

Table S1: Precipitation chloride concentration measured in N'Djamena.

Sampling Date	Precipitation amount (mm)	Chloride concentration (mg l <sup>-1</sup> )l
16/06/2016	19	1.25
17/06/2016	17	0.82
26/06/2016	20	0.37
12/07/2016	55	0.13
25/07/2016	0.5	0.37
01/08/2016	51	0.29
07/08/2016	13.5	0.17
10/08/2016	23	0.22
24/08/2016	29	0.22
01/09/2016	36	0.20
24/05/2017	1	19.60
30/05/2017	4	3.40
10/06/2017	1	3.24
12/06/2017	12	0.82
21/06/2017	33	1.45
22/06/2017	8	1.12
27/06/2017	11	0.97
30/06/2017	6	0.53
05/07/2017	40	0.39
08/07/2017	30	0.17
17/07/2017	24	0.19
24/07/2017	65	0.15
09/08/2017	55	0.15
15/08/2017	23	0.28
18/08/2017	40	0.17
14/09/2017	29	0.31
25/09/2017	31	0.43
28/05/2018	28	0.91
01/07/2018	60	0.16
07/07/2018	65	0.11
11/07/2018	46	0.16
13/07/2018	43	0.38
30/07/2018	50	0.09
08/08/2018	50	0.13
23/08/2018	80	0.05
07/09/2018	30	0.13
28/05/2019	45	1.89
30/05/2019	30	0.37
22/07/2019	121	0.17
05/08/2019	29	0.09
09/08/2019	45	0.08
27/08/2019	35	0.25
09/09/2019	45	0.46
15/09/2019	43	0.37
01/10/2019	36	0.55
04/10/2019	14	0.46

07/10/2019	20	0.27
04/05/2020	19.3	1.35
05/06/2020	15.9	1.30
09/06/2020	21.4	0.69
15/06/2020	26.5	0.29
19/06/2020	12	0.30
26/06/2020	14.4	0.85
05/07/2020	26.5	0.21
10/07/2020	27.4	0.18
14/07/2020	9.4	0.26
22/07/2020	13.2	0.16
24/07/2020	16.6	0.12
27/07/2020	24.6	0.15

Table S2: Soil chloride concentration measured in each of the Salamat profiles.

Site	Depth interval (cm)	Soil chloride concentration (mg l <sup>-1</sup> )		Gravimetric water content (%)	
		2016	2019	2016	2019
ST1	0-10	2.61	1.73	0.14	0.31
	10-20	2.54	1.37	0.14	0.18
	20-30	2.40	0.76	0.24	0.16
	30-40	2.78	0.71	0.28	0.20
	40-50	1.49	0.67	0.29	0.21
	50-60	3.62	0.44	0.30	0.23
	60-80	2.06	0.34	0.29	0.24
	80-100	1.16	0.32	0.25	0.24
	100-110	1.43	0.26	0.25	0.25
	110-120	2.40		0.25	
	120-130	2.71	0.20	0.24	0.23
	130-140	1.65		0.22	
	140-150	2.02	0.20	0.21	0.23
	150-160	4.90		0.23	
	160-170	3.86	0.22	0.18	0.23
	170-180	2.05		0.21	
	180-190	3.13	0.23	0.19	0.20
	190-200	2.04		0.17	
	200-210	3.13	1.58	0.18	0.20
	210-220	0.72		0.17	
	220-230	1.91	0.13	0.17	0.18
	230-240	1.80		0.17	
	240-260		0.14		0.16
	260-280		0.12		0.17
	280-300		0.10		0.16
	300-320		0.09		0.16
	320-340		0.14		0.16
	340-360		0.16		0.14
	360-380		0.09		0.16
	380-400		0.08		0.16

