Recycled toilet paper: A novel source of sensitizer contamination in rivers

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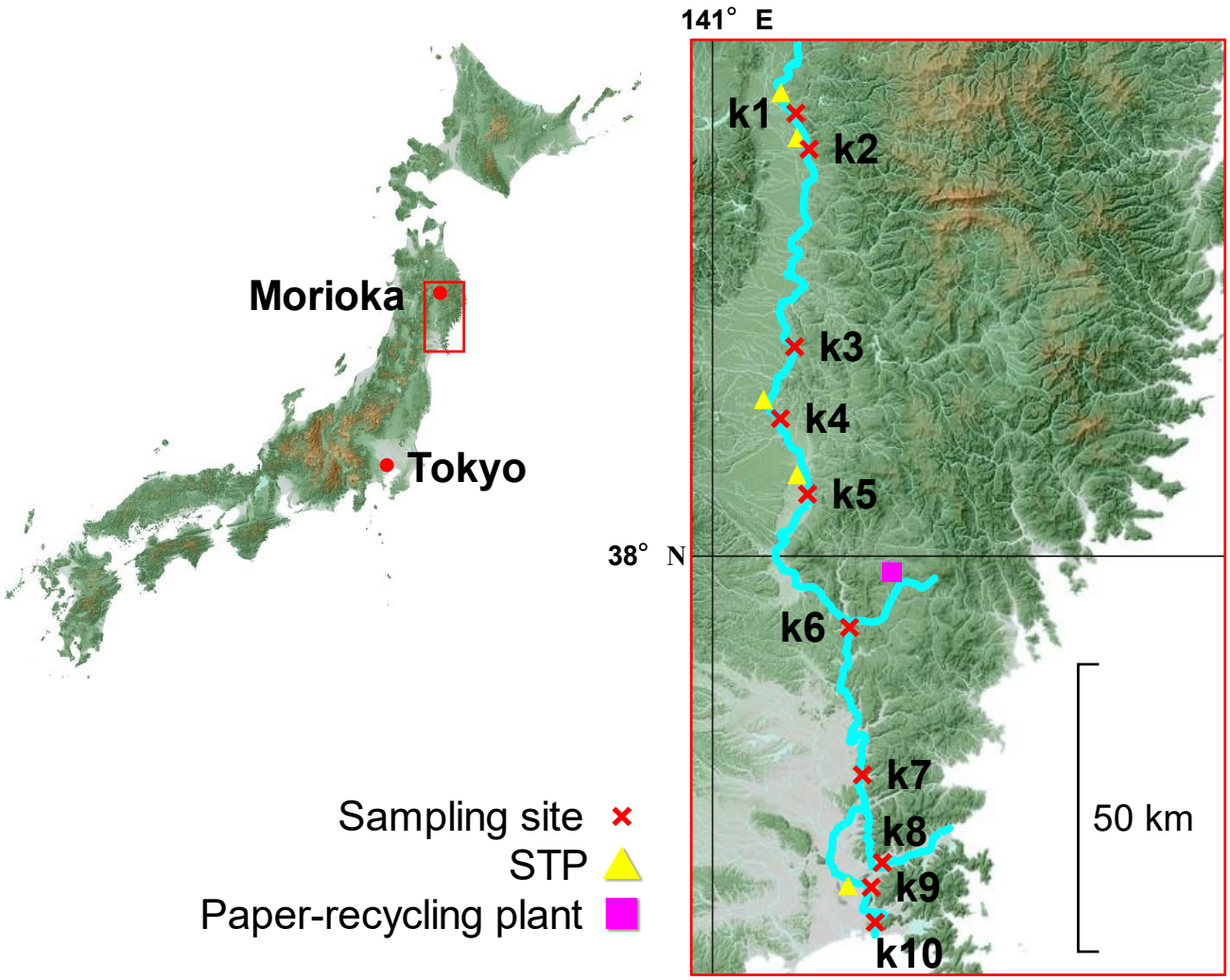
141° E
38° N
Morioka
Tokyo
k1
k2
k3
k4
k5
k6
k7
k8
k9
k10
Sampling site
STP
Paper-recycling plant
50 km

