The manuscript addresses an important topic with valuable data, but significant reorganization, clearer figures, and expanded discussion are needed to improve clarity and scientific impact. I therefore recommend **major revisions**. With the above changes, the paper would be much more accessible to a broader readership and would better highlight its contributions.

We thank the reviewers for their time and constructive feedback. Please see our responses below.

Major Comments

1. **Figures and Visualization**

- **Figure 1:** The current layout is difficult to interpret: the legends are too small, and colors are used simultaneously to represent ^{137}Cs deposition and river catchments. I recommend separating these elements:
  - Create a first panel where colors represent only ^{137}Cs deposition, and identify river catchments with labels instead of colors.
  - Zoom in slightly so that Fukushima Dai-ichi Nuclear Power Plant is clearly visible.
  - Include an inset map showing the study area within Japan to orient readers unfamiliar with the region.
  - Describe all acronyms in the figure caption.
- **Contextual location:** There is no figure linking the lagoon to its main ^{137}Cs source (Fukushima). A simple map indicating the relative position of the lagoon and nuclear plant would strengthen context for non-local readers.

The map has been adjusted to make it easier to see the relative positions of the study area and the Fukushima Daiichi Nuclear Power Plant, and river catchments have been identified with labels (Figure 1).

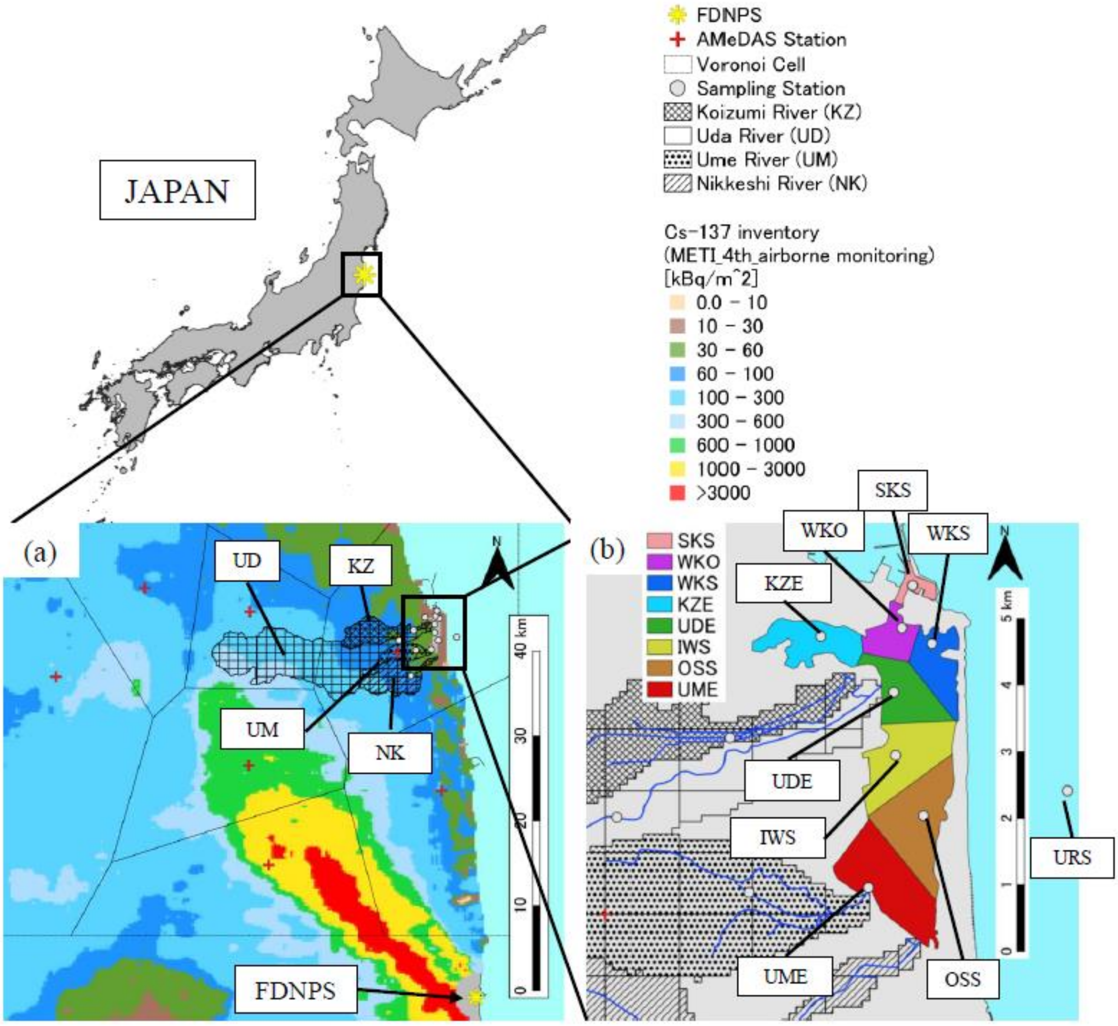

Figure 1: Spatial distribution of the ^{137}Cs inventory in the study catchment (a) and sampling stations of Matsukawa-ura lagoon (b). The spatial distribution of the ^{137}Cs inventory is based on the fourth airborne survey by MEXT (2011). The Voronoi cells were created based on the coordination of Japan Meteorological Agency weather stations (a) and sampling stations (b).

