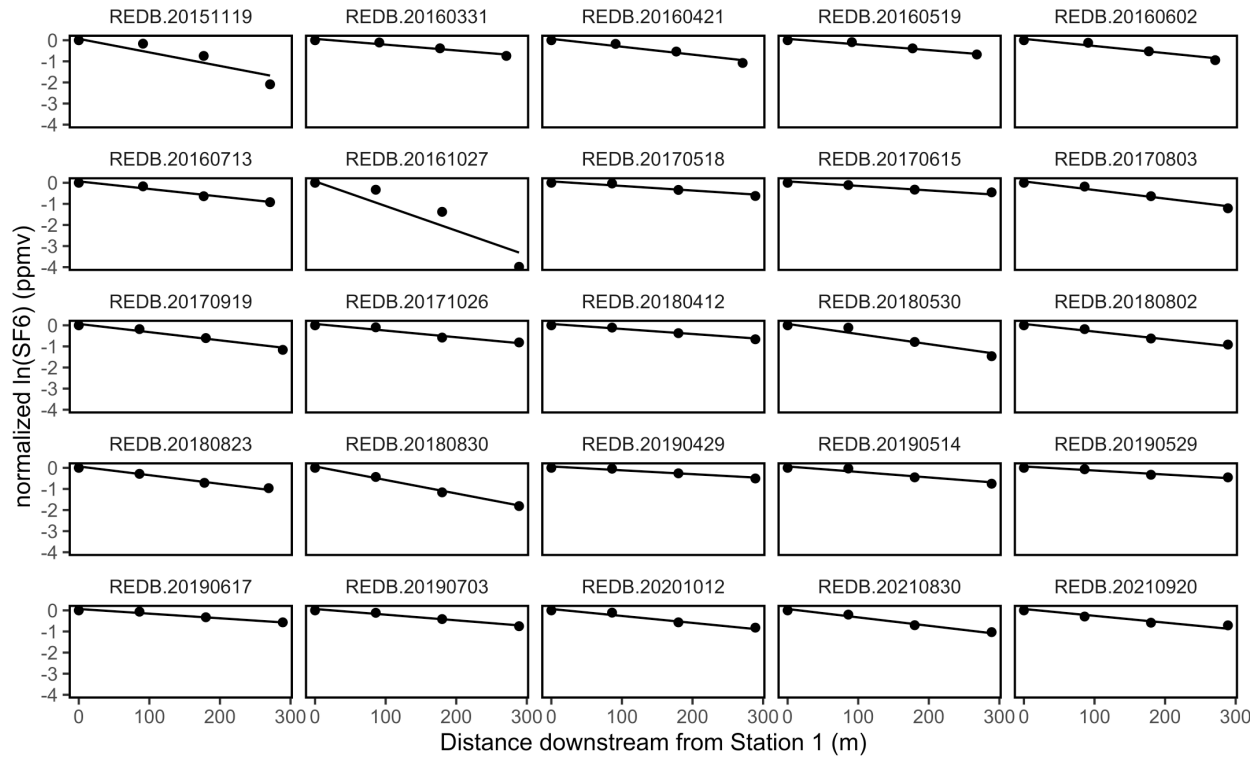
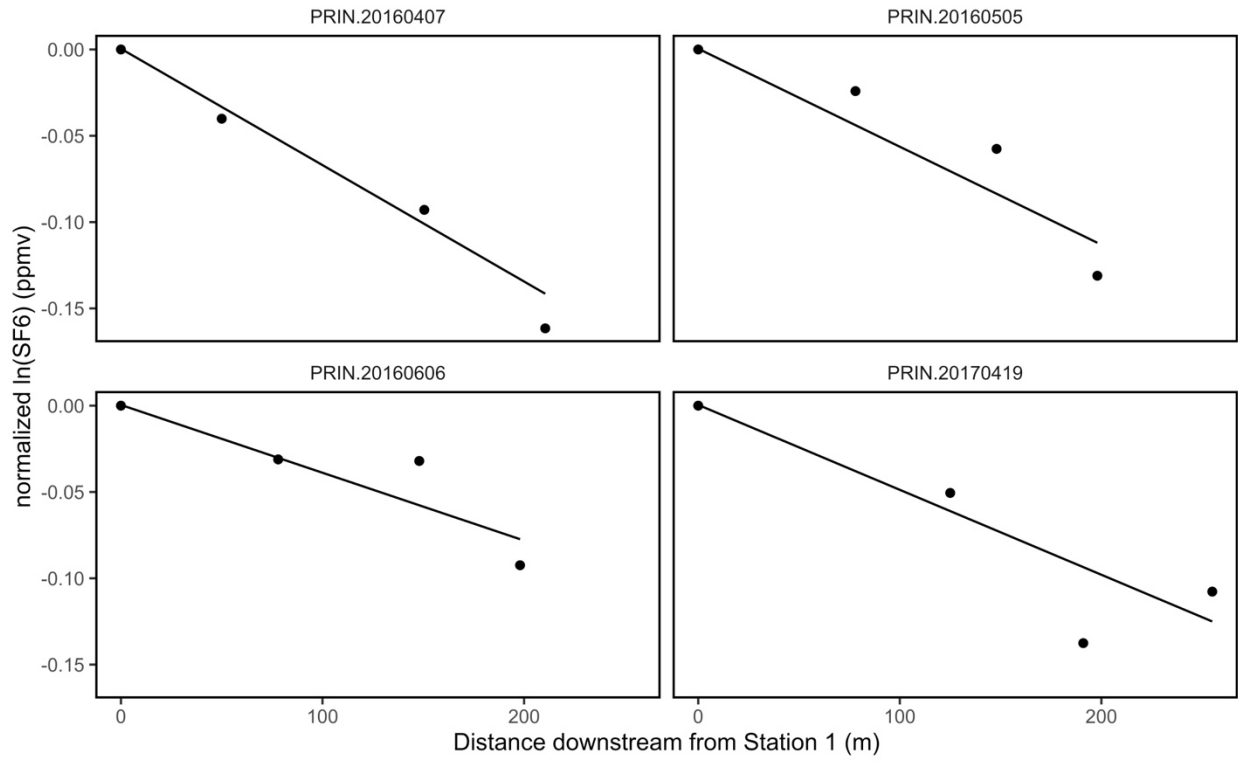


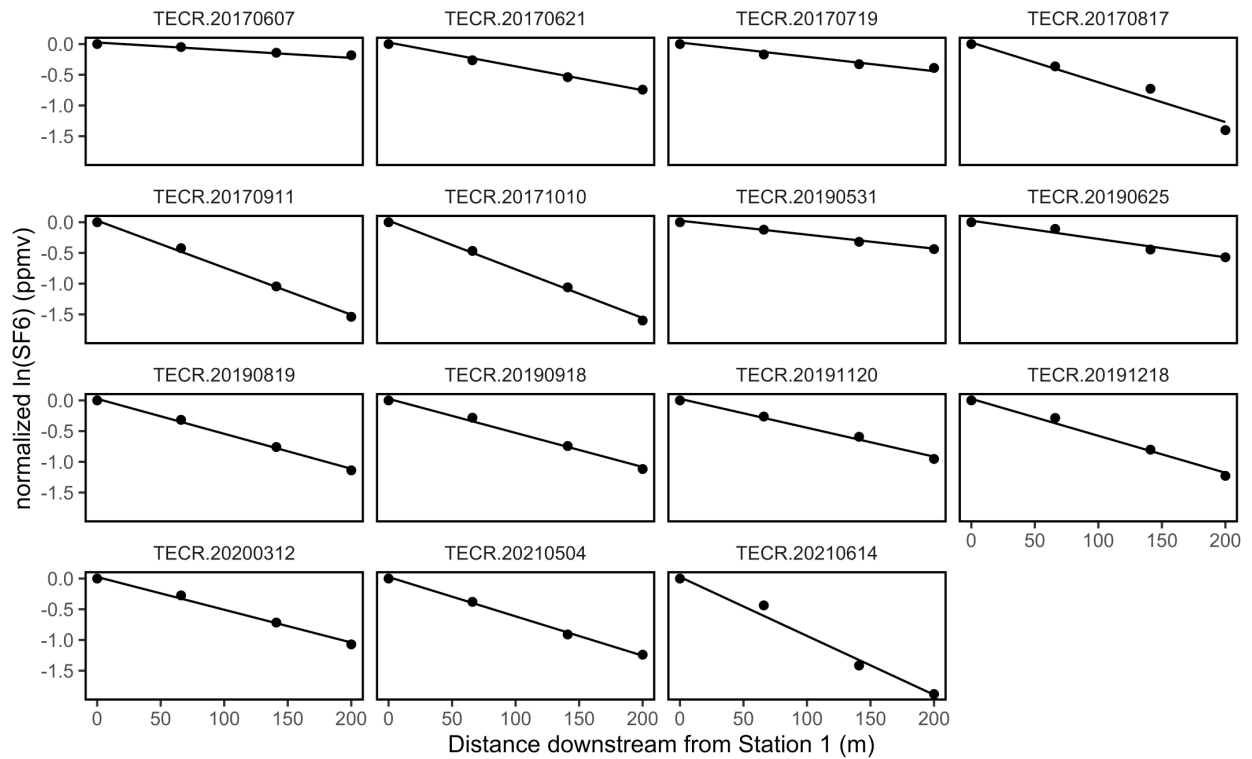
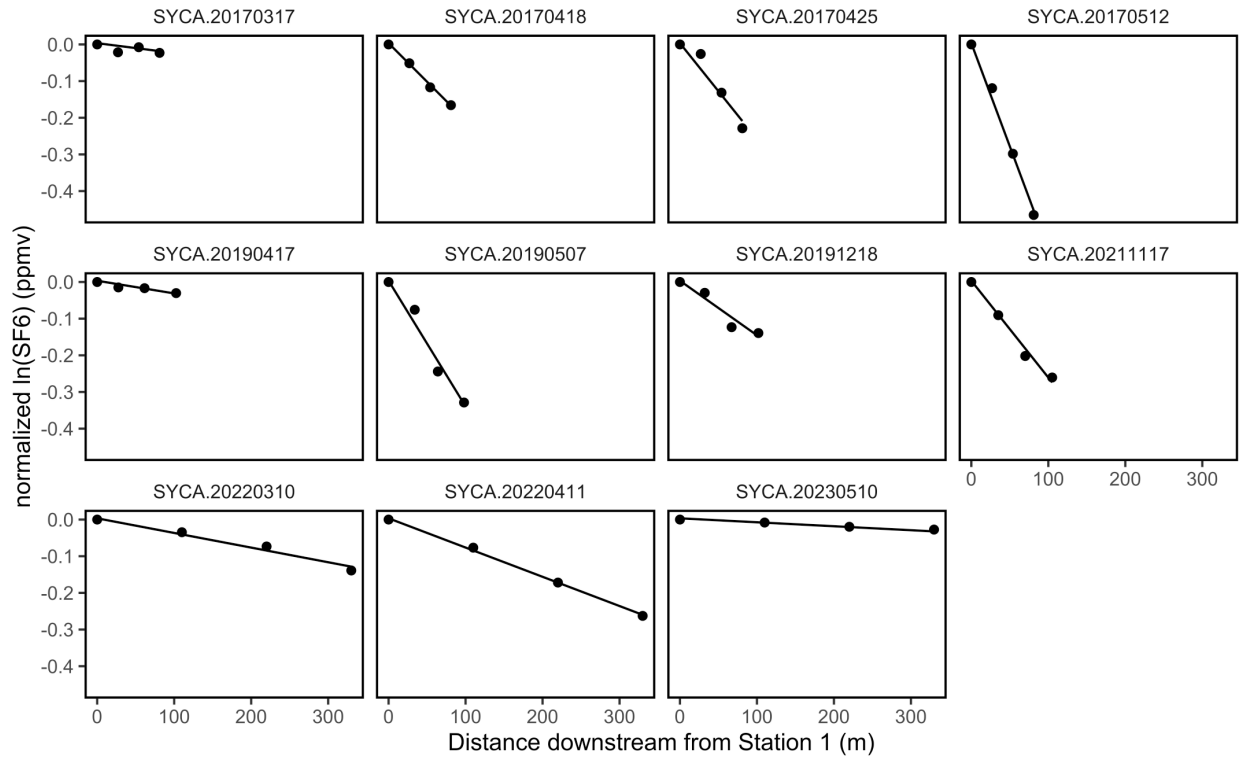