	400-420		0.11		0.16
	420-440		0.10		0.15
	440-460		0.11		0.16
	460-480		0.09		0.17
	480-500		0.09		0.18
ST2	0-10	3.66	2.65	0.03	2.65
	10-20	2.35	3.70	0.05	3.70
	20-30	2.11	12.30	0.06	12.30
	30-40	1.72	4.55	0.06	4.55
	40-50	4.43	1.57	0.10	1.57
	50-60	8.57	1.12	0.10	1.12
	60-70	6.46	1.11	0.07	1.11
	70-80	1.41		0.07	
	80-90	1.16	3.12	0.08	3.12
	90-100	1.41		0.09	
	100-110	1.46	7.96	0.09	7.96
	110-120	3.91		0.06	
	120-130	8.98	15.50	0.08	15.50
	130-140	20.20		0.23	
	140-150	23.70	20.70	0.19	20.70
	150-160	22.80		0.15	
	160-170	12.90	16.90	0.16	16.90
	170-180	10.30		0.15	
	180-190	11.20	10.30	0.14	10.30
	190-200	12.60		0.14	
	200-220		8.05		8.05
	220-240		5.84		5.84
	240-260		4.36		4.36
	260-280		3.03		3.03
	280-300		1.97		1.97
ST3	300-320		1.51		1.51
	320-340		1.63		1.63
	340-360		1.62		1.62
	360-380		2.73		2.73
	380-400		3.45		3.45
	400-420		3.69		3.69
	420-440		3.93		3.93
	440-460		2.91		2.91
	460-480		0.67		0.67
	480-500		0.97		0.97
	0-10	0.96	0.41	0.01	0.41
	10-20	0.69	0.61	0.01	0.61
	20-30	1.04	0.6	0.02	0.60
	30-40	0.64	0.24	0.02	0.24
	40-50	0.54	0.37	0.03	0.37
	50-60	0.98	0.17	0.03	0.17
	60-70	1.40		0.03	
	70-80	1.03	0.19	0.04	0.19
	80-90	0.59		0.05	
	90-100	0.46	0.20	0.05	0.20
	100-110	0.43		0.06	
	110-120	0.35	0.14	0.07	0.14
	120-130	0.44		0.07	

130-140	0.54	0.19	0.07	0.19
140-150	0.31		0.07	
150-160	0.75	0.15	0.05	0.15
160-170	0.83		0.03	
170-180	1.73	0.20	0.03	0.20
180-190	1.23		0.04	
190-200	1.63	0.17	0.05	0.17
200-210	0.96		0.06	
210-220	0.89	0.36	0.05	0.36
220-230	0.96		0.05	
230-240	0.69	0.26	0.02	0.26
240-250	1.04		0.02	
250-260	0.64	0.11	0.01	0.11
260-270	0.54		0.03	
270-280	0.98	0.17	0.01	0.17
280-300		0.12		0.12
300-320		0.23		0.23
320-340		0.18		0.18
340-360		0.28		0.28
360-380		0.25		0.25
380-400		0.27		0.27
400-420		0.3		0.30
420-440		0.28		0.28
440-460		2.83		2.83
460-480		0.30		0.30
480-500		0.42		0.42

Table S3: Soil chloride concentration measured in each of the Waza Logone profiles in 2017.

Site	Depth interval (cm)	Soil chloride concentration (mg l <sup>-1</sup> )	Gravimetric water content (%)
WL1	0,0-0,1	14.60	0.15
	0,1-0,2	8.96	0.15
	0,2-0,3	2.28	0.14
	0,3-0,4	0.98	0.13
	0,4-0,5	0.64	0.08
	0,5-0,6	1.00	0.09
	0,6-0,7	0.54	0.13
	0,7-0,8	0.28	0.16
	0,8-0,9	0.64	0.19
	0,9-1,0	1.01	0.23
	1,0-1,2	0.58	0.20
	1,2-1,4	0.33	0.19
	1,4-1,6	0.30	0.20
	1,6-1,8	1.11	0.24
	1,8-2,0	0.29	0.24
	2,0-2,2	0.21	0.23
	2,2-2,4	0.41	0.10
	2,4-2,6	1.65	0.18
	2,6-2,8	1.26	0.16
	2,8-3,0	1.39	0.21

	3,0-3,2	1.41	0.25
	3,2-3,4	4.15	0.22
	3,4-3,6	2.06	0.21
	3,6-3,8	5.65	0.17
	3,8-4,0	0.52	0.18
WL2	0,0-0,1	6,74	0.03
	0,1-0,2	3,39	0.03
	0,2-0,3	2,11	0.05
	0,3-0,4	1,06	0.06
	0,4-0,5	1,40	0.07
	0,5-0,6	0,73	0.08
	0,6-0,8	0,75	0.09
	0,8-1,0	0,61	0.08
	1,0-1,2	0,50	0.07
	1,2-1,4	0,41	0.07
	1,4-1,6	3,83	0.08
	1,6-1,8	0,62	0.09
	1,8-2,0	0,26	0.10
	2,0-2,2	0,22	0.10
	2,2-2,4	0,18	0.10
	2,4-2,6	0,12	0.12
	2,6-2,8	0,14	0.11
	2,8-3,0	0,24	0.11
WL3	0,0-0,1	4,72	0.12
	0,1-0,2	2,33	0.11
	0,2-0,3	0,71	0.13
	0,3-0,4	1,74	0.12
	0,4-0,5	0,80	0.13
	0,5-0,6	0,53	0.13
	0,6-0,8	0,53	0.14
	0,8-1,0	0,65	0.15
	1,0-1,2	0,47	0.16
	1,2-1,4	0,43	0.16
	1,4-1,6	0,41	0.17
	1,6-1,8	0,77	0.25
	1,8-2,0	1,21	0.28
	2,0-2,2	0,47	0.24
	2,2-2,4	0,50	0.25
	2,4-2,6	0,49	0.27
	2,6-2,8	0,54	0.31
	2,8-3,0	1,11	0.35
	3,0-3,2	1,09	0.28
	3,2-3,4	1,06	0.28
	3,4-3,6	1,05	0.30
	3,6-3,8	1,90	0.21