Fig. 1S

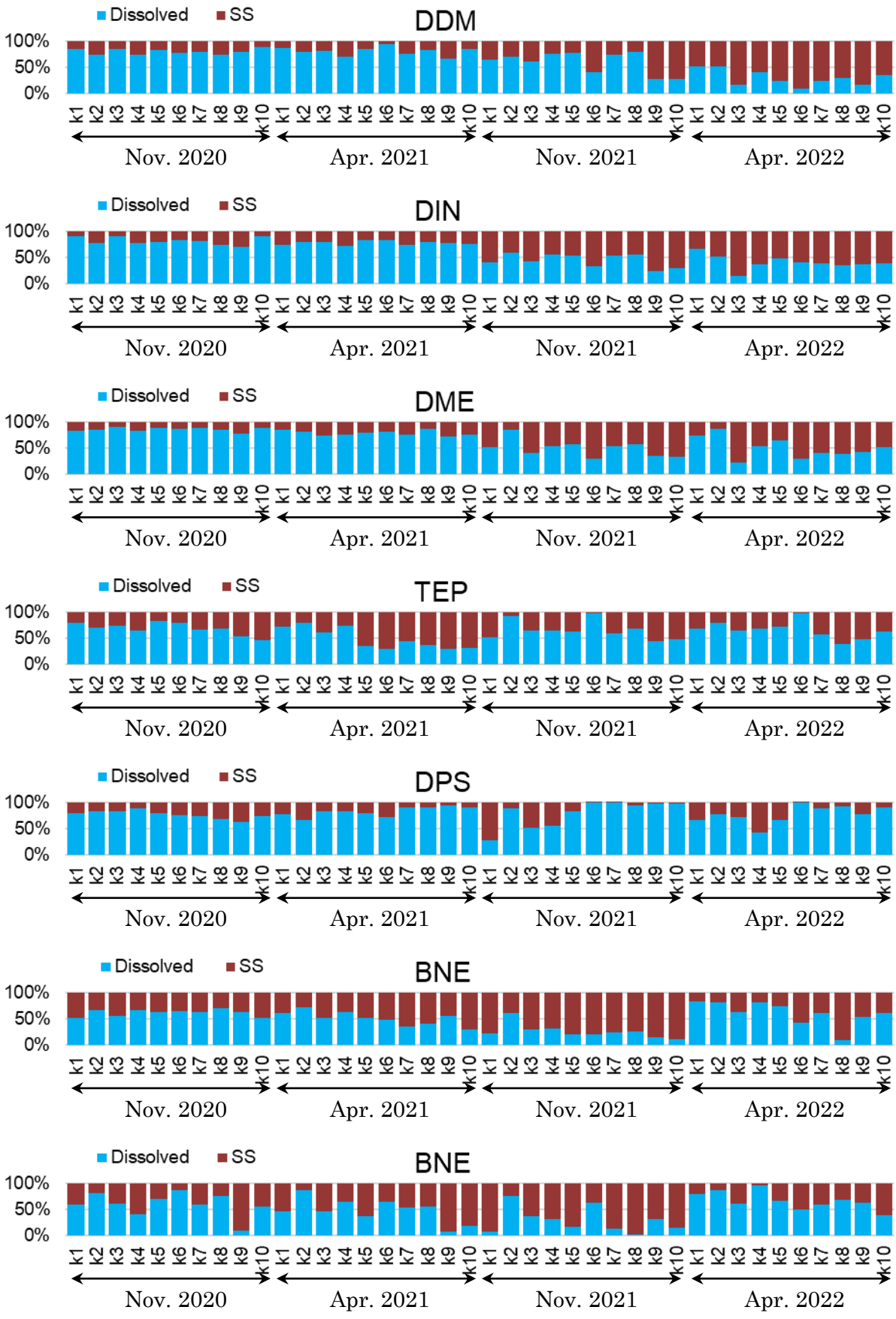
Dissolved
SS
DDM
DIN
DME
TEP
DPS
BNE
BNE
100%
50%
0%
k1 k2 k3 k4 k5 k6 k7 k8 k9 k10
Nov. 2020
Apr. 2021
Nov. 2021
Apr. 2022