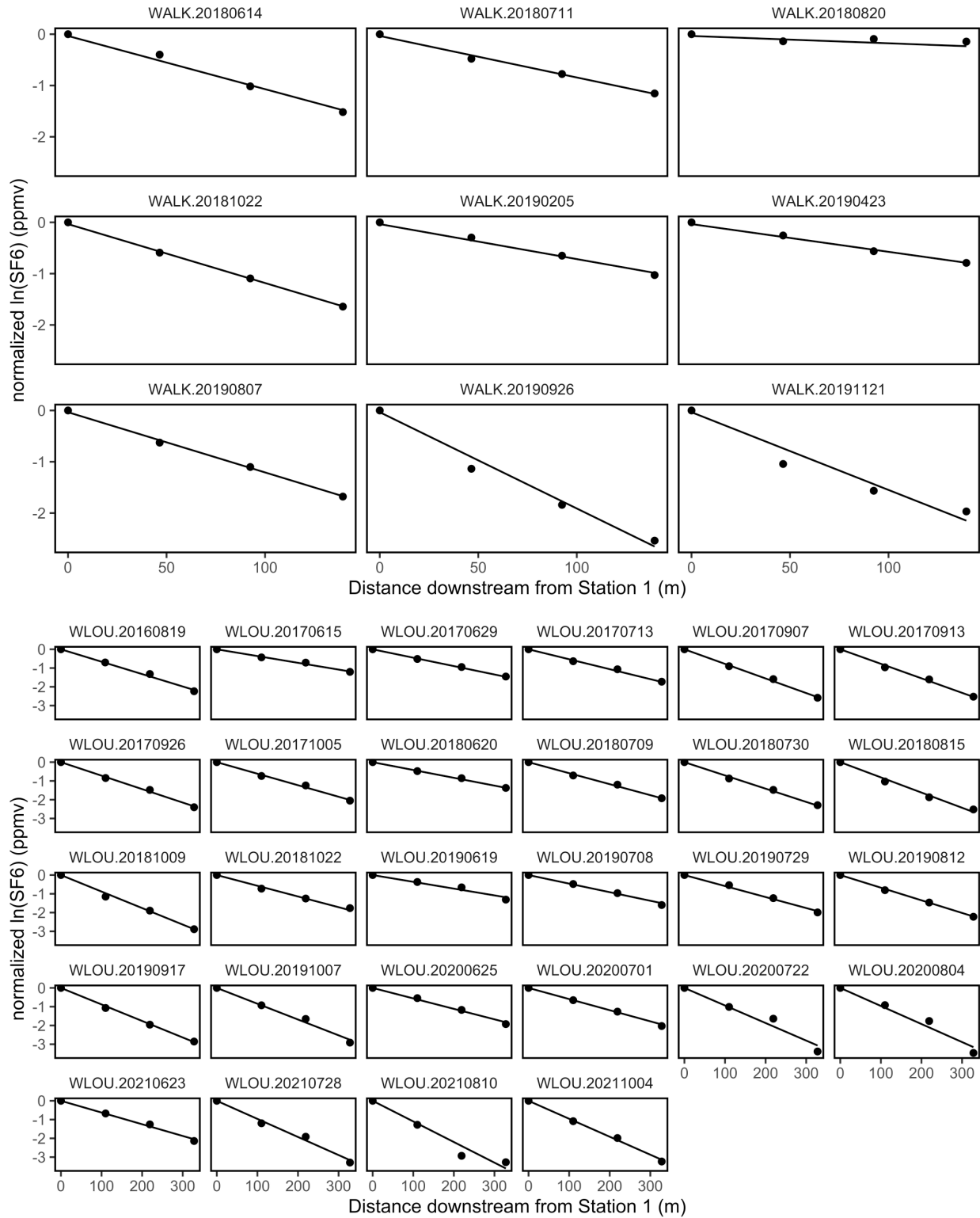
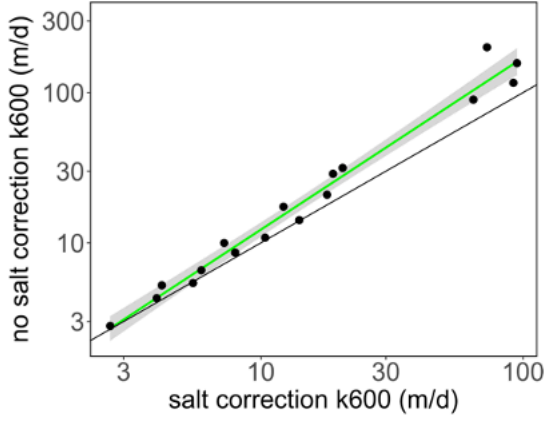


Figure S2. Model fits for Bayesian K_{600} models.

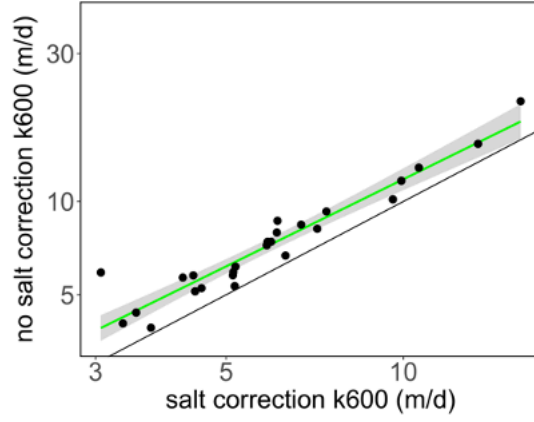
COMO

stan k600 (no salt vs salt correction)



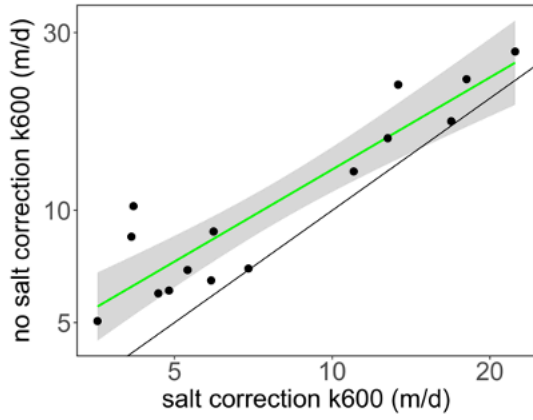
CUPE

stan k600 (no salt vs salt correction)



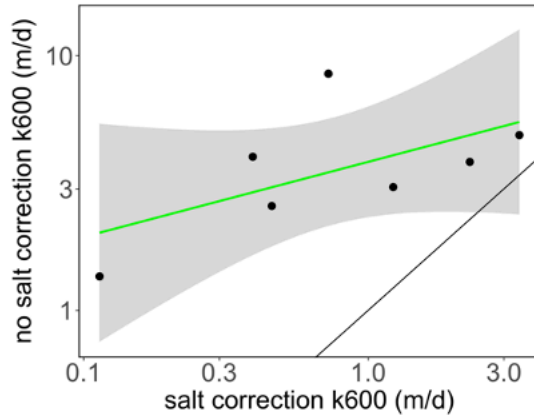
GUIL

stan k600 (no salt vs salt correction)



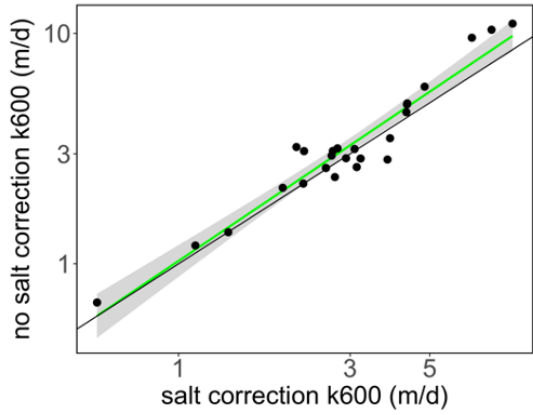
MART

stan k600 (no salt vs salt correction)



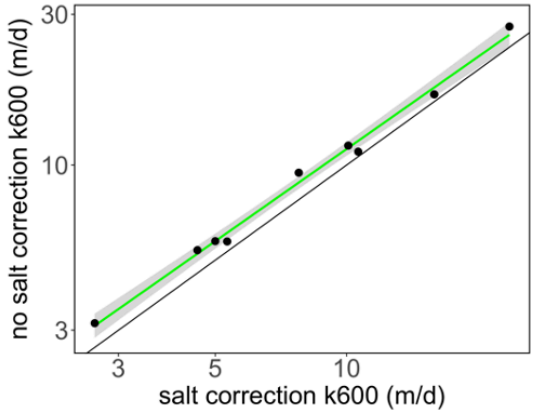
POSE

stan k600 (no salt vs salt correction)



TECR

stan k600 (no salt vs salt correction)



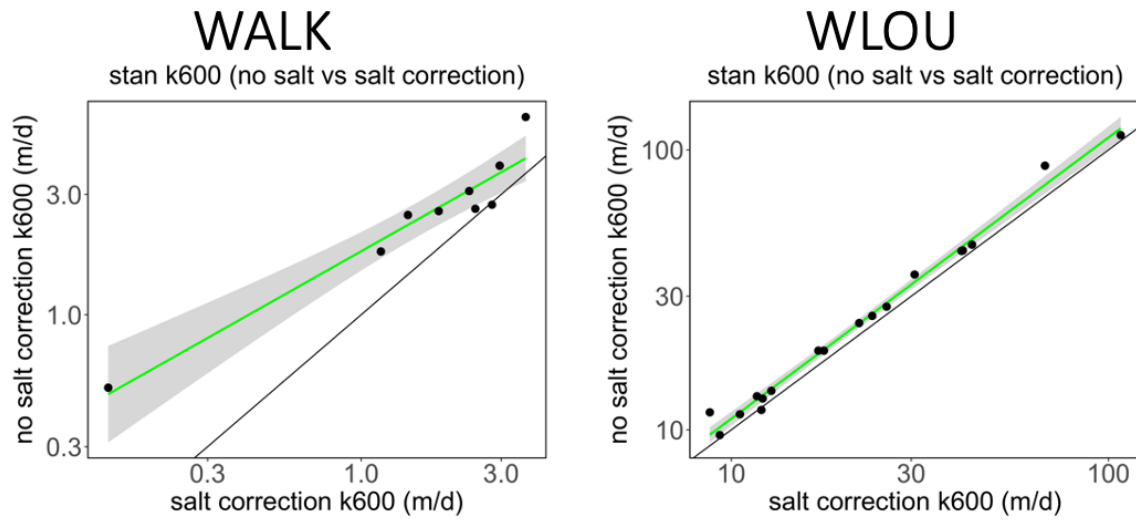
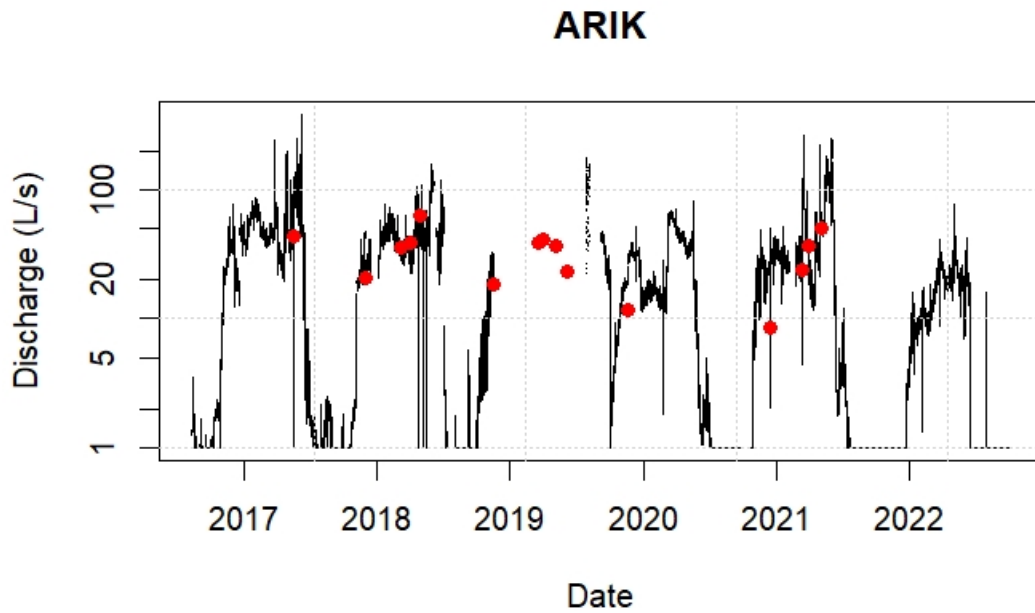
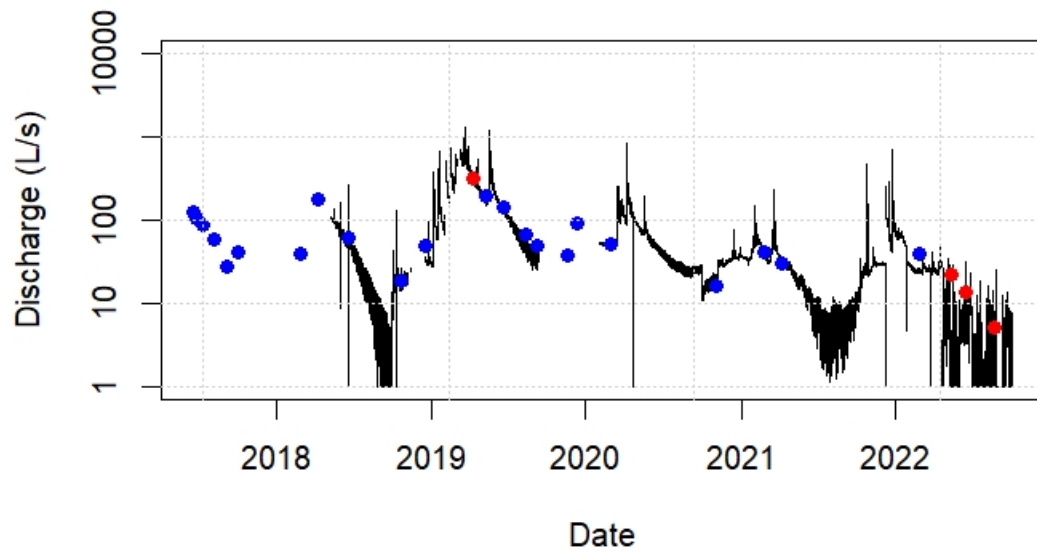


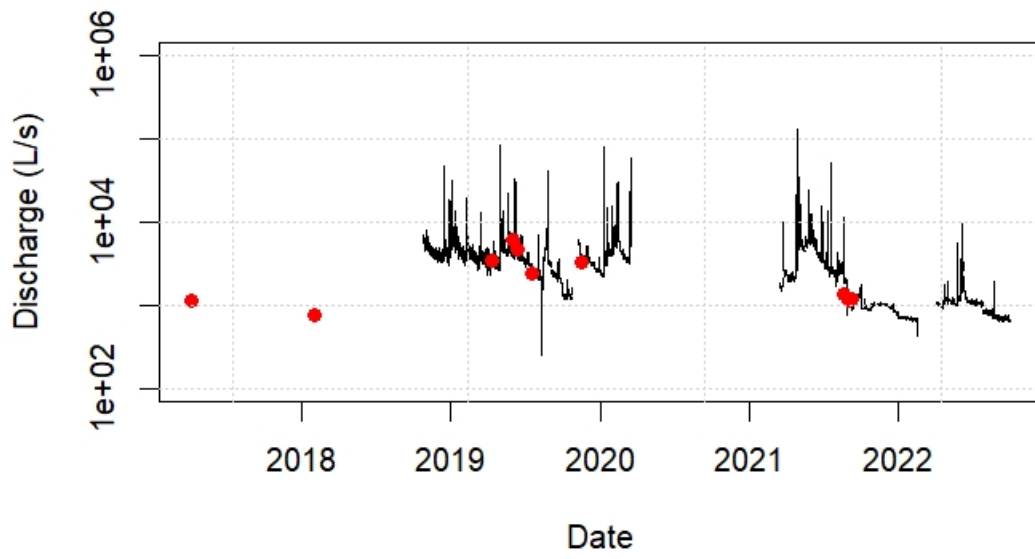
Figure S3. Comparison of salt-corrected k_{600} and uncorrected k_{600} for sites where a salt-correction was possible. A salt-correction is only recommended for COMO, CUPE, GUIL, MART, and WALK.