Table S4: Site-specific estimated monthly variation of ground cover including grass, crops, and flooding periods with ranges of monthly basal crop coefficient ( $K_{cb}$ ), soil water evaporation coefficient ( $K_e$ ), and root depth used in the scenarios.

Location	Month	Vegetation	$K_{cb}$	$K_e$	Root depth (m)
ST1	Jan	Sorghum	1.01 – 0.86	0.12	1.5 – 2.5
	Feb	Sorghum	0.35 – 0.35	0.48	1.5 – 2.5
	Mar	Bare soil	0.0	0.47 – 0.68	0.0
	Apr	Bare soil	0.0	0.27 – 0.41	0.0
	May	Grass	0.6 – 0.4	0.1 – 0.12	0.1 – 0.5
	June	Grass	0.85 – 0.6	0.05	0.2 – 0.7
	July	Grass	1.03 – 0.83	0.12	0.2 – 0.7
	Aug	Flooded	0.3 – 0.2	0.9 – 1.0	0.2 – 0.7
	Sep	Flooded	0.0	1.08	0.0
	Oct	Flooded	0.0	1.08	0.0
	Nov	Sorghum	0.2 – 0.1	0.66	0.5 – 1.5
	Dec	Sorghum	1.01 – 0.86	0.12	1.5 – 2.5
ST2	Jan	Tree (Acacia)	0.5 – 0.8	0.2 – 0.34	
	Feb	Tree	0.2 – 0.6	0.17 – 0.39	
	Mar	Tree	0.1 – 0.3	0.07 – 0.37	
	Apr	Tree	0.1 – 0.3	0.02 – 0.17	
	May	Tree, Grass	0.1 – 0.3	0.5	
	June	Tree, Grass	0.3 – 0.4	0.5	Time invariant root distribution
	July	Tree, Grass	0.3 – 0.4	0.5	
	Aug	Tree, flooded	0.6 – 0.8	0.25	
	Sep	Tree, flooded	0.7 – 1.05	0.25	
	Oct	Tree, flooded	0.7 – 1.05	0.25	
	Nov	Tree, Grass	0.7 – 0.9	0.25	
	Dec	Tree	0.5 – 0.8	0.32 – 0.37	
ST3	Jan	Grass	0.05 – 0.1	0.13 – 0.39	0.1
	Feb	Dry Grass	0.0 – 0.05	0.04 – 0.13	0.1
	Mar	Dry Grass	0.0 – 0.05	0.0	0.1 – 0.2
	Apr	Grass	0.1 – 0.3	0.0	0.2 – 0.3
	May	Green grass	0.6	0.0	0.2 – 0.3
	June	Green grass	0.65 – 0.85	0.34 – 0.54	0.2 – 0.4
	July	Green grass	0.73 – 1.03	0.16 - 0.24	0.2 – 0.4
	Aug	Green grass	0.83 – 1.03	0.09 - 0.22	0.2 – 0.4
	Sep	Green grass	0.83 – 0.98	0.14 - 0.22	0.2 – 0.4
	Oct	Green grass	0.78 – 0.93	0.19 - 0.22	0.2 – 0.3
	Nov	Green grass	0.4 – 0.6	0.51	0.1 – 0.3
	Dec	Grass	0.05 – 0.1	0.4 – 0.67	0.1
WL1	Jan	Bare soil	0.0 – 0.1	0.29 – 0.63	0.0 – 0.2
	Feb	Bare soil	0.0 – 0.1	0.16 – 0.42	0.0 – 0.2
	Mar	Bare soil	0.10	0.07 – 0.25	0.05 – 0.3
	Apr	Grass	0.30 – 0.4	0.03 – 0.1	0.1 – 0.3
	May	Grass	0.40	0.02 – 0.08	0.1 – 0.5
	June	Grass	0.70 – 0.9	0.01 – 0.02	0.1 – 0.5
	July	Grass	0.89 – 1.09	0.13	0.1 – 0.5
	Aug	Flooded	0.1 – 0.2	0.92 - 1.01	0.1 – 0.4
	Sep	Flooded	0.1 – 0.2	0.92 - 1.01	0.0 – 0.1
	Oct	Flooded	0.1 – 0.2	0.92 - 1.01	0.0 – 0.1
	Nov	Grass	0.2 – 0.5	0.58 – 0.62	0.05 – 0.2
	Dec	Grass	0.2 – 0.4	0.37 – 0.57	0.05 – 0.2