1. **Methods vs. Results**

- Some parameters discussed in Results and Discussion could be introduced in Methods:
  - K_d calculation: Please specify explicitly how K_d was obtained (e.g., Bq m^{-3} divided by Bq kg^{-1}).
  - Voronoi partitioning: Mention and briefly describe this procedure in

Methods (currently introduced only in line 199).

- In general, all analytical and data-processing steps used to represent or interpret results should be described in Methods before they appear in the Results section.

The Kd calculation, Voronoi tessellation and mass balance calculation method mentioned in the Results and Discussion have been added in materials and methods (L116-L158). The water catchments basic information tables have been moved to the Supplementary (Table S1).

Representation of Results

- **Figure 2:** The statistical plot combines all river catchment data, but much of the underlying data are not shown elsewhere (only partially in Table S1). Consider a clearer, more illustrative figure:
    - For example, a four-panel plot—one per river—showing monthly dissolved and particulate ^{137}Cs concentrations (Bq m^{-3}) as column plots.
    - This would highlight the key findings: (a) Ume and Nikkeshi contribute most ^{137}Cs to the estuary; (b) fluxes peak in summer.
    - Remaining parameters (Bq kg^{-1}, g m^{-3}, K_d) could either share a secondary axis or be kept in a table placed in the main text rather than in the Supplementary Information.
- **Tables:**
    - **Table 1** seems to contain background or supporting data rather than primary results. Consider moving it to the Supplementary Information and bringing **Table S1** into the main text.

Since no seasonal trends were observed in the ^{137}Cs concentrations in river water, the currently used box plots were retained (Figure 2), but the time series of dissolved and suspended ^{137}Cs and other parameters were added to the supplementary (Figure S1, Table S2).

1. **Organization of Results and Discussion**

- **Section 3.2 (Lagoon results):**
  - Subsection 3.2.1 is titled "Relationship between dissolved ^{137}Cs and salinity" but includes all parameters and does not first present the spatial distribution of ^{137}Cs itself. Begin with a clear presentation of particulate and dissolved ^{137}Cs distributions—perhaps using isosurface plots or panel figures similar to those for rivers (even a subset of months for clarity).
  - The investigation of relationships with salinity fits better in the Discussion rather than Results. Splitting Results and Discussion would improve flow and clarity.
- **Figure 3 (salinity relationships):** The panels suggest little to no correlation. Consider exploring:
  - Subsets of data (individual rivers, specific lagoon stations near river mouths, or specific seasons).
  - If no relationship exists under any subset, move these plots to the Supplementary Information or remove them.
- **Section 3.2.2 and Figure 4:** Similar concerns apply here—repeated salinity analysis without a clear signal. A deeper targeted analysis or removal is advised.
- **Figure 5:** This clearly shows seasonal variability (higher in summer, lower in winter) and could be placed under a dedicated subsection focused on temporal variability rather than under temperature–salinity relationships.

The title of the subsection 3.2.1 has been changed to "Changes in parameters due to salinity" (L192). The figures of salinity and each parameter have been left intact to clarify whether there is a relationship with salinity (Figure 3), but the figures showing the relationship with salinity at each location have been removed. Instead, figures showing the time series of dissolved and suspended ^{137}Cs has been added (Figure 4), which will lead to the next subsection, "Seasonal variation of dissolved ^{137}Cs in the lagoon". Other parameters have been added in the supplementary (Table S3, S4). In addition, the context has been restructured to make the results and discussion clearer.

A subsection focusing on seasonal variations has been added as subsection 3.2.2, and the effects of water temperature have been integrated into this subsection.