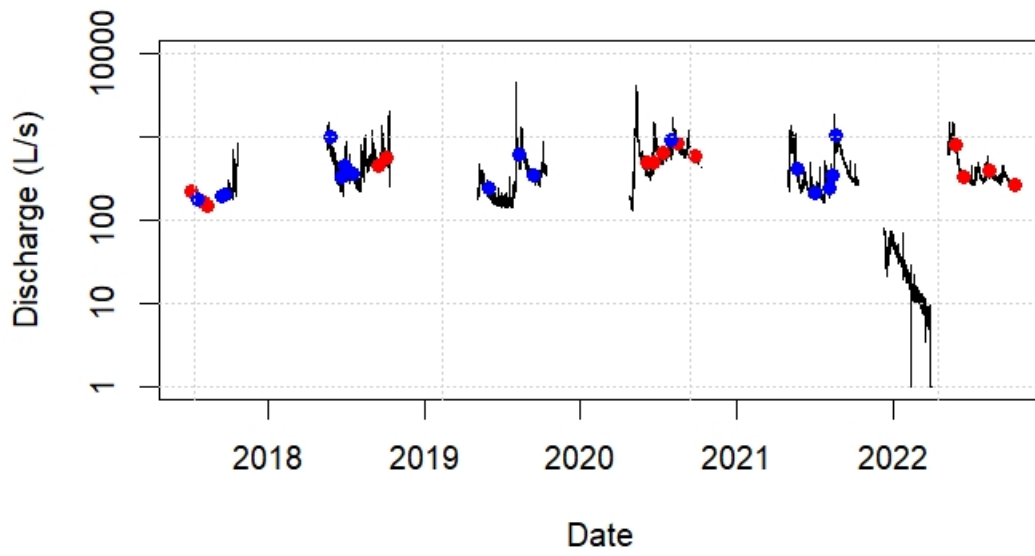
BIGC



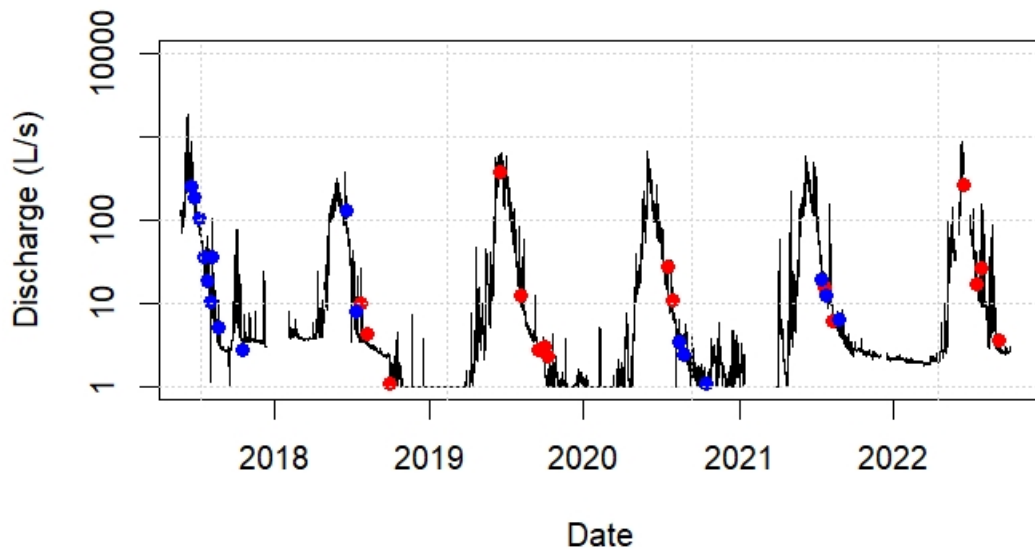
BLUE



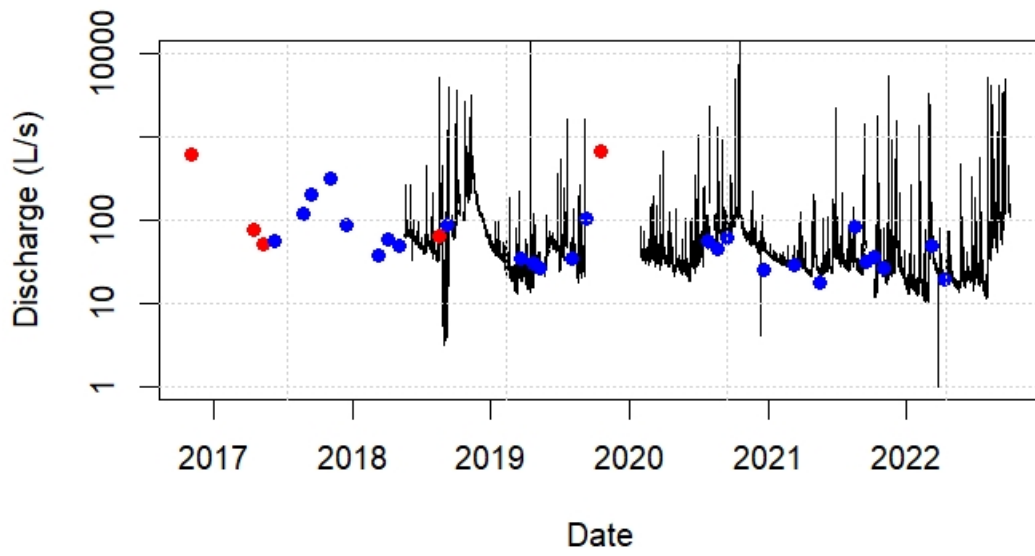
CARI



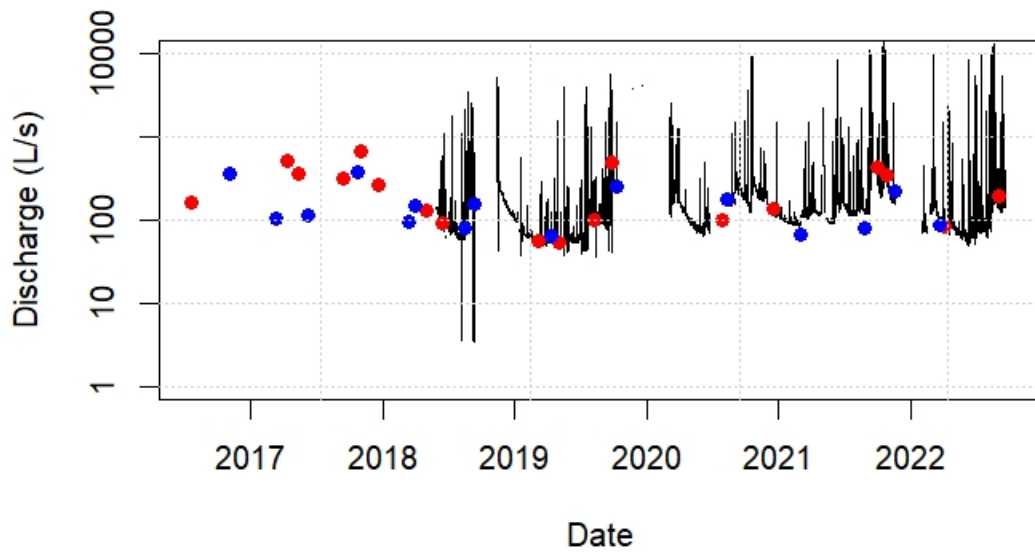
COMO



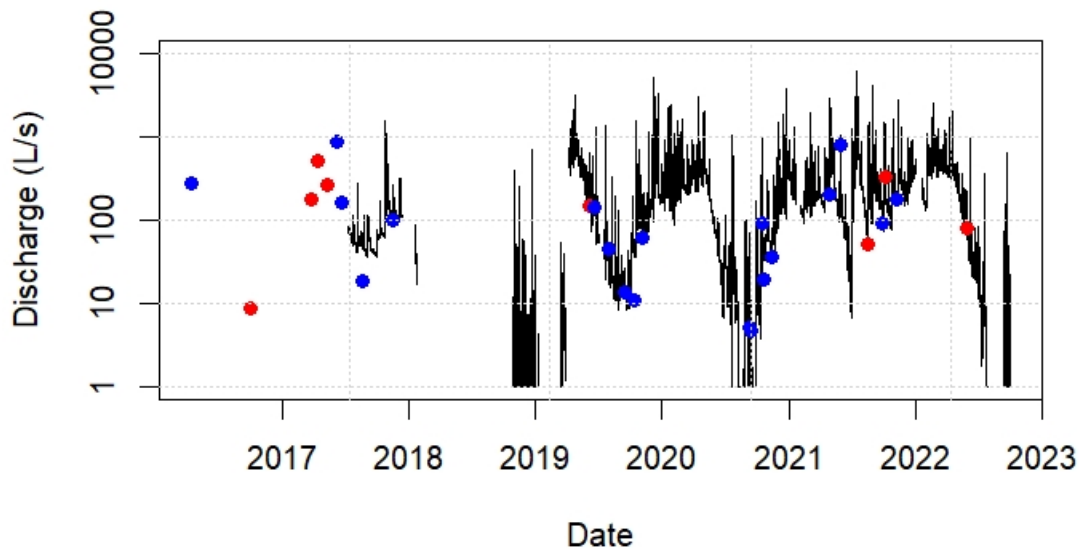
CUPE



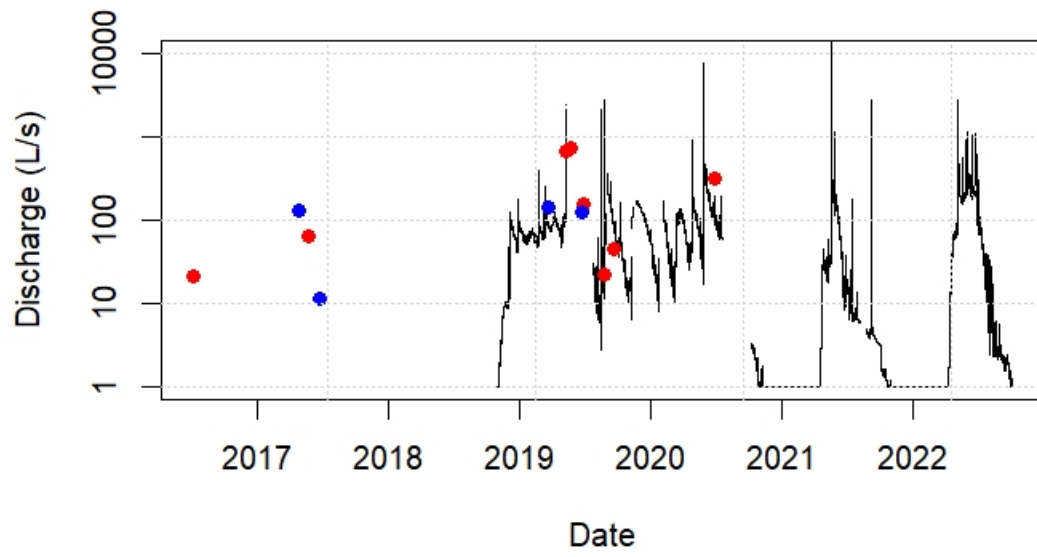
GUIL



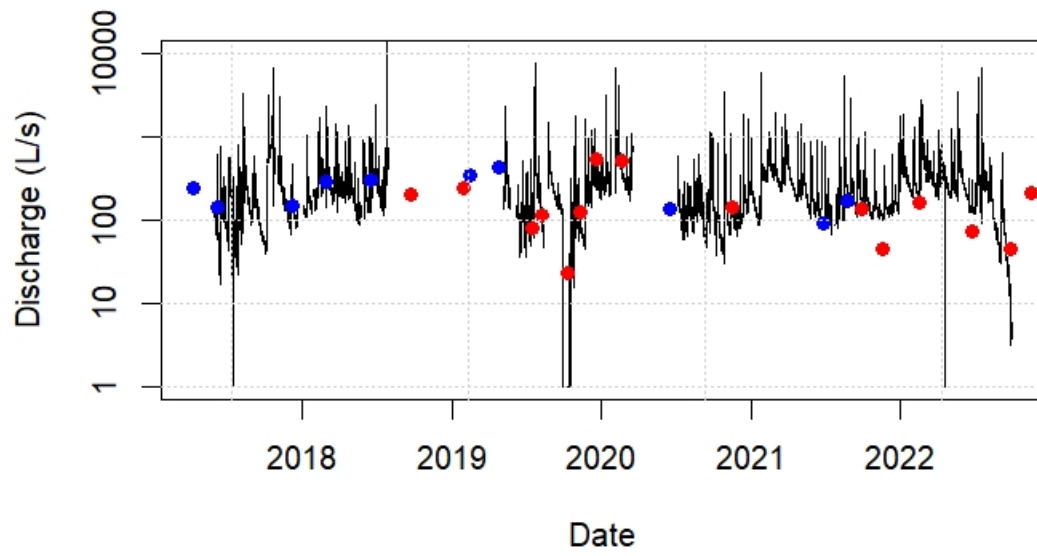