	Jan	Bare soil	0.0 – 0.1	0.11 – 0.57	0.0 – 0.1
WL2	Feb	Bare soil	0.0 – 0.1	0.03 – 0.24	0.0 – 0.1
	Mar	Bare soil	0.1 – 0.2	0.0 – 0.07	0.05 – 0.1
	Apr	Grass	0.2 – 0.3	0.0 – 0.02	0.05 – 0.2
	May	Grass	0.4 – 0.4	0.0 – 0.01	0.15 – 0.3
	June	Grass	0.45 – 0.6	0.0	0.15 – 0.3
	July	Grass	0.5 – 0.7	0.55 - 0.75	0.15 – 0.3
	Aug	Grass	0.45 – 1.0	0.12 - 0.22	0.1 – 0.3
	Sep	Flooded	0.3 – 1.0	0.12 - 0.22	0.1 – 0.3
	Oct	Grass	0.2 – 0.7	0.42 - 0.67	0.15 – 0.2
	Nov	Grass	0.1 – 0.2	0.77	0.15 – 0.2
	Dec	Grass	0.0 – 0.1	0.32 – 0.9	0.05 – 0.1
WL3	Jan	Bare soil	0.0 – 0.1	0.28 – 0.6	0.1 – 0.2
	Feb	Bare soil	0.0 – 0.1	0.15 – 0.4	0.1 – 0.2
	Mar	Bare soil	0.1 – 0.1	0.06 – 0.23	0.1 – 0.5
	Apr	Grass	0.2 – 0.4	0.03 – 0.09	0.2 – 0.5
	May	Grass	0.4	0.01 – 0.08	0.2 – 0.6
	June	Grass	0.4 – 0.9	0.01 - 0.01	0.2 – 0.6
	July	Grass	0.79 – 1.09	0.13	0.2 – 0.6
	Aug	Flooded	0.1 – 0.2	0.92 - 1.01	0.2 – 0.6
	Sep	Flooded	0.0 – 0.1	1.01	0.2 – 0.6
	Oct	Flooded	0.0 – 0.1	1.01	0.2 – 0.5
	Nov	Grass	0.2 – 0.5	0.58	0.1 – 0.5
	Dec	Grass	0.1 – 0.4	0.1 - 0.41	0.1 – 0.2

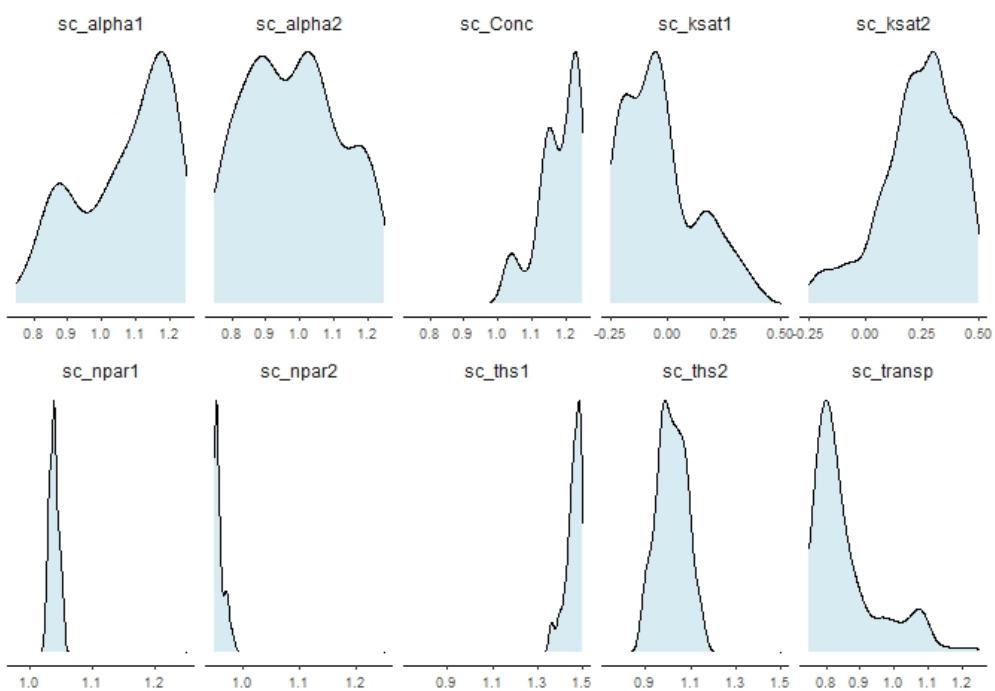


Fig. S1: posterior density distributions of the scaling factors used in the calibration of model ST1. Numbers indicate the individual model layers. Range of x-axes corresponds to prior distribution.