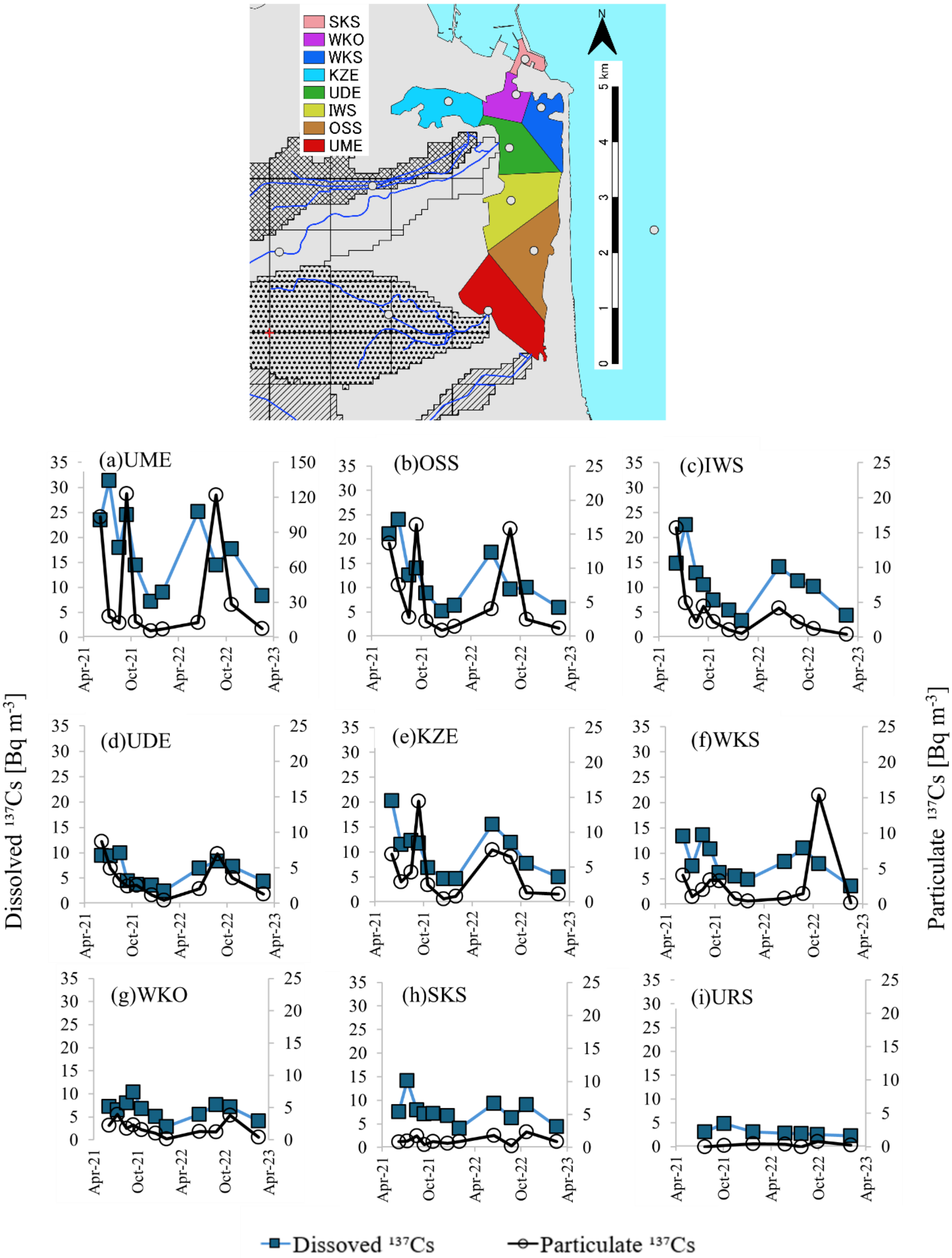

Figure 4: Time series of dissolved ^{137}Cs and particulate ^{137}Cs concentration in Matsukawa-ura lagoon. ^{137}Cs concentrations were decay-corrected to the sampling date. Relative positions of each sampling station are shown in Figure 1b.

Section 3.3 (Modeling)

- Add a schematic diagram summarizing the model setup and assumptions for desorption/dissolution of Cs. Values adopte from the literature could be noted on the schematic for transparency.
- Include final model results within the main text (e.g., from Figure S1). Panels a–c of Figure S1 are particularly informative, illustrating that most ^{137}Cs is discharged in August and that the particulate fraction dominates.

We added column plots as Figure 6, showing estimated fluxes from the river. In addition, we added column plots as Figure 7, showing the model results estimating the flux of dissolved ^{137}Cs supplied to the lagoon. These makes the model results easier to understand visually. The original table showing the model results has been reorganized and moved to the supplementary (Table S5).