HOPB



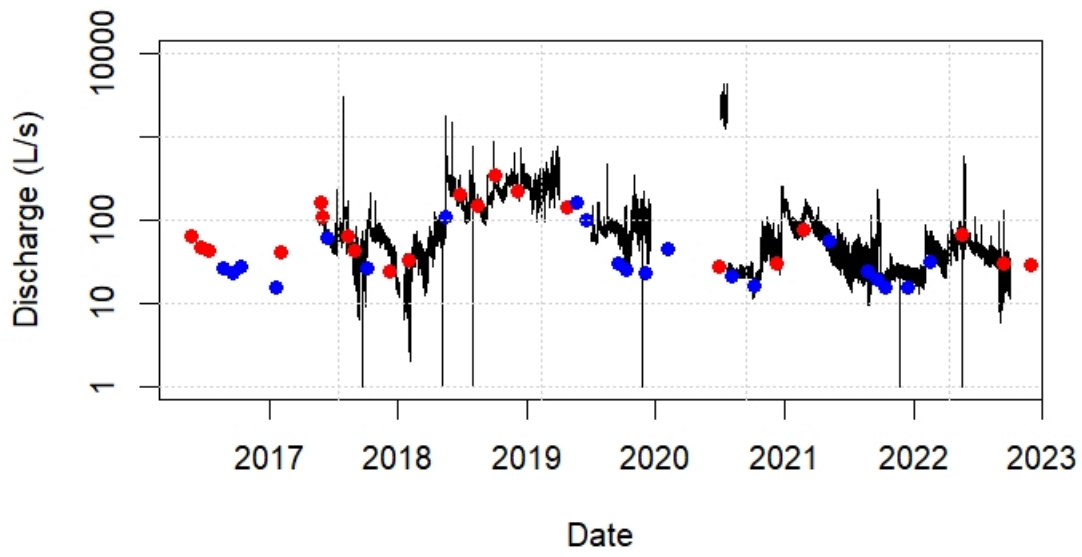
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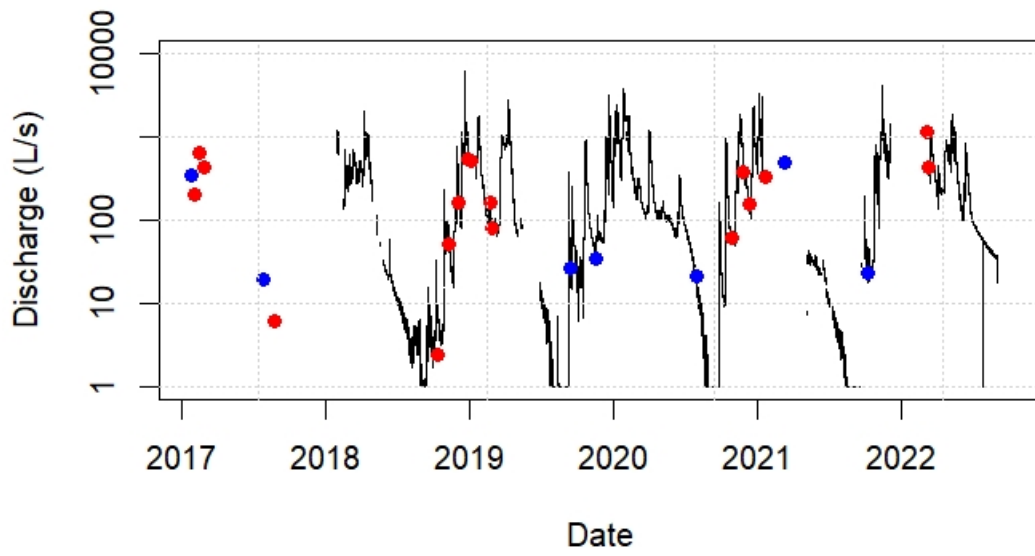
LECO



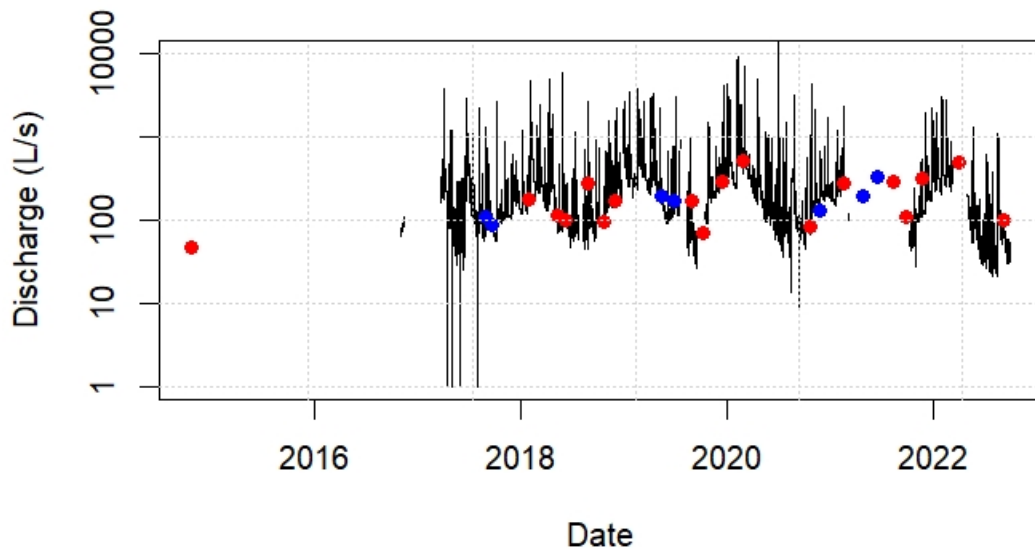
LEWI



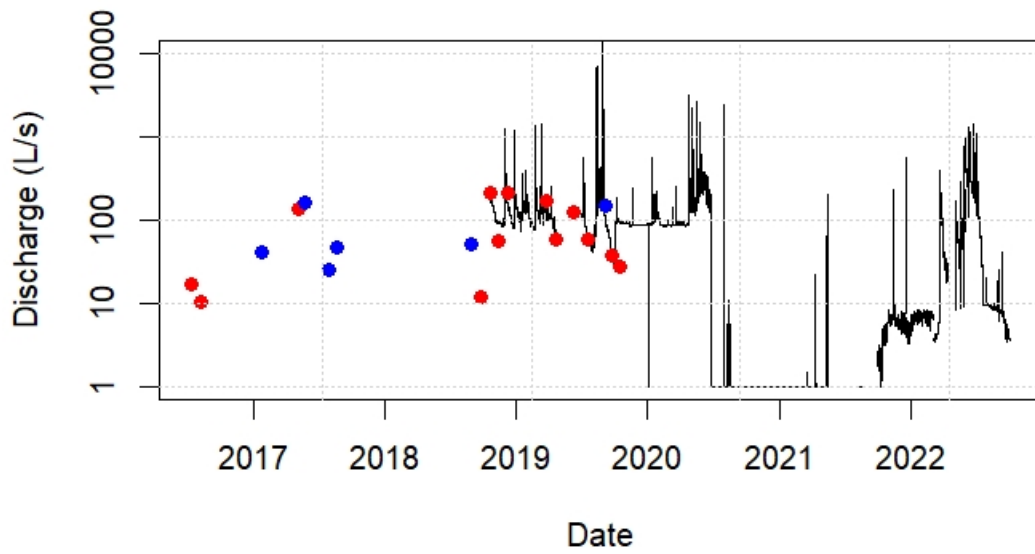
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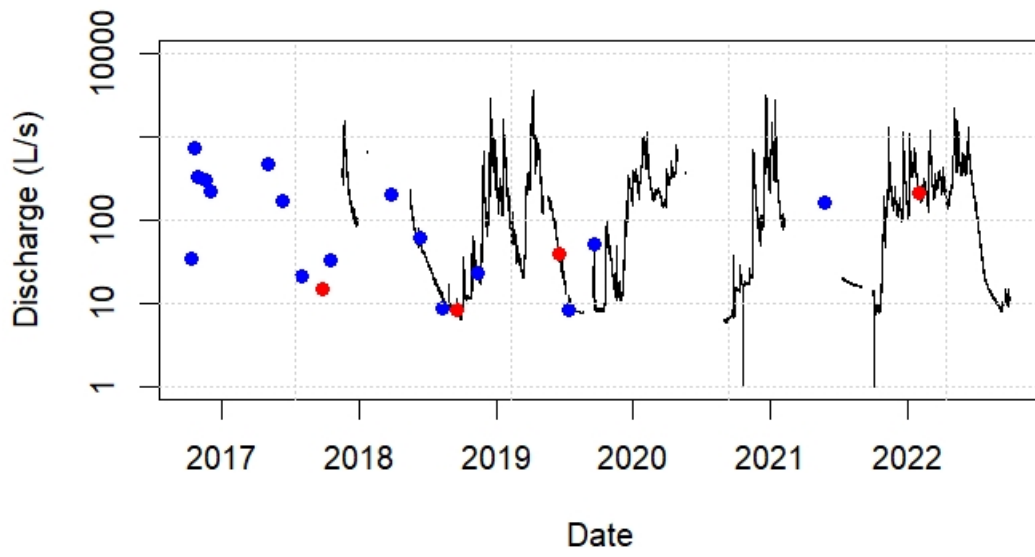
MAYF