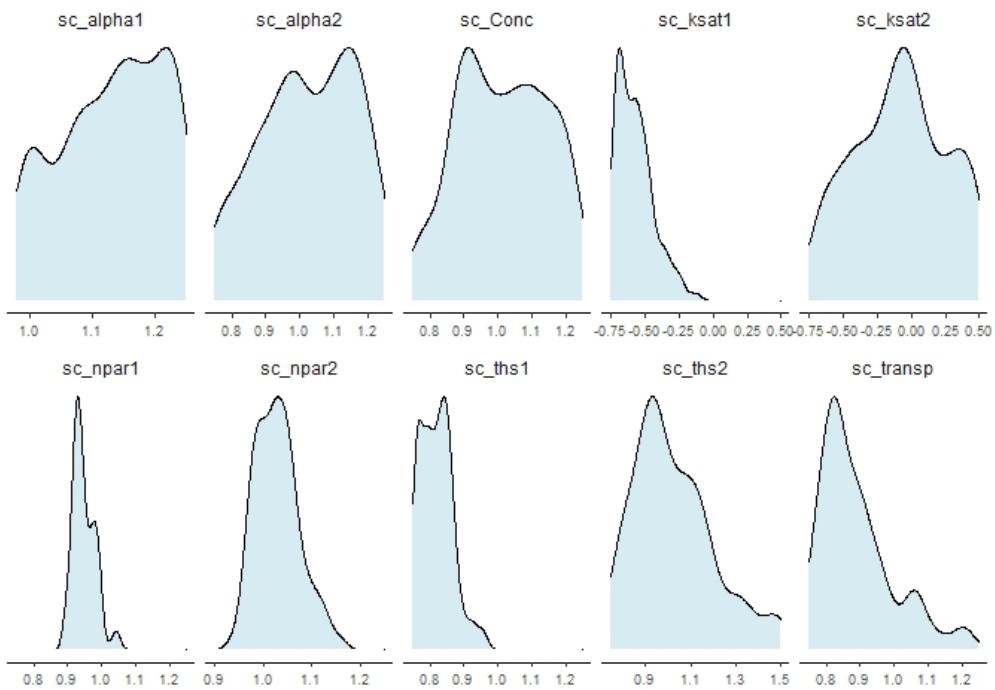


Fig. S2: posterior density distributions of the scaling factors used in the calibration of model ST2. Numbers indicate the individual model layers. Range of x-axes corresponds to prior distribution.