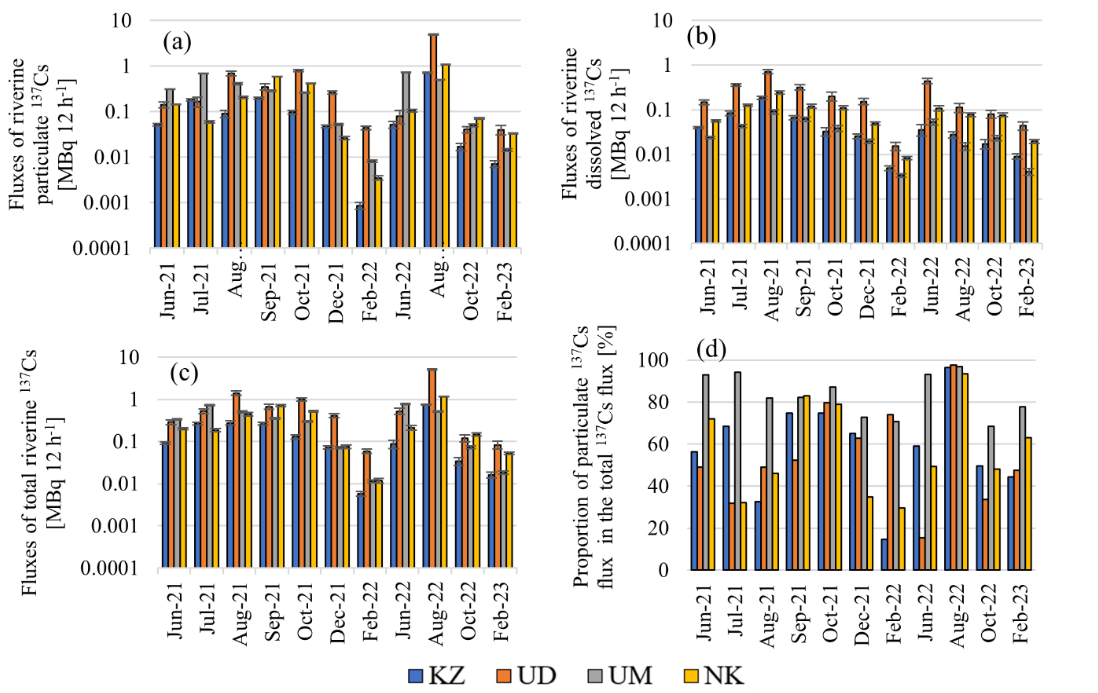

Figure 6: Fluxes of riverine particulate ^{137}Cs (a), dissolved ^{137}Cs (b) and total ^{137}Cs (c) in each river. Proportion of particulate ^{137}Cs flux in the total ^{137}Cs flux (d). Black bars represent the measurement error of ^{137}Cs.