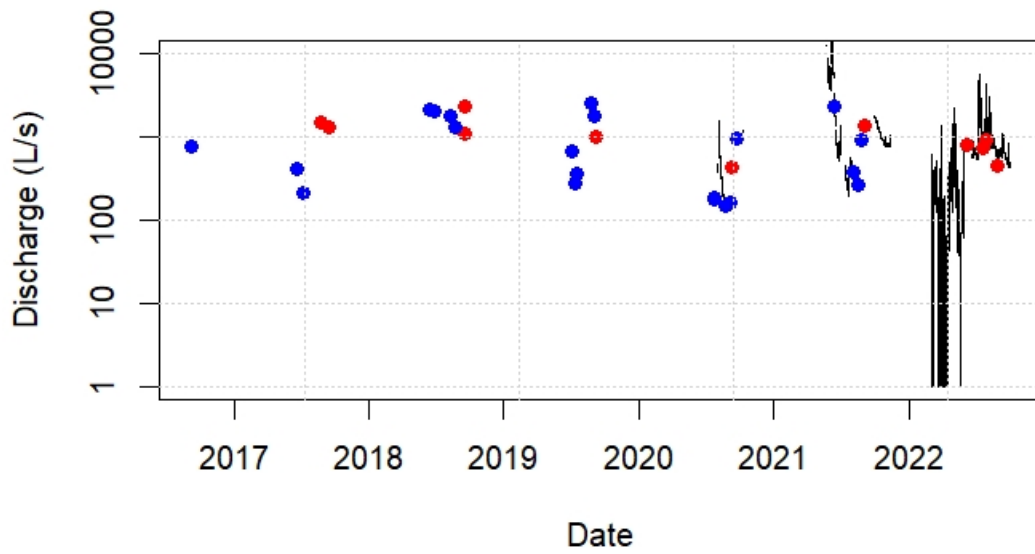
MCDI



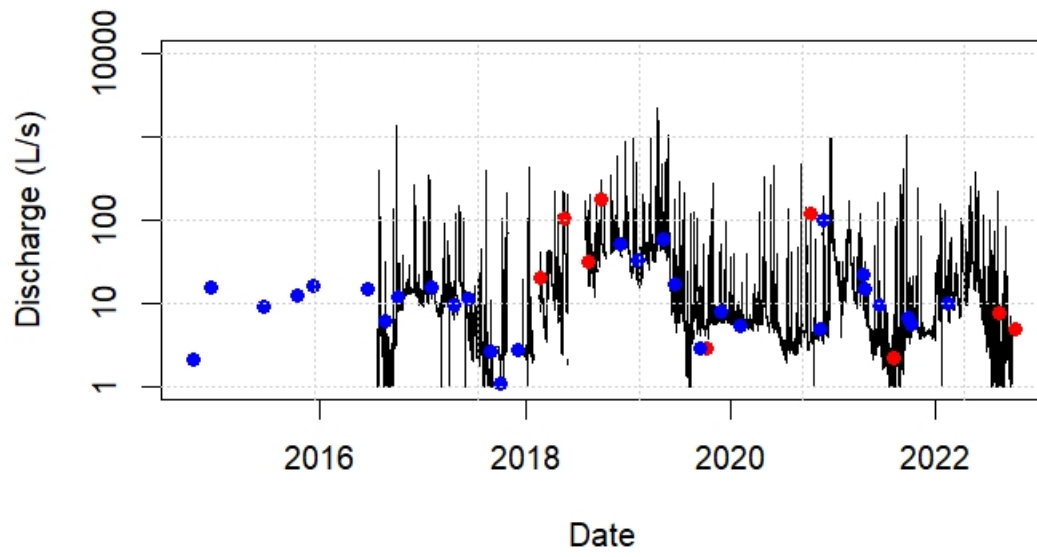
MCRA



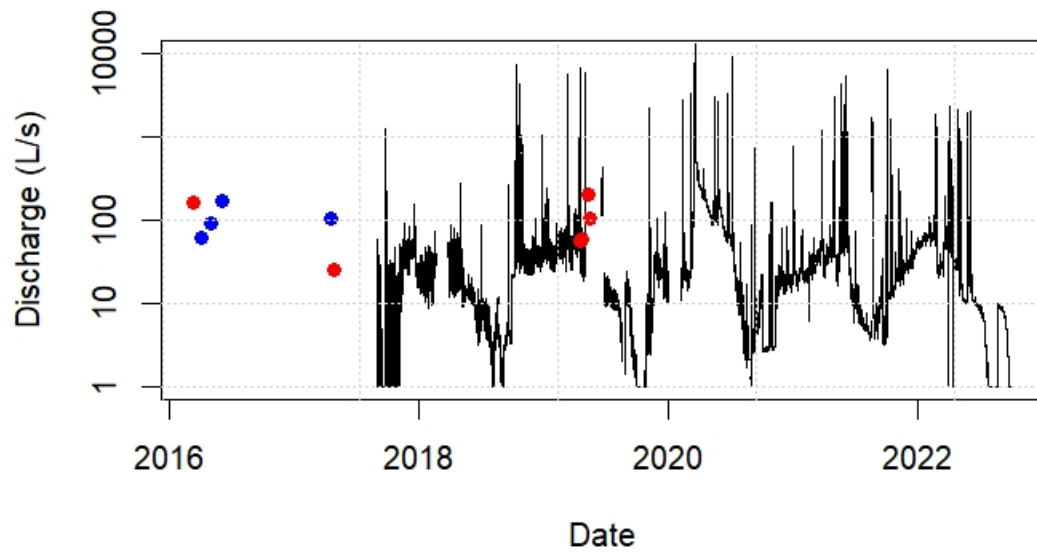
OKSR



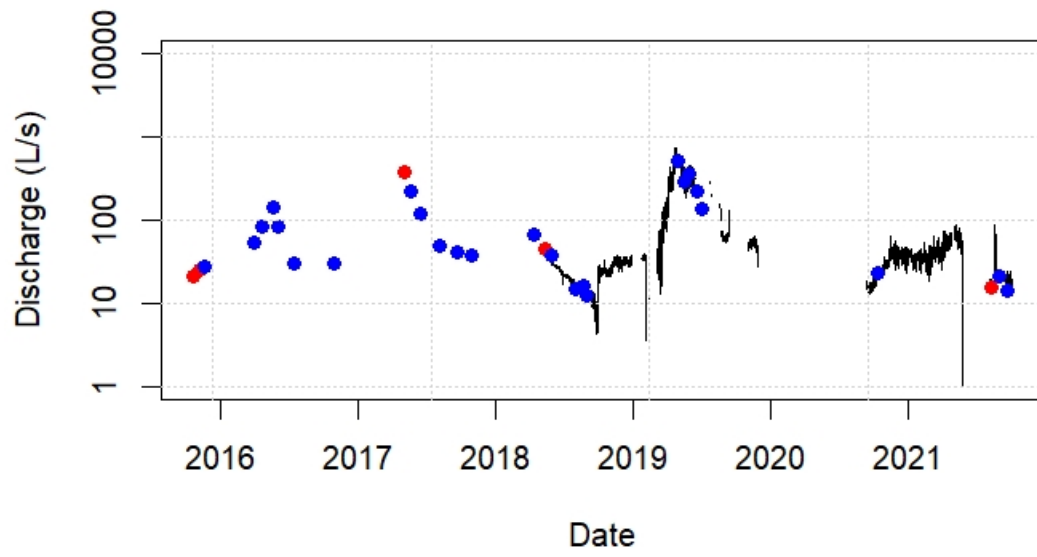
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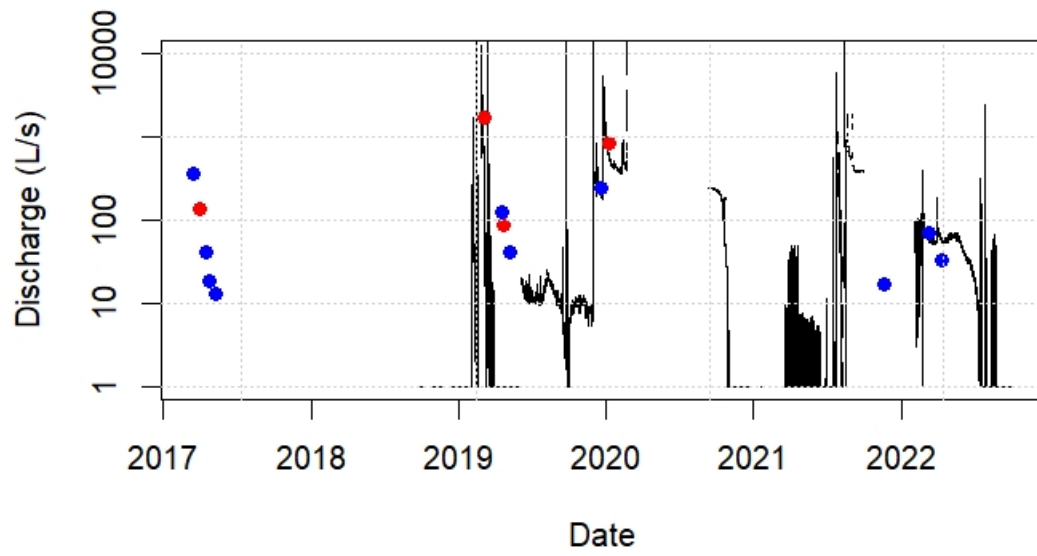
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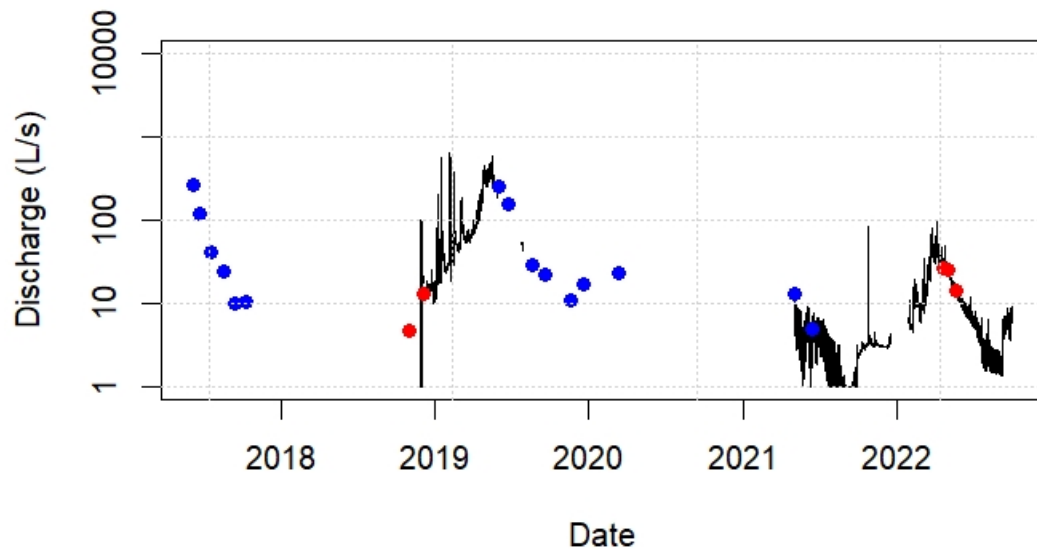
REDB



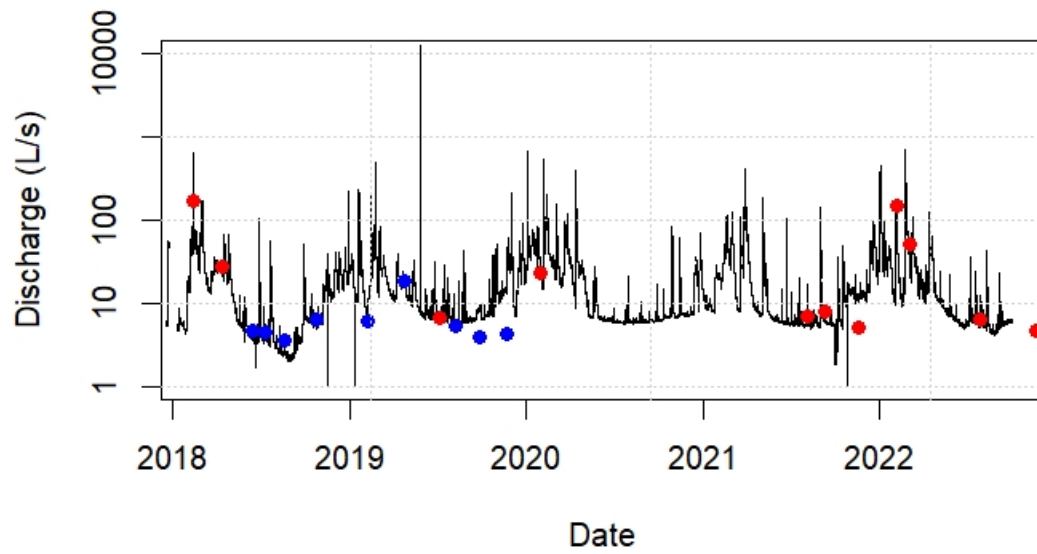
SYCA



TECR



WALK



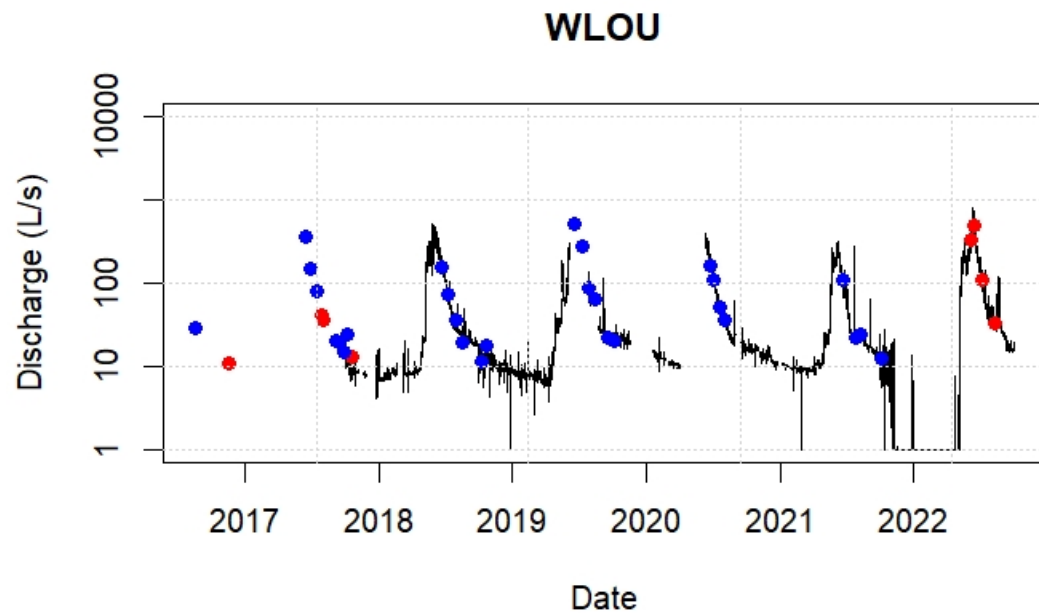
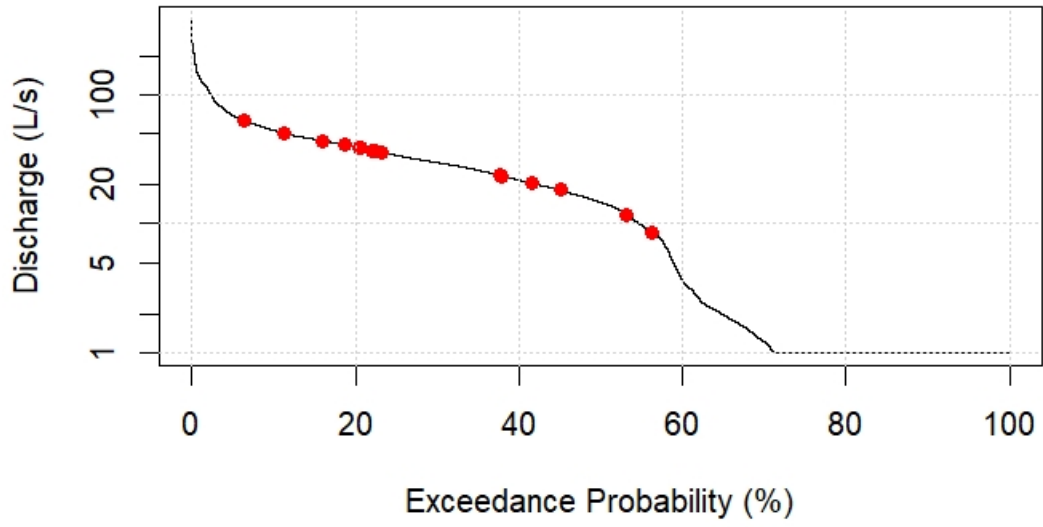
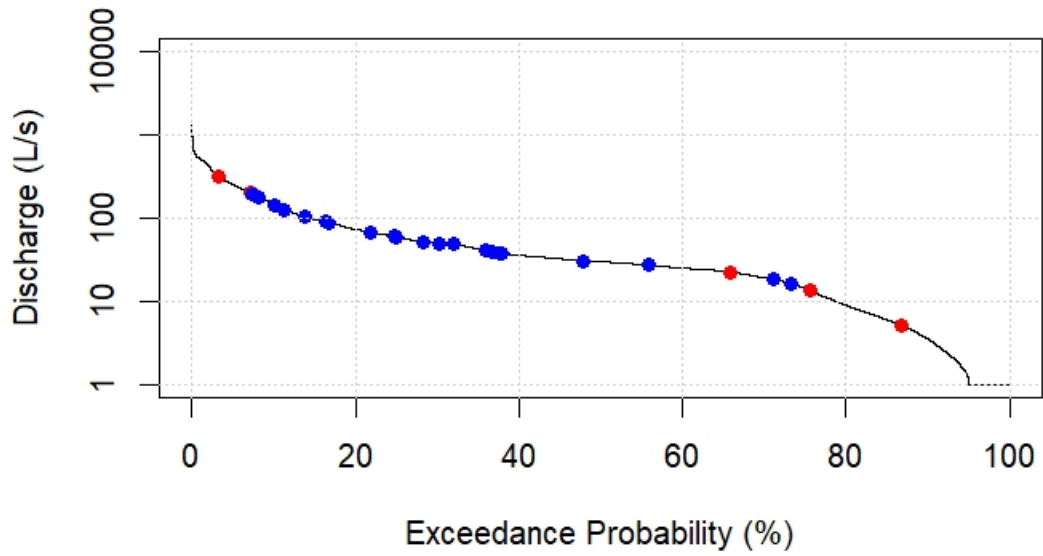


Figure S4. Hydrographs for each site, with points indicating the date and measured discharge during tracer-gas experiments that resulted in k_{600} and K_{600} estimates (blue) or salt-slug experiments that resulted in hydraulic geometry estimates (red). Continuous discharge estimates (lines) less than 1 L s^{-1} (including when the stream is dry) have been set to 1 L s^{-1} for plotting purposes. Breaks in the line indicate periods of time when estimates of continuous discharge are not available.