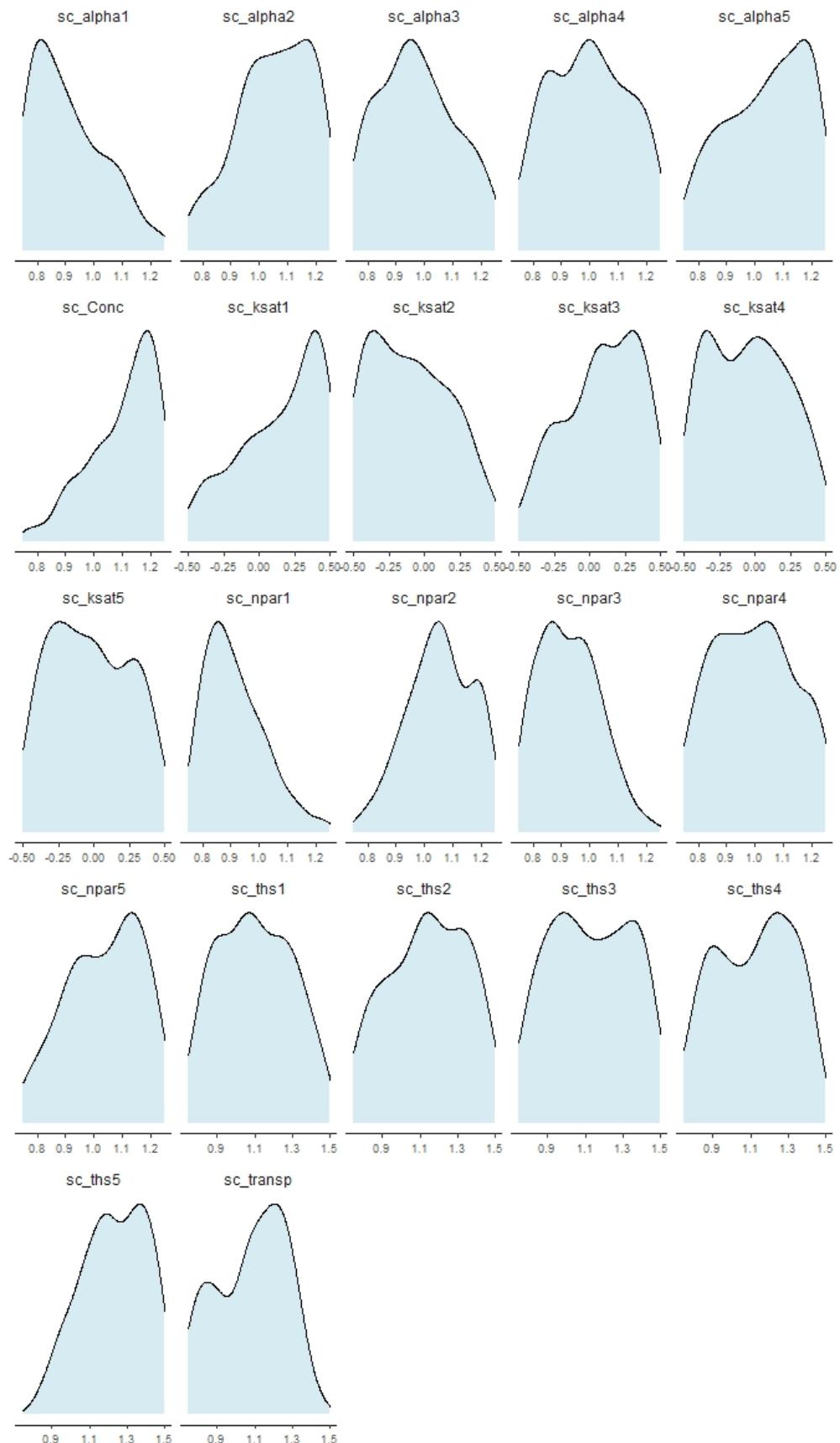


Fig. S3: posterior density distributions of the scaling factors used in the calibration of model ST3. Numbers indicate the individual model layers. Range of x-axes corresponds to prior distribution.