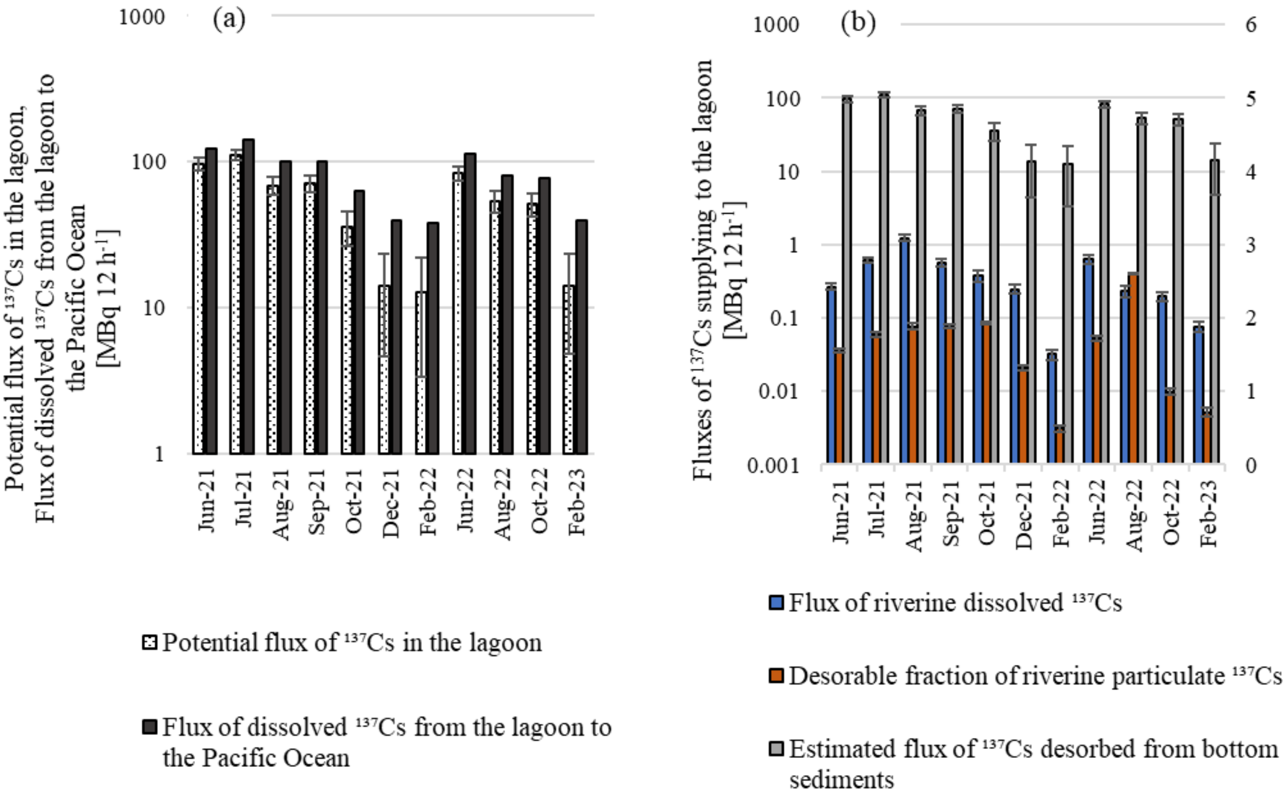

Figure 7: Potential fluxes of dissolves ^{137}Cs supplied to Matsukawa-ura lagoon and fluxes of dissolved ^{137}Cs from the lagoon to the Pacific Ocean (a). Fluxes of dissolved ^{137}Cs supplied to the lagoon from the rivers, desorbed from riverine particles and bottom sediments in the lagoon (b). Black bars represent the measurement error of ^{137}Cs.

1. **Broader Perspective and Implications**

- Quantify, if possible, the flux of ^{137}Cs from the lagoon to the Pacific Ocean, addressing one of the paper's stated aims.
- Place findings in a broader context:
  - How significant are lagoon discharges compared with other ^{137}Cs sources to the Pacific?
  - Are there similar studies (in Japan or elsewhere) that could provide

comparison?

- What are the implications of these results for understanding radionuclide transport or for monitoring strategies?
- Suggest potential next steps or research directions based on the conclusions.

We quantified the flux of ^{137}Cs from the lagoon to the Pacific Ocean (Figure 7a) and compared it with studies reporting fluxes from other rivers in Fukushima Prefecture (Niida et al., 2022) (306-313). Niida et al. (2022) calculated the fluxes of ^{137}Cs flowing out the Pacific Ocean from rivers closer to the Fukushima Daiichi Nuclear Power Plant than Matsukawa-ura lagoon during high flow conditions and found that some of this flux was equivalent to the flux of ^{137}Cs flowing out the Pacific Ocean from Matsukawa-ura lagoon. This highlights the significant impact of the flux of ^{137}Cs flowing out the Pacific Ocean from Matsukawa-ura lagoon compared to other rivers.

Furthermore, because the impact of ^{137}Cs dissolution from bottom sediments is significant (Figure 7b), the report also proposed future monitoring strategies in the Fukushima coastal areas, such as strengthening analysis of marine sediments and their pore water (L329-336).

Table S1

Catchment mean rainfall and flux of river water discharge.

		Weather station		Catchment				
		Hippo	Soma	Koizumi	Uda	Ume	Nikkeshi	Total
Catchment area (km^2)				17.8	100.6	10.7	22.6	151.6
Land use (%)	Forest			51	85	27	62	
	Paddy field			18	5	41	22	
	Farmland			6	6	6	4	
	Urban area			22	1	20	3	
Ratio to entire catchment (%)	Koizumi river (KZ)	0	100					
	Uda river (UD)	60	40					
	Ume river (UM)	0	100					
	Nikkeshi river (NK)	0	100					
Rainfall in the 30 days prior to sample collection (mm)	Jun-21	91	74	74	84	74	74	
	Jul-21	165	197	197	177	197	197	
	Aug-21	346	321	321	336	321	321	
	Sep-21	211	195	195	204	195	195	
	Oct-21	181	177	177	179	177	177	
	Dec-21	117	64	64	96	64	64	
	Feb-22	21	12	12	17	12	12	
	Jun-22	217	235	235	224	235	235	
	Aug-22	141	99	99	124	99	99	
	Oct-22	54	97	97	71	97	97	
	Feb-23	47	28	28	39	28	28	
Flux of river water discharge ($\times 10^6$ m^3 12 h^{-1})[a]	Jun-21			0.011	0.073	0.0068	0.014	0.11
	Jul-21			0.030	0.15	0.018	0.039	0.24
	Aug-21			0.050	0.29	0.030	0.063	0.44
	Sep-21			0.030	0.18	0.018	0.038	0.26
	Oct-21			0.027	0.16	0.016	0.035	0.23
	Dec-21			0.010	0.083	0.0059	0.013	0.11
	Feb-22			0.0019	0.015	0.0011	0.0024	0.020
	Jun-22			0.036	0.20	0.022	0.046	0.30
	Aug-22			0.015	0.11	0.0092	0.019	0.15
	Oct-22			0.015	0.062	0.0090	0.019	0.10
	Feb-23			0.0043	0.034	0.0026	0.0055	0.047

[a] Based on the data from Kamo et al.(2014).