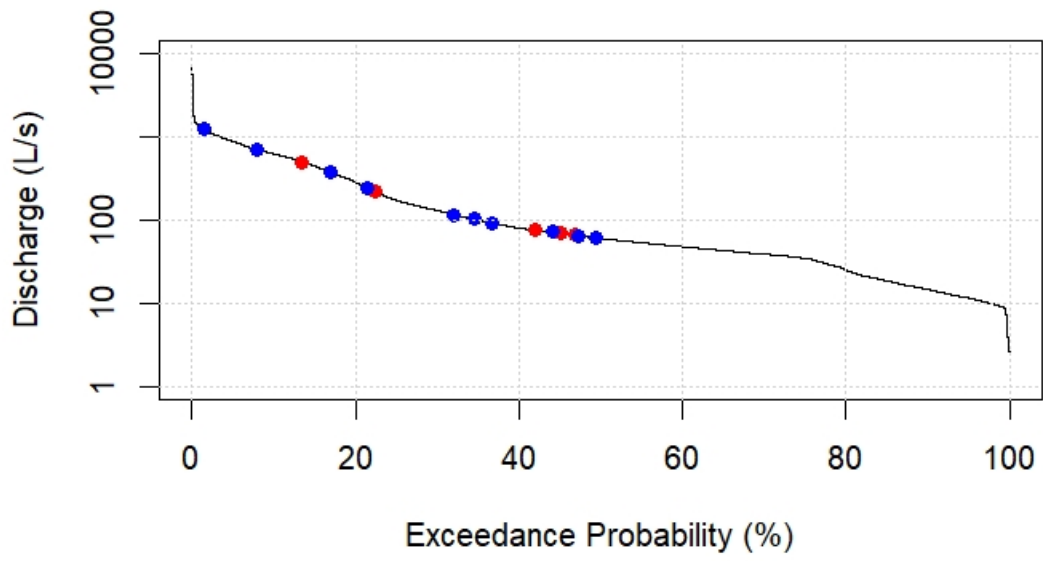
ARIK



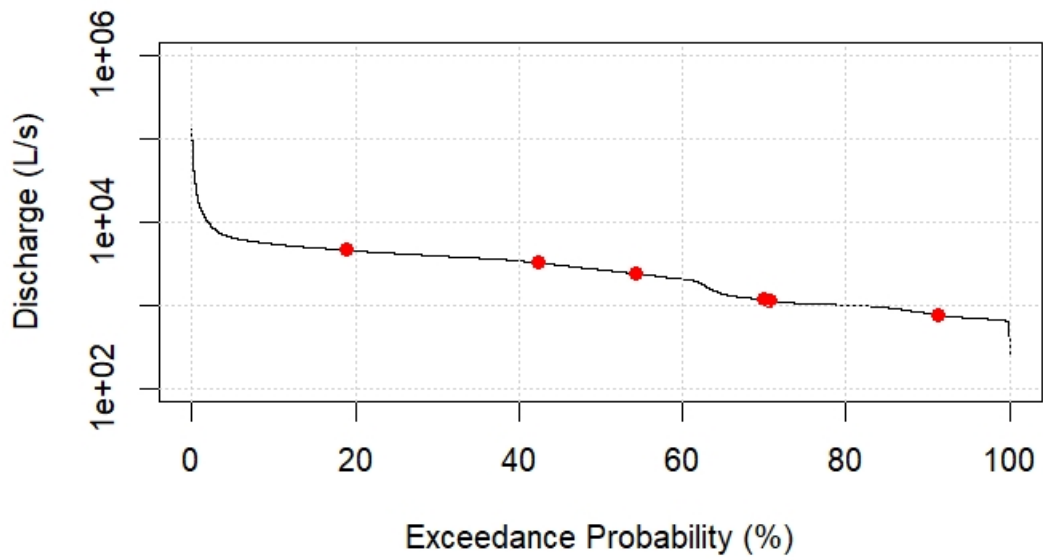
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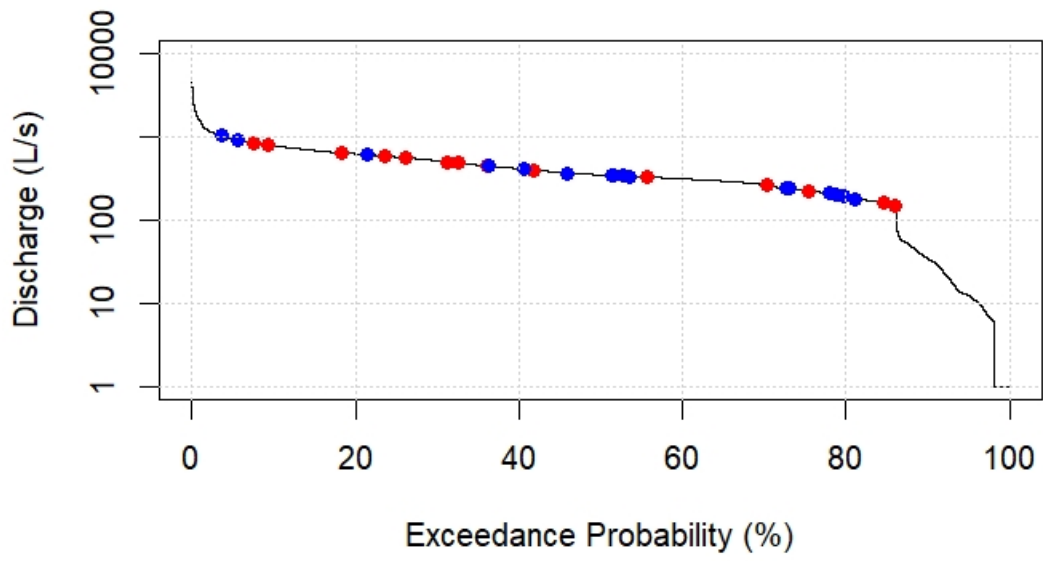
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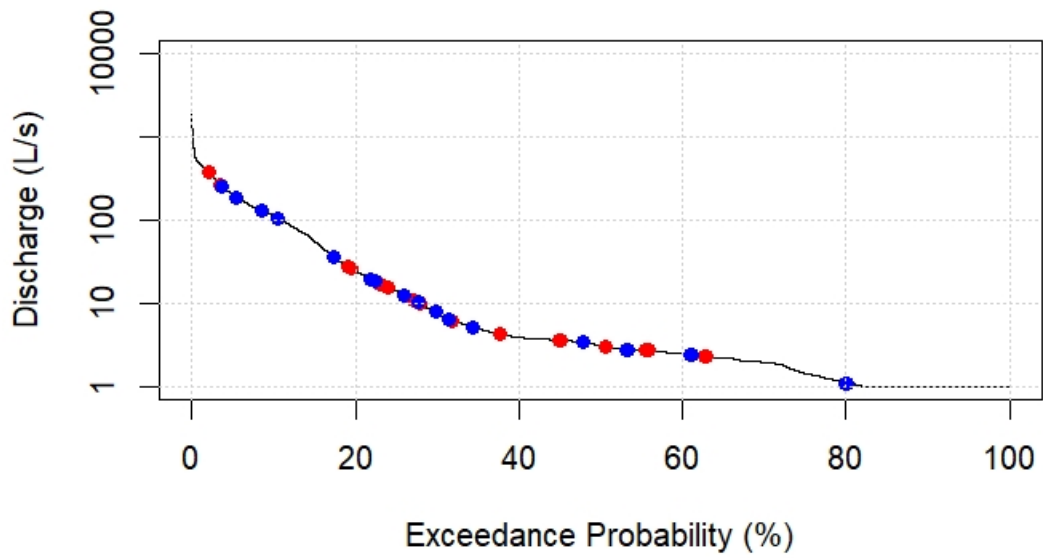
BLUE



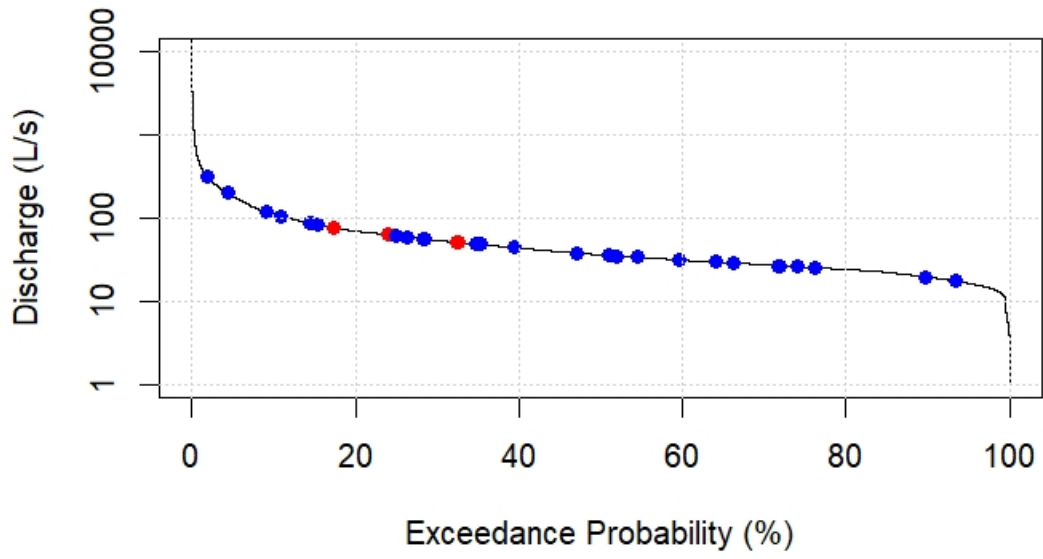
CARI



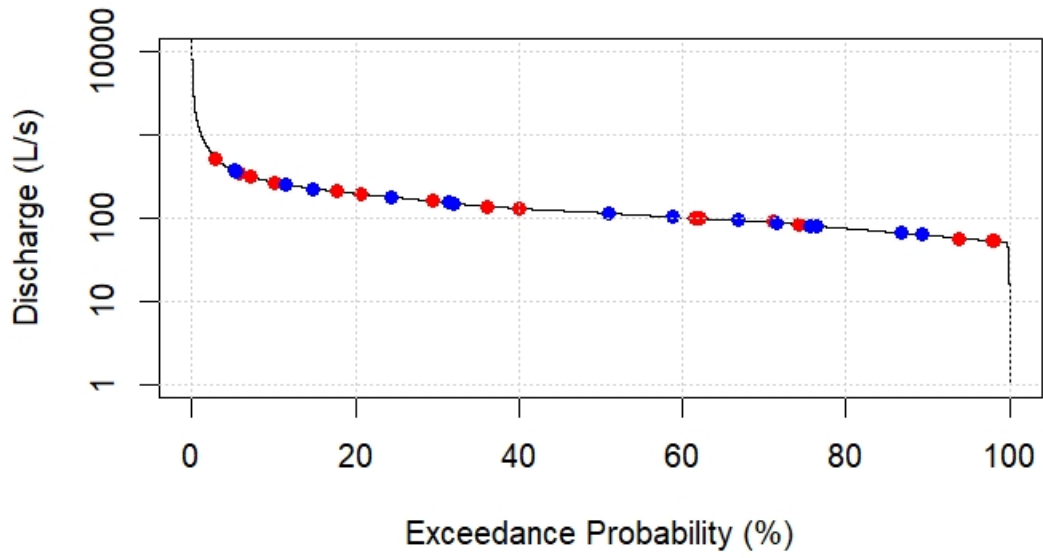
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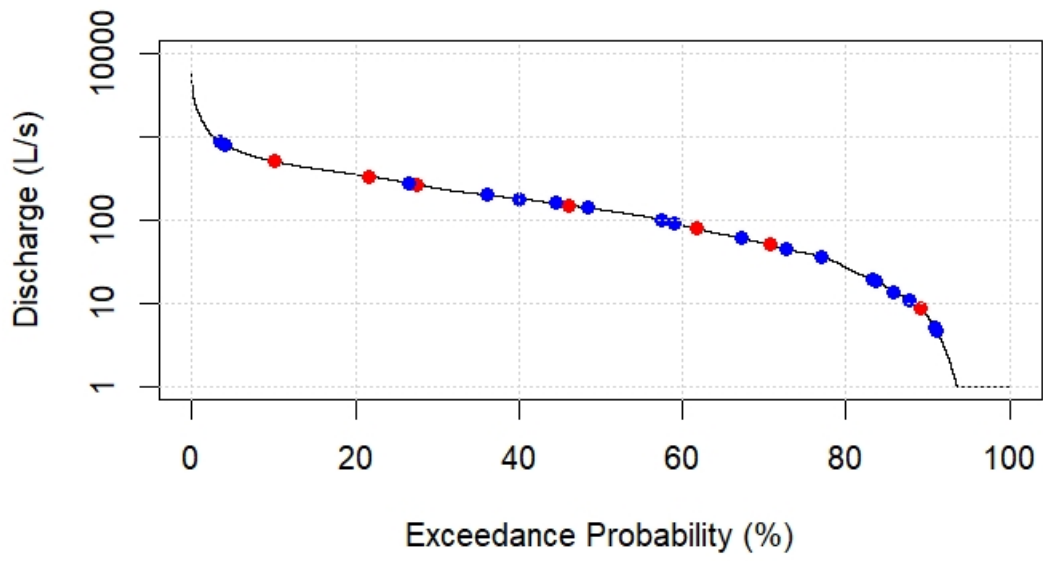
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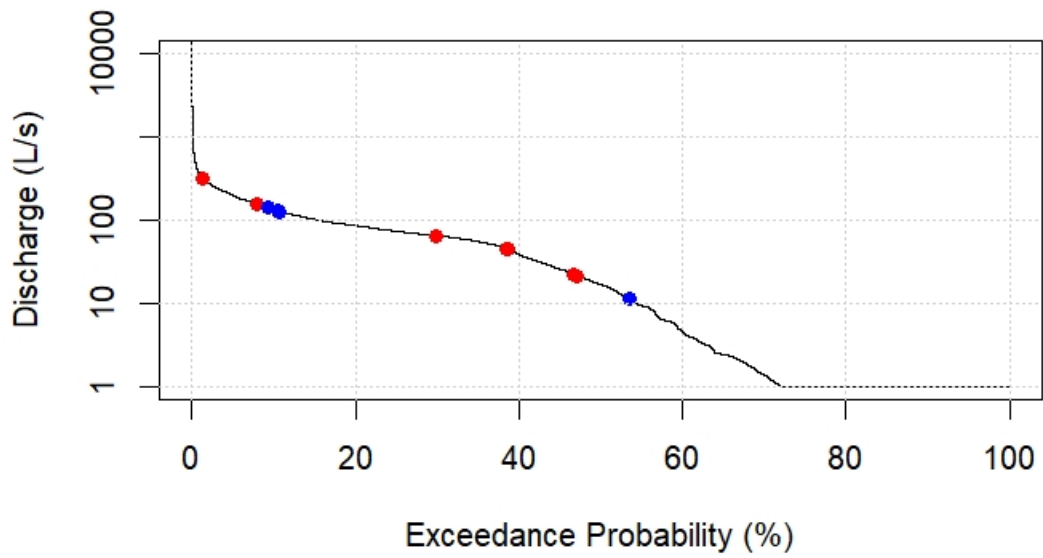
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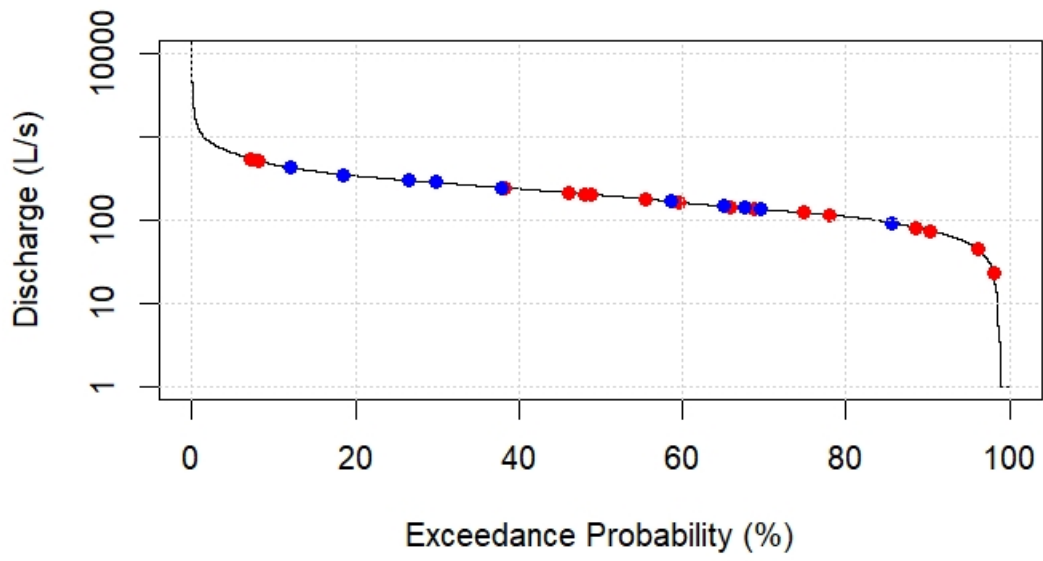
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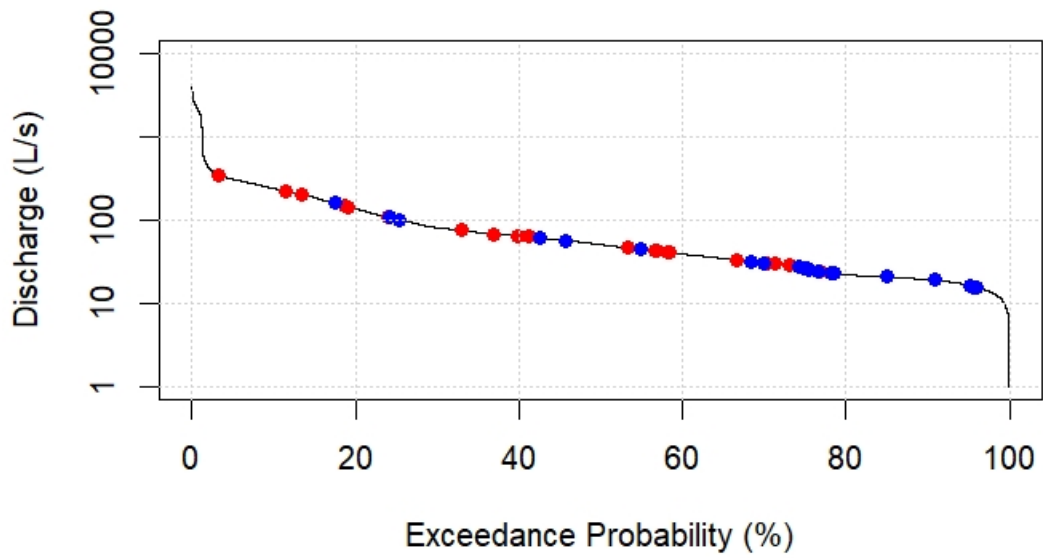
KING