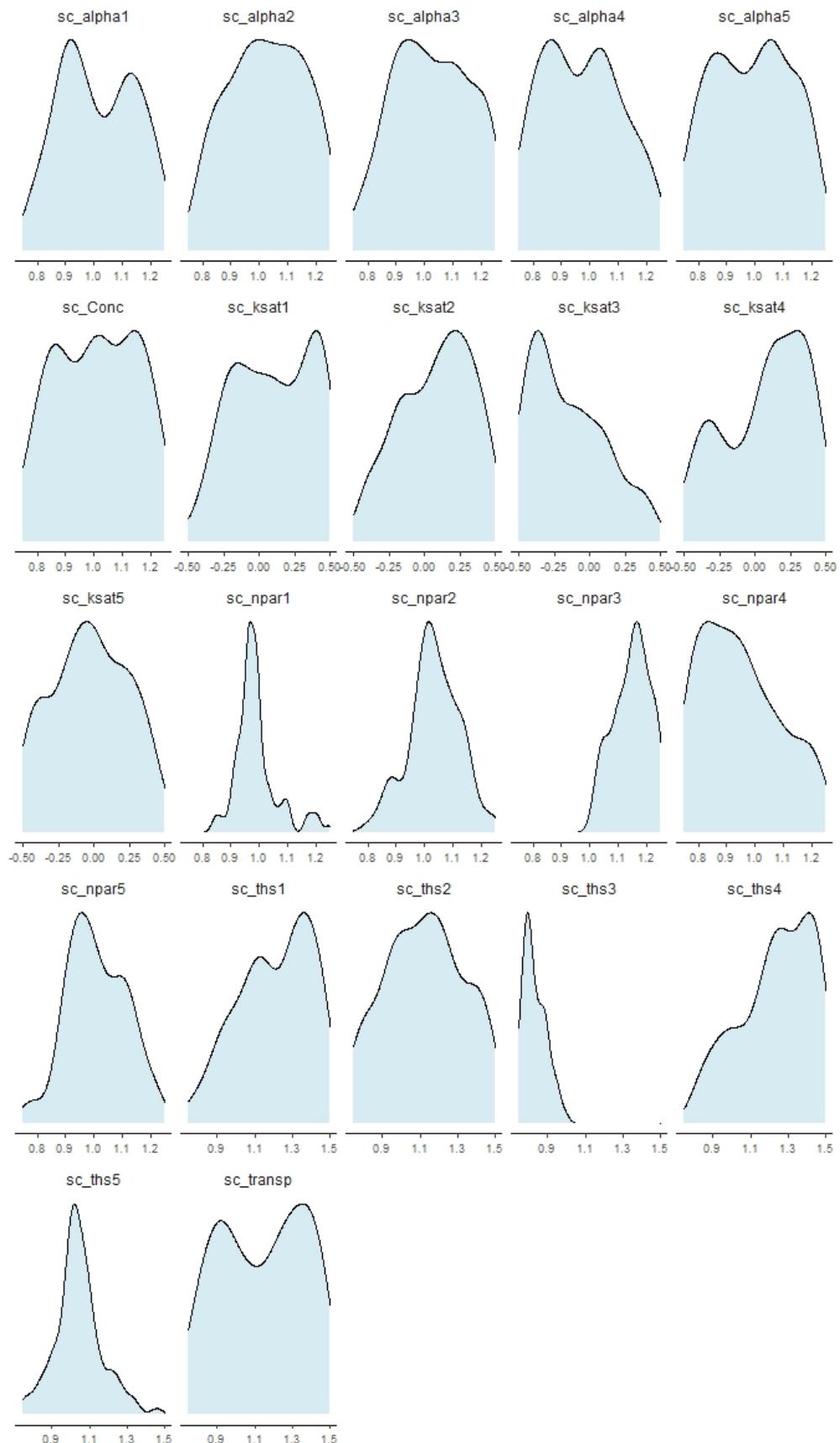


Fig. S4: posterior density distributions of the scaling factors used in the calibration of model WL1. Numbers indicate the individual model layers. Range of x-axes corresponds to prior distribution.