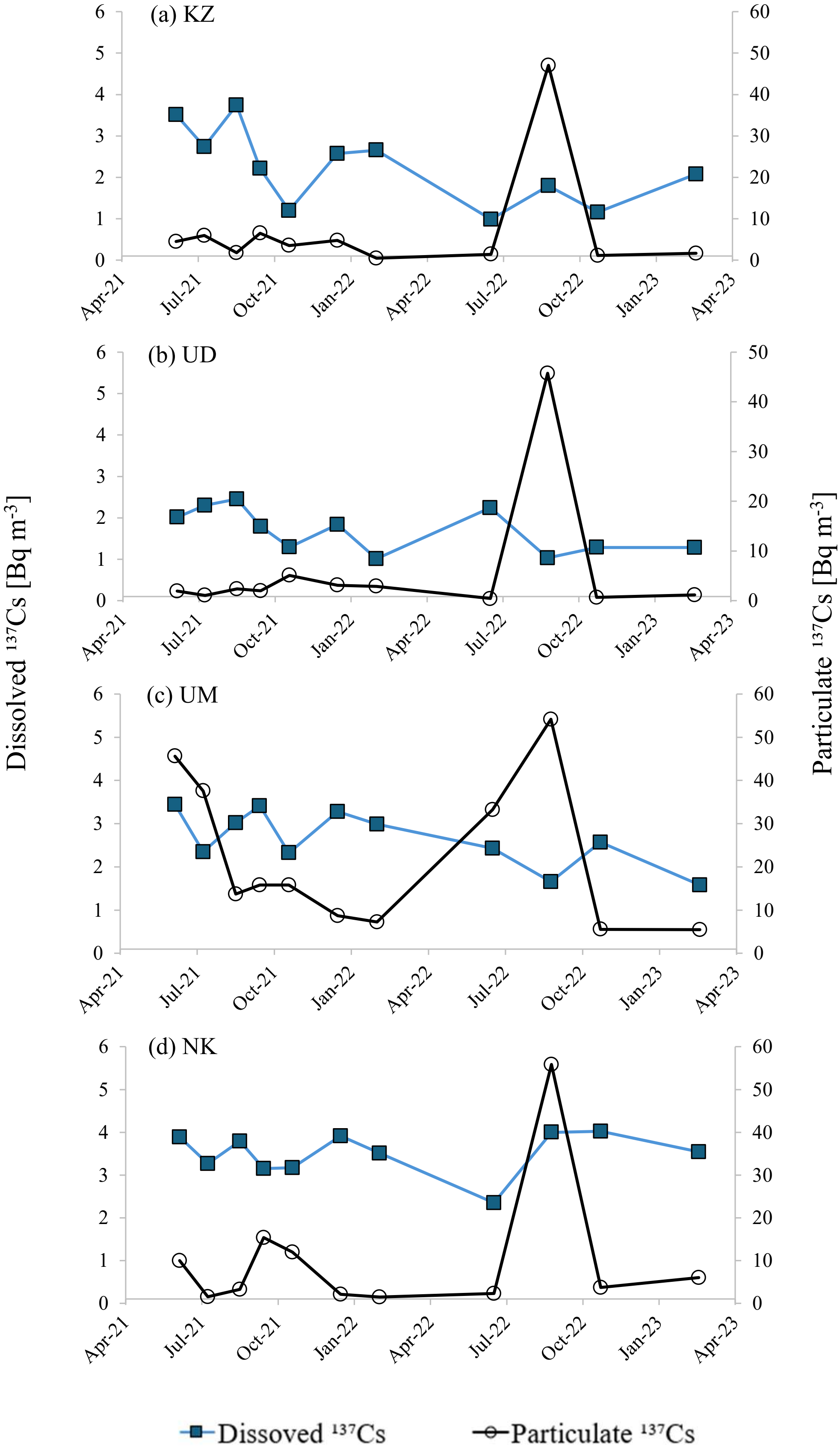

Figure S1: Time series of dissolve ^{137}Cs and particulate ^{137}Cs concentration in Matsukawa-ura lagoon and station URS at offshore of the lagoon. ^{137}Cs concentrations were decay-corrected to the sampling date.