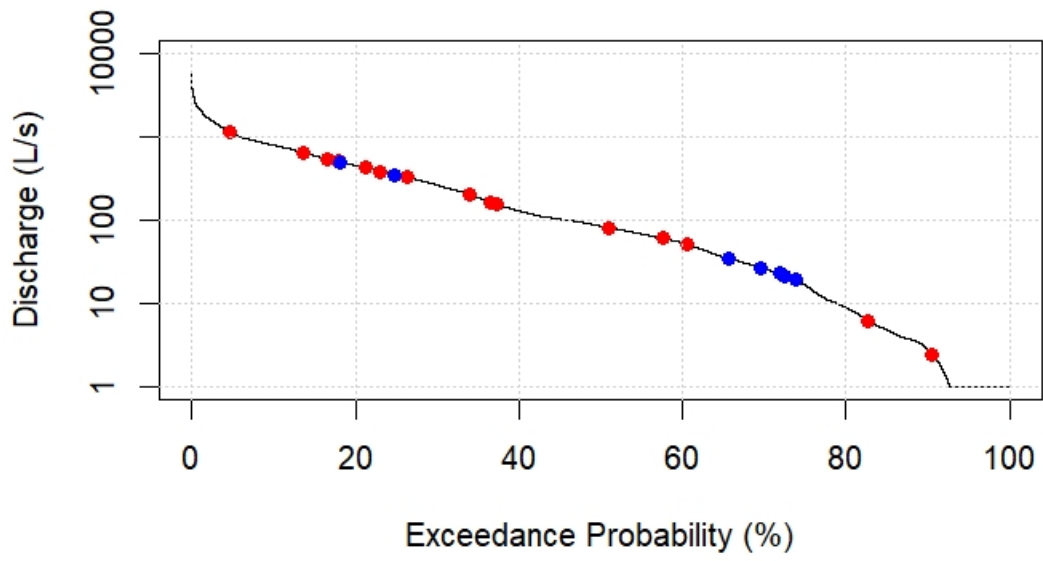
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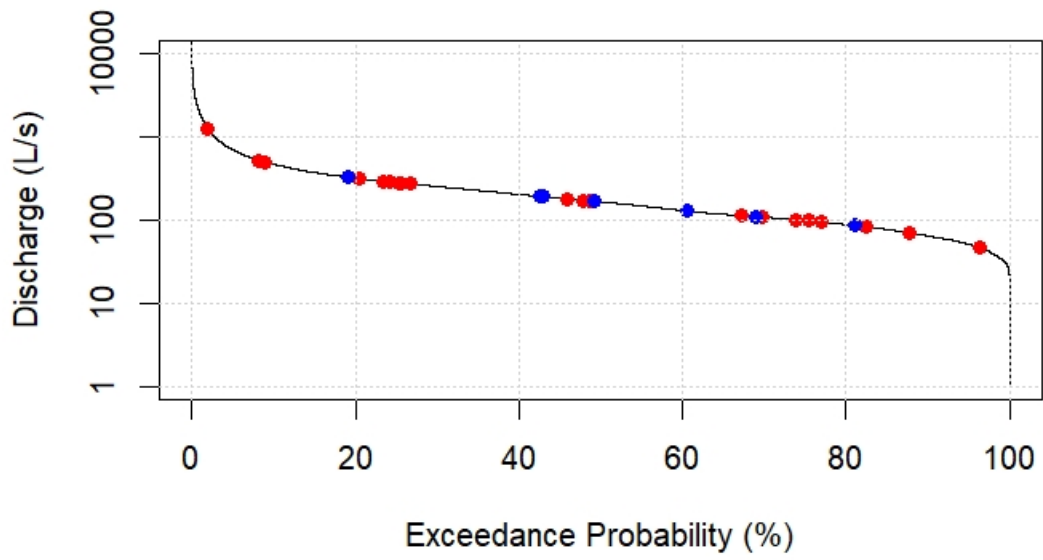
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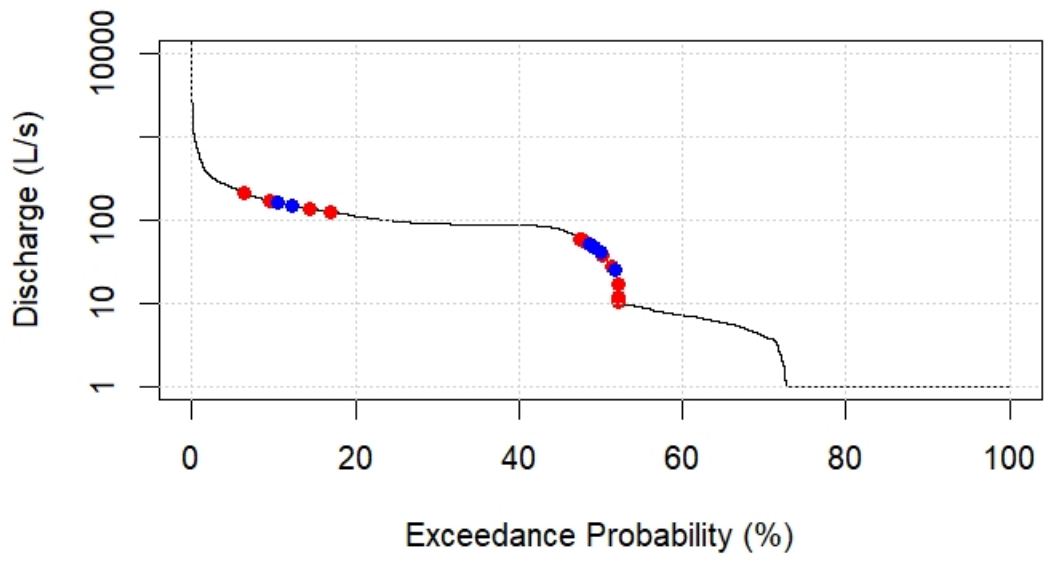
MART



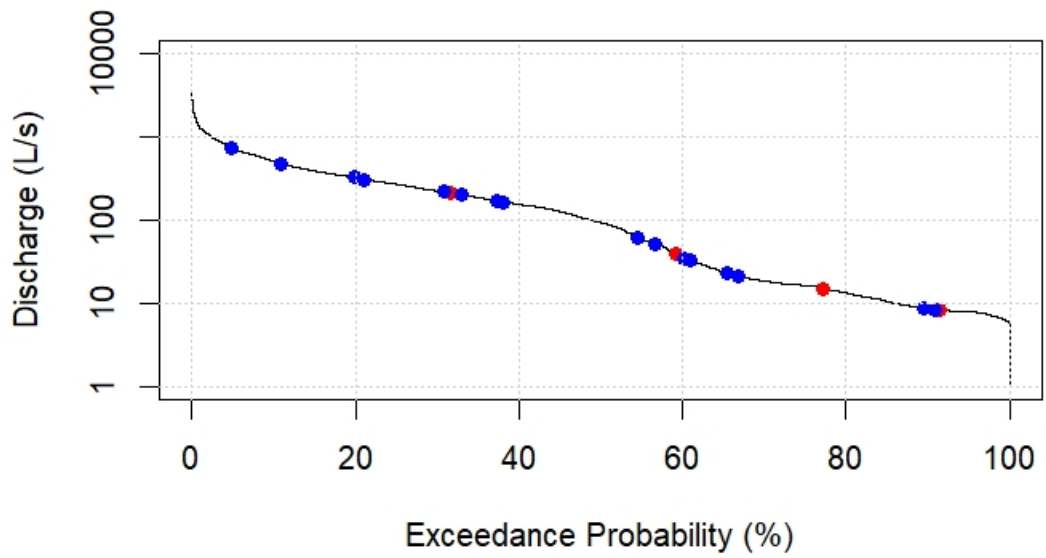
MAYF



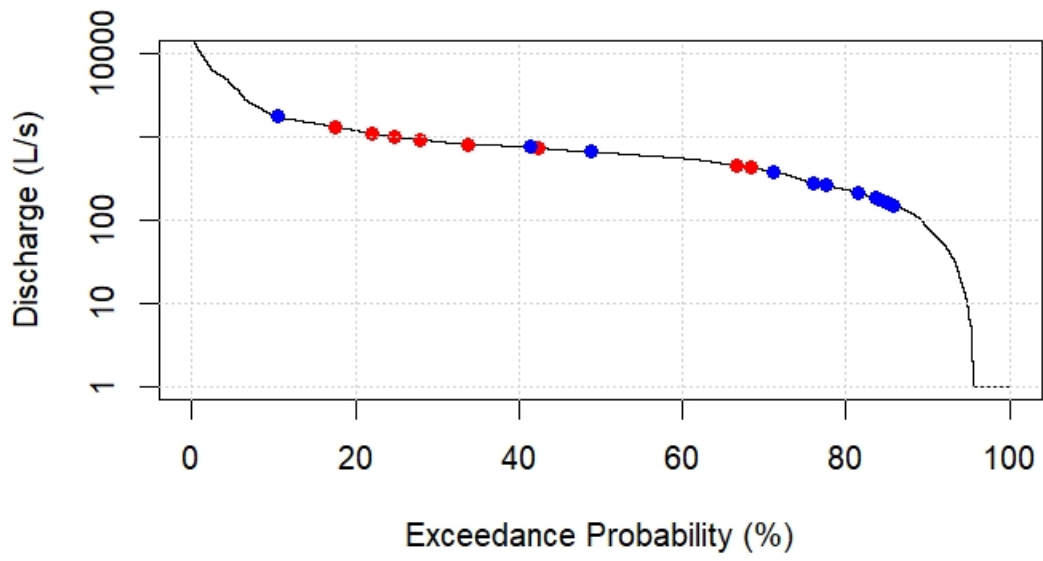
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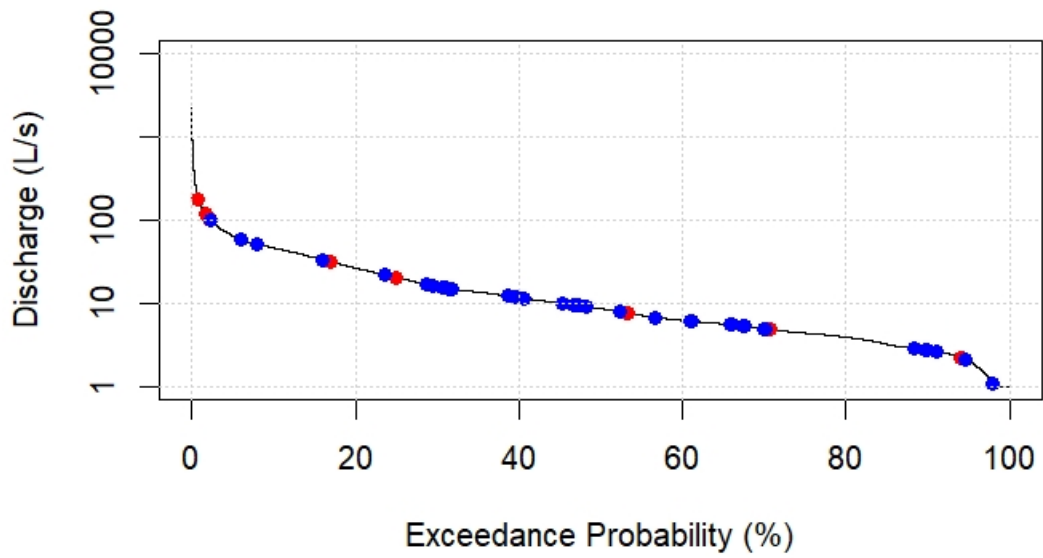
MCRA