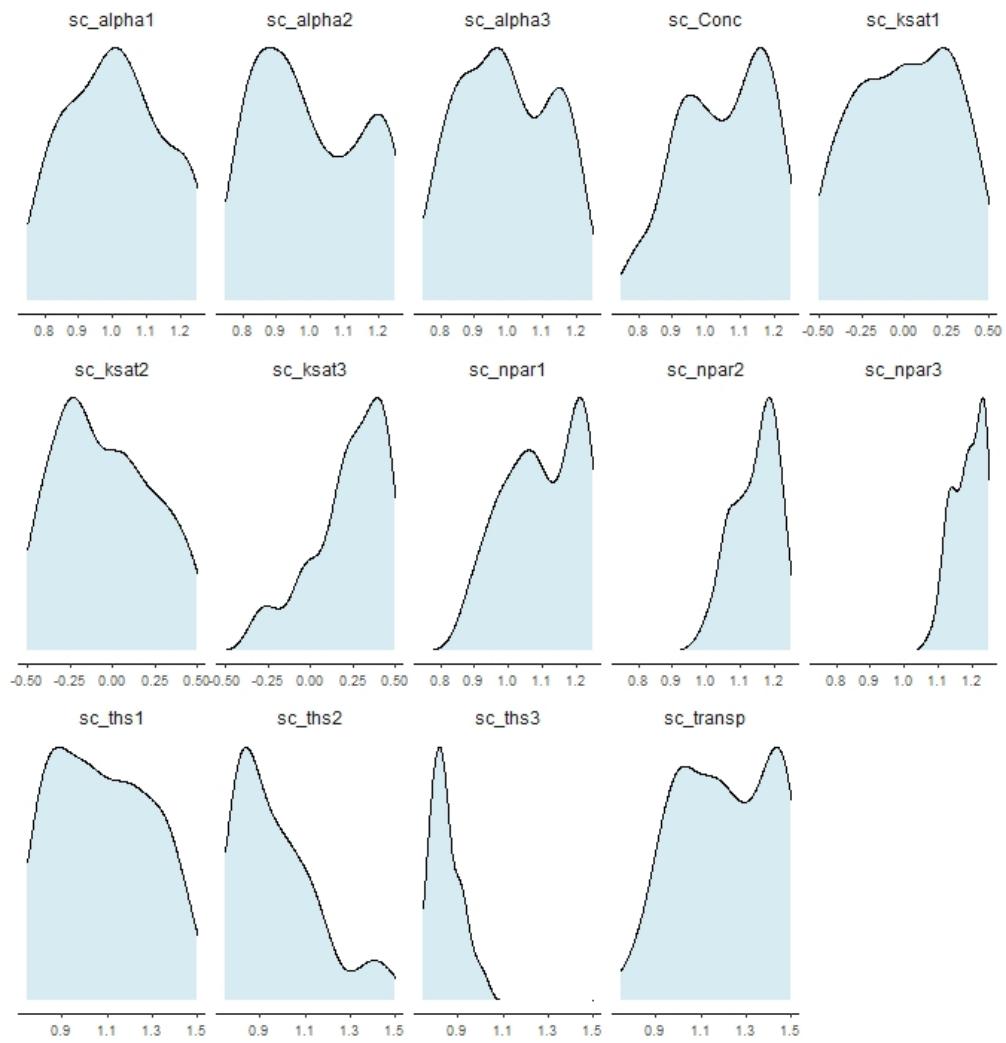


Fig. S5: posterior density distributions of the scaling factors used in the calibration of model WL2. Numbers indicate the individual model layers. Range of x-axes corresponds to prior distribution.

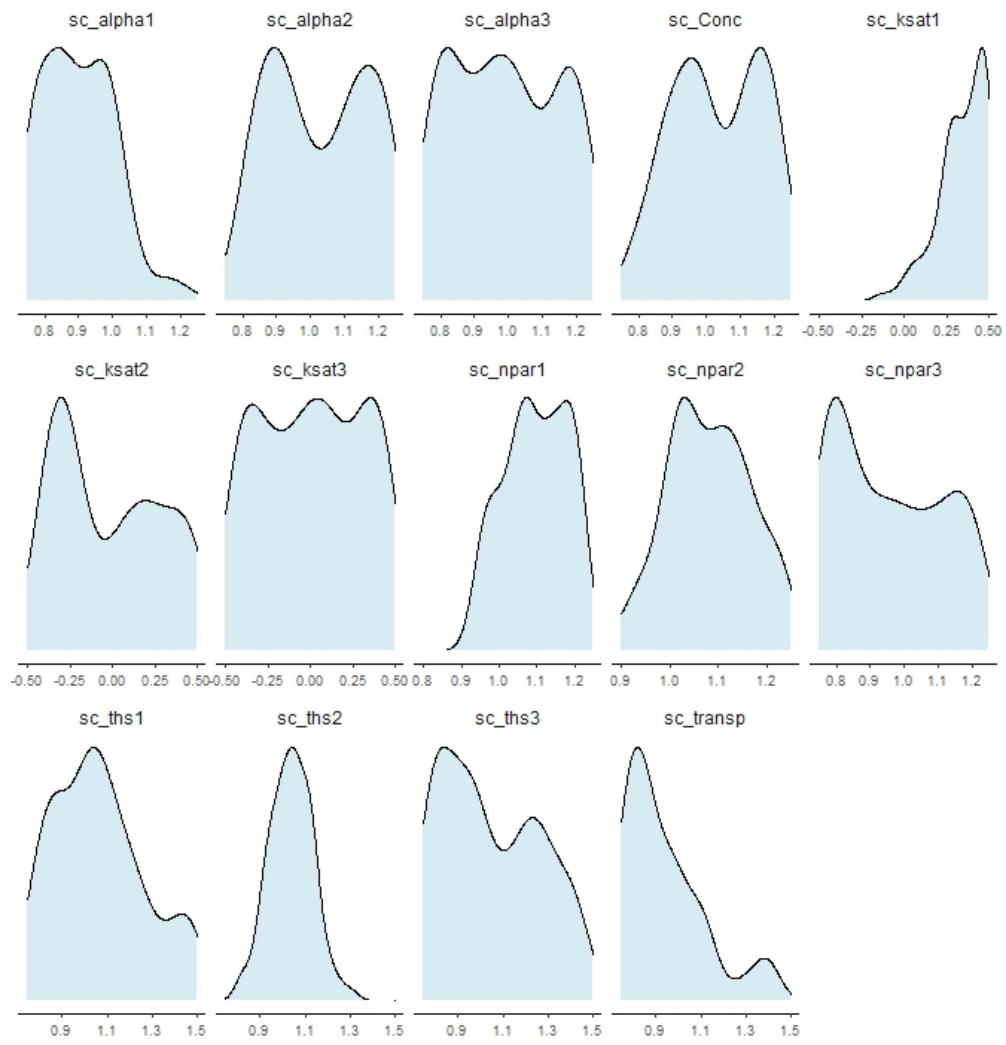


Fig. S6: posterior density distributions of the scaling factors used in the calibration of model WL3. Numbers indicate the individual model layers. Range of x-axes corresponds to prior distribution.