Table S2

Analytical results of ^{137}Cs concentration at river inflowing to Matsukawa-ura lagoon.

^{137}Cs activity concentrations were decay-corrected to the sampling date.

Station	Sampling date	Long E	Lat N	Salinity	^{137}Cs in suspended particles (Bq kg^{-1})	Particulate ^{137}Cs (Bq m^{-3})	Dissolved ^{137}Cs (Bq m^{-3})	Suspended particle concentration (Bq m^{-3})	Apparent distribution coefficient (L kg^{-1})
KZ	2021/6/17	140.9272	37.8076	0.1	1128 ± 87	4.5 ± 0.3	3.5 ± 0.2	4.0	321075
	2021/7/20			0.2	3677 ± 221	6.0 ± 0.4	2.7 ± 0.3	1.6	1343027
	2021/8/27			0.1	4835 ± 854	1.8 ± 0.3	3.7 ± 0.3	0.4	1290839
	2021/9/24			0.1	1419 ± 68	6.5 ± 0.3	2.2 ± 0.3	4.6	641397
	2021/10/28			0.1	2368 ± 196	3.6 ± 0.3	1.2 ± 0.3	1.5	1976150
	2021/12/24			0.4	1833 ± 115	4.8 ± 0.3	2.6 ± 0.3	2.6	712516
	2022/2/8			1.0	191 ± 34	0.5 ± 0.1	2.7 ± 0.3	2.4	71815
	2022/6/23			0.1	386 ± 65	1.4 ± 0.2	1.0 ± 0.3	3.7	391027
	2022/8/30			0.1	955 ± 19	47.0 ± 0.9	1.8 ± 0.3	49.2	531742
	2022/10/27			0.1	776 ± 144	1.1 ± 0.2	1.2 ± 0.3	1.5	669661
	2023/2/20			0.1	653 ± 119	1.7 ± 0.3	2.1 ± 0.3	2.5	314126
UD	2021/6/17	140.9126	37.7902	0.1	1110 ± 163	1.9 ± 0.3	2.0 ± 0.3	1.8	551470
	2021/7/20			0.1	1790 ± 447	1.1 ± 0.3	2.3 ± 0.2	0.6	777173
	2021/8/27			0.1	2368 ± 272	2.4 ± 0.3	2.5 ± 0.3	1.0	965710
	2021/9/24			0.1	988 ± 149	2.0 ± 0.3	1.8 ± 0.2	2.0	550703
	2021/10/28			0.1	1435 ± 91	5.1 ± 0.3	1.3 ± 0.3	3.6	1110440
	2021/12/24			0.1	4452 ± 352	3.1 ± 0.2	1.8 ± 0.3	0.7	2419522
	2022/2/8			0.1	3750 ± 327	2.9 ± 0.3	1.0 ± 0.2	0.8	3698272
	2022/6/23			0.1	376 ± 122	0.4 ± 0.1	2.2 ± 0.3	1.1	167708
	2022/8/30			0.1	670 ± 15	45.7 ± 1.0	1.0 ± 0.2	68.2	648187
	2022/10/27			0.1	1308 ± 211	0.7 ± 0.1	1.3 ± 0.3	0.5	1016381
	2023/2/20			0.1	2331 ± 541	1.2 ± 0.3	1.3 ± 0.3	0.5	1813976
UM	2021/6/17	140.9494	37.7863	0.1	1496 ± 30	45.6 ± 0.9	3.4 ± 0.2	30.5	434323
	2021/7/20			0.1	2331 ± 51	37.6 ± 0.8	2.3 ± 0.2	16.1	992628
	2021/8/27			0.1	9140 ± 384	13.7 ± 0.6	3.0 ± 0.3	1.5	3024999
	2021/9/24			0.1	974 ± 29	15.8 ± 0.5	3.4 ± 0.4	16.2	285496
	2021/10/28			0.1	1034 ± 28	15.8 ± 0.4	2.3 ± 0.3	15.3	444498
	2021/12/24			0.1	1244 ± 53	8.7 ± 0.4	3.3 ± 0.3	7.0	379072
	2022/2/8			0.1	789 ± 36	7.3 ± 0.3	3.0 ± 0.3	9.2	264015
	2022/6/23			0.1	1346 ± 24	33.2 ± 0.6	2.4 ± 0.3	24.7	554292
	2022/8/30			0.1	2707 ± 49	54.1 ± 1.0	1.7 ± 0.3	20.0	1630890
	2022/10/27			0.1	1014 ± 60	5.6 ± 0.3	2.6 ± 0.3	5.5	394389
	2023/2/20			0.2	454 ± 28	5.5 ± 0.3	1.6 ± 0.3	12.1	287519
NK	2021/6/17	140.9428	37.7594	0.1	1360 ± 65	10.0 ± 0.5	3.9 ± 0.2	7.3	349932
	2021/7/20			0.1	560 ± 88	1.5 ± 0.2	3.3 ± 0.2	2.8	171579
	2021/8/27			0.1	1861 ± 210	3.3 ± 0.4	3.8 ± 0.3	1.8	490207
	2021/9/24			0.1	2176 ± 74	15.3 ± 0.5	3.2 ± 0.3	7.1	690292
	2021/10/28			0.1	2224 ± 80	12.0 ± 0.4	3.2 ± 0.3	5.4	701280
	2021/12/24			0.1	373 ± 51	2.1 ± 0.3	3.9 ± 0.4	5.6	95406
	2022/2/8			0.1	360 ± 65	1.5 ± 0.3	3.5 ± 0.3	4.1	102398
	2022/6/23			0.1	1208 ± 146	2.3 ± 0.3	2.4 ± 0.3	1.9	513555
	2022/8/30			0.1	1702 ± 32	55.8 ± 1.0	4.0 ± 0.4	32.8	425506
	2022/10/27			0.1	1039 ± 75	3.7 ± 0.3	4.0 ± 0.4	3.6	258130
	2023/2/20			0.1	595 ± 31	6.0 ± 0.3	3.5 ± 0.3	10.1	168108