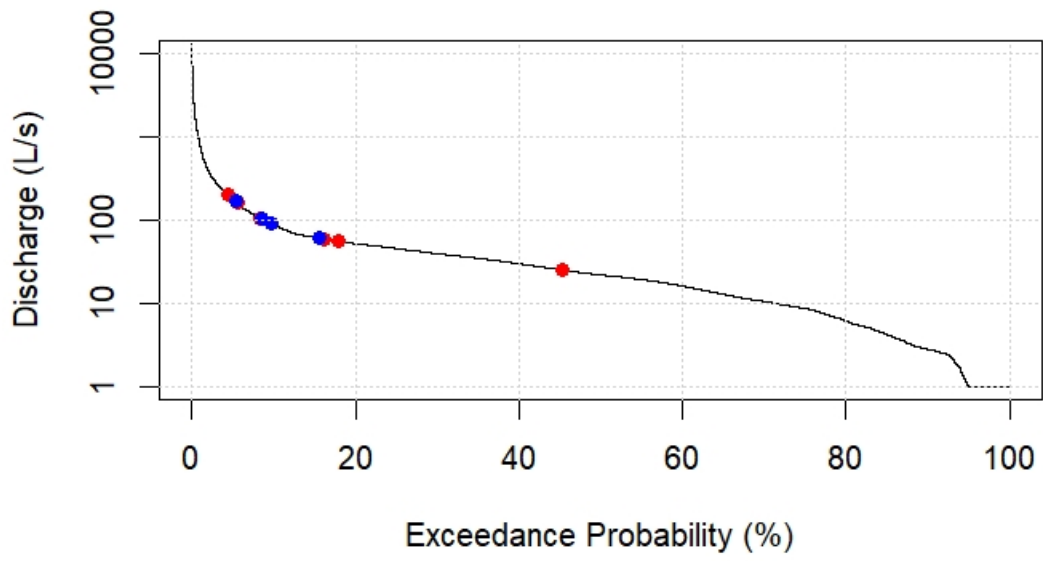
OKSR



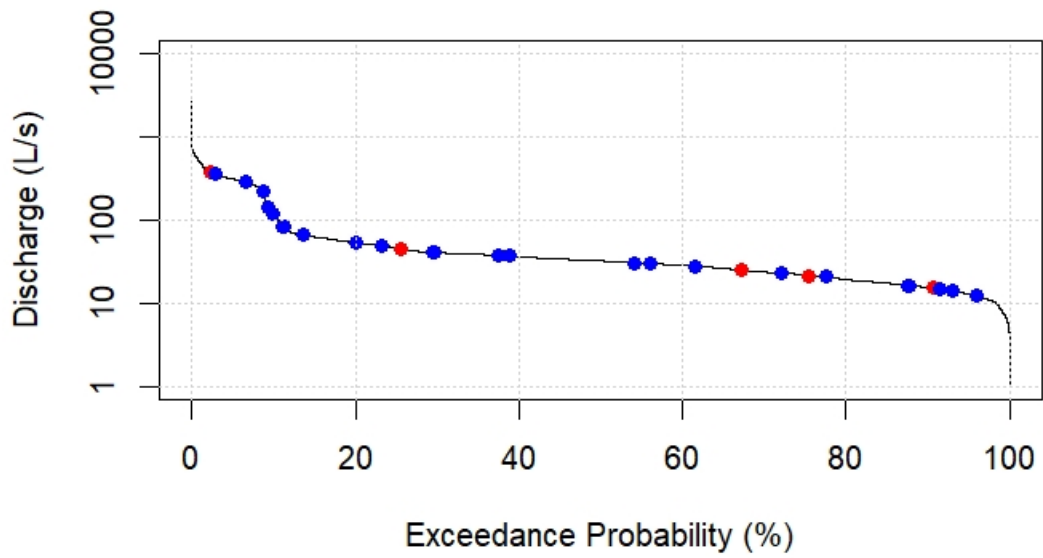
POSE



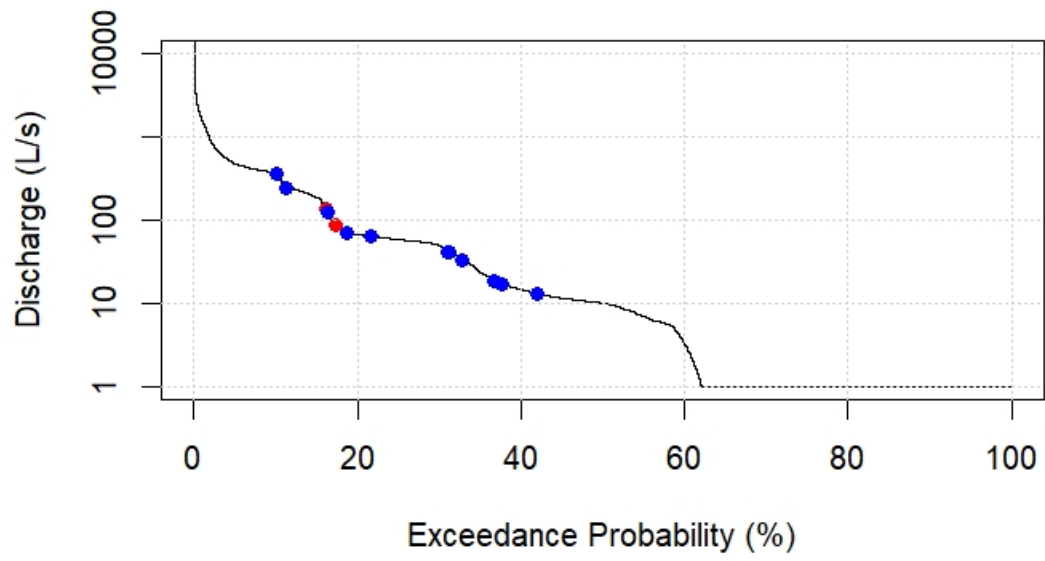
PRIN



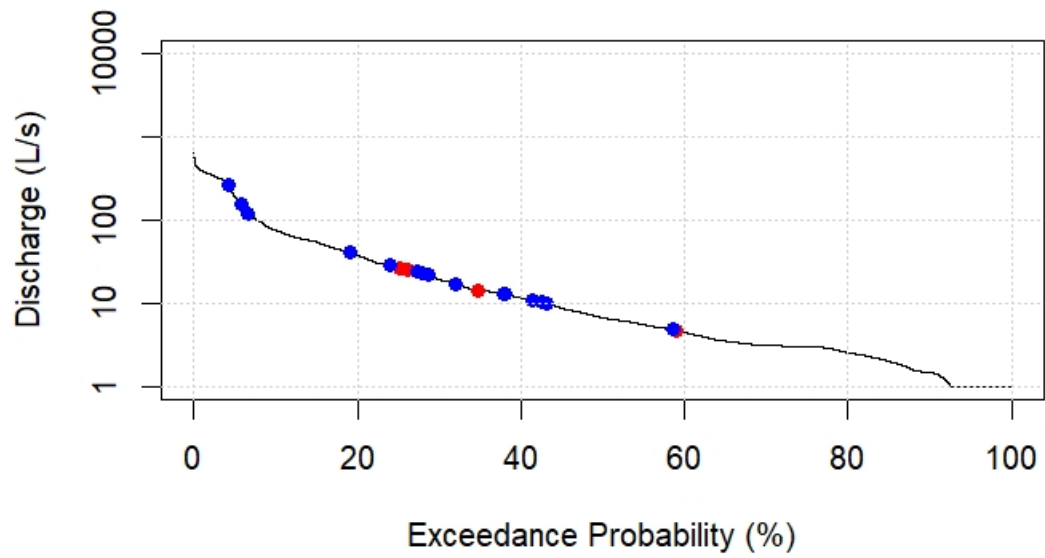
REDB



SYCA



TECR



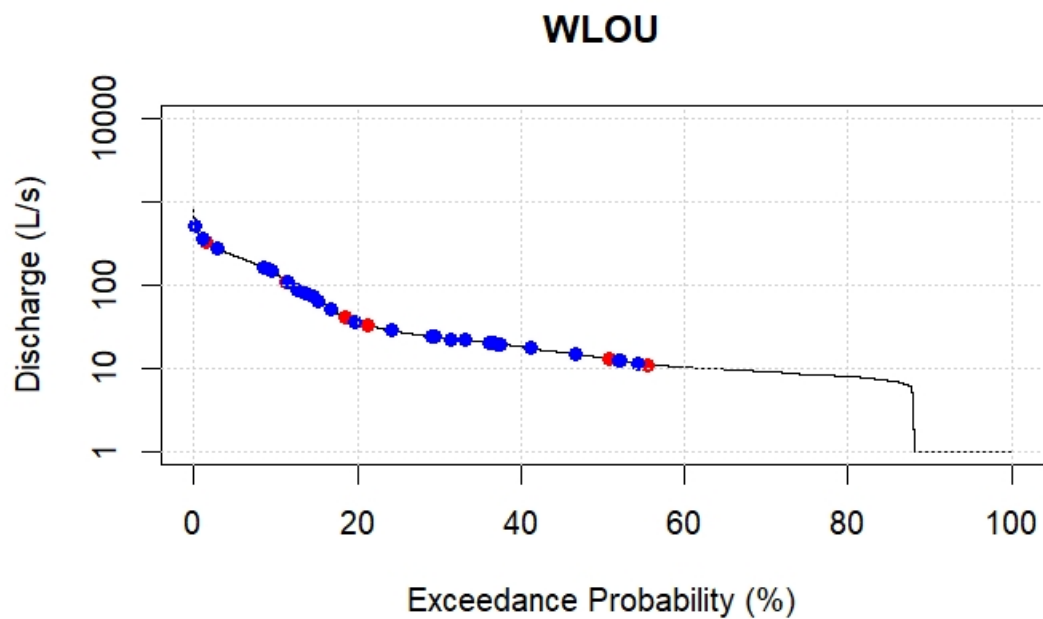
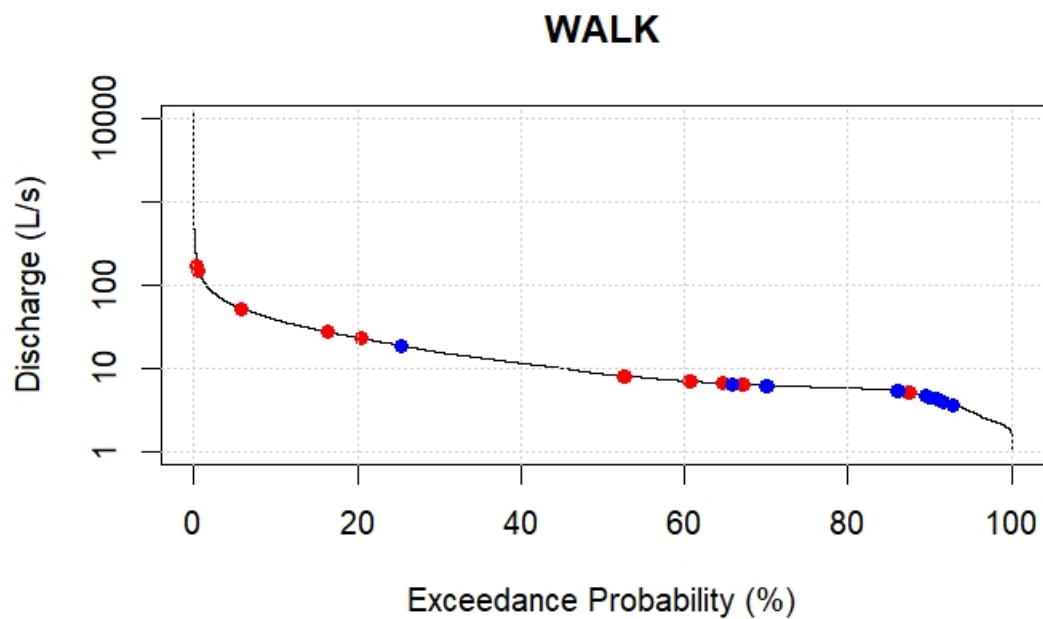


Figure S5. Flow duration curves for each site (derived from continuous discharge estimates) with points indicating the associated discharge of tracer-gas experiments that resulted in k_{600} and K_{600} estimates (blue) or salt-slug experiments that resulted in hydraulic geometry estimates (red). Discharge estimates less than 1 L s^{-1} (including when the stream is dry) have been set to 1 L s^{-1} for plotting purposes.