Fig. 2S

Target	Calibration curve		Retention time (min)	Mass ion (m/z)	Recovery from water		Recovery from SS		LOQ (ng/l)
	Slope	R^2			%	RSD	%	RSD	
DDM	0.6726	0.9988	5.745	181, 196	99	3.6	95	3.5	56
DIN	0.5038	0.9969	5.995	212, 155	100	2.5	94	14	64
DME	0.2624	0.9978	6.140	210, 180	100	2.5	84	13	58
DTE	1.4435	0.9982	6.296	105, 210	99	6.5	99	5.6	67
BME	0.3220	0.9997	8.932	91, 242	106	2.0	93	5.2	68
DPS	0.7691	0.9980	9.560	125, 218	101	2.4	97	10	62
TEP	0.9800	0.9983	11.656	230, 231	95	10	87	6.1	58
BNE	0.8611	0.9983	12.072	91, 234	88	11	89	1.9	66
DPB	1.6882	0.9980	12.520	262, 77	94	11	92	5.5	73
BBP	0.5842	0.9976	13.176	244, 165	99	8.5	90	5.8	81
DOB	1.3666	0.9959	17.685	91, 290	104	13	97	7.0	86

Table 1S

	A	B	C	D	E	F	G	H	
Paper recycling rates	100%	100%	100%	100%	100%	100%	98-100%	100%	Mean
Manufacturing country	Japan	Japan	Japan	Japan	Vietnam	USA	USA	Canada	
DDM	n.d.	n.d.	n.d.	n.d.	0.0030	0.012	0.0026	0.0015	0.0048
DIN	0.024	0.029	0.10	0.075	0.027	0.053	0.0051	0.0075	0.040
DME	4.1	5.8	27	22	6.4	4.4	0.55	1.1	8.9
DTE	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	
BME	0.80	0.54	3.9	2.5	0.63	0.85	0.14	0.19	1.2
DPS	1.7	0.16	2.5	2.1	0.84	1.3	0.042	0.092	1.1
TEP	0.0041	0.015	0.062	0.22	0.032	0.13	0.0040	0.0046	0.059
BNE	0.028	0.13	0.83	0.25	0.15	5.1	0.036	0.065	0.83
DBP	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	
BBP	n.d.	0.0051	0.0031	0.0067	0.0016	n.d.	n.d.	n.d.	0.0041
DOB	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	
ΣSRCs (μg/g)	6.6	6.7	34	27	8.1	12	0.78	1.4	12

Table 2S

Cmpd.	Conc.	k1	k2	k3	k4	k5	k6	k7	k8	k9	k10
DDM	min.	1.0	0.86	0.77	0.94	0.85	1.5	1.0	0.87	1.2	1.1
	max.	19	14	21	15	17	29	14	10	6.4	5.1
	mean	5.8	4.6	6.9	4.8	5.3	9.8	4.5	3.4	2.6	2.4
DIN	min.	0.49	0.62	0.57	0.45	0.54	0.54	0.38	0.42	0.50	0.58
	max.	4.5	3.0	7.2	3.3	3.5	9.6	3.1	2.5	2.3	2.2
	mean	2.0	1.7	3.2	1.7	1.9	3.3	1.7	1.4	1.4	1.3
DME	min.	17	15	14	11	12	14	12	15	14	13
	max.	84	147	167	66	72	3219	72	55	52	49
	mean	39	68	70	35	41	1024	35	32	30	30
DTE	min.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
	max.	0.12	0.21	0.23	0.20	0.13	0.23	0.45	0.37	0.62	0.57
	mean	0.029	0.078	0.074	0.058	0.033	0.11	0.20	0.14	0.20	0.22
BME	min.	6.1	4.2	4.0	3.0	1.8	1.5	1.7	1.9	2.2	2.5
	max.	49	44	42	35	37	1311	33	43	28	38
	mean	19	20	17	15	15	382	12	19	12	15
DPS	min.	6.7	5.6	8.6	6.3	4.8	4.0	14	15	14	14
	max.	28	352	23	16	38	1799	427	125	203	321
	mean	16	102	16	12	18	811	125	54	65	98
TEP	min.	0.44	0.28	0.39	0.33	0.22	0.16	0.17	0.16	0.18	0.25
	max.	1.8	4.4	2.2	1.8	2.2	2.7	1.6	3.2	1.8	2.1
	mean	1.0	1.6	0.93	0.90	0.93	0.89	0.68	1.4	0.78	0.90
BNE	min.	1.0	0.26	0.53	0.32	0.30	0.12	0.14	0.14	1.0	0.20
	max.	15	22	4.6	4.2	5.5	9.1	9.2	125	5.1	2.9
	mean	5.0	6.4	1.8	2.2	2.1	2.7	2.6	32	2.2	1.4

Table 3S