Table S3

Analytical results of ^{137}Cs activity concentration in surface water collected at station UME, OSS, IWS and UDE in Matsukawa-ura lagoon. ^{137}Cs activity concentrations were decay-corrected to the sampling date.

Station	Sampling date	Long E	Lat N	Salinity	^{137}Cs in suspended particles (Bq kg^{-1})	Particulate ^{137}Cs (Bq m^{-3})	Dissolved ^{137}Cs (Bq m^{-3})	Suspended particle concentration (Bq m^{-3})	Apparent distribution coefficient (L kg^{-1})
UME	2021/6/17	140.9698	37.7869	6.0	730 ± 14	103.3 ± 2.0	23.5 ± 0.4	141.5	31057
	2021/7/20			26.8	489 ± 16	18.0 ± 0.6	31.3 ± 0.7	36.8	15602
	2021/8/27			28.3	16433 ± 770	12.3 ± 0.6	18.0 ± 0.5	0.7	914863
	2021/9/24			28.7	594 ± 7	123.3 ± 1.4	24.6 ± 0.8	207.6	24181
	2021/10/28			26.7	853 ± 26	13.2 ± 0.4	14.4 ± 0.6	15.5	59062
	2021/12/24			23.3	2005 ± 108	5.6 ± 0.3	7.2 ± 0.5	2.8	278607
	2022/2/8			31.0	779 ± 34	7.2 ± 0.3	9.0 ± 0.4	9.2	86841
	2022/6/23			28.4	1001 ± 34	12.7 ± 0.4	25.1 ± 0.8	12.7	39801
	2022/8/30			15.6	1369 ± 19	121.9 ± 1.7	14.4 ± 0.6	89.0	94935
	2022/10/27			32.0	1509 ± 30	28.2 ± 0.6	17.7 ± 0.6	18.7	85289
	2023/2/20			32.5	570 ± 31	7.3 ± 0.4	8.3 ± 0.5	12.8	68412
OSS	2021/6/17	140.9792	37.7967	30.9	751 ± 26	13.6 ± 0.5	21.0 ± 0.4	18.2	35753
	2021/7/20			28.8	1708 ± 85	7.6 ± 0.4	24.0 ± 0.6	4.4	71195
	2021/8/27			26.1	1482 ± 141	2.8 ± 0.3	12.5 ± 0.4	1.9	118460
	2021/9/24			28.7	1162 ± 35	16.4 ± 0.5	14.0 ± 0.6	14.1	83068
	2021/10/28			26.8	1224 ± 147	2.2 ± 0.3	8.9 ± 0.5	1.8	137625
	2021/12/24			29.7	447 ± 105	0.9 ± 0.2	5.2 ± 0.4	1.9	85873
	2022/2/8			31.7	232 ± 36	1.4 ± 0.2	6.4 ± 0.4	6.1	36525
	2022/6/23			30.1	869 ± 68	4.0 ± 0.3	17.2 ± 0.6	4.6	50544
	2022/8/30			9.7	503 ± 21	15.8 ± 0.7	9.7 ± 0.5	31.4	51996
	2022/10/27			32.6	632 ± 68	2.5 ± 0.3	10.0 ± 0.5	3.9	62913
	2023/2/22			33.4	888 ± 176	1.2 ± 0.2	5.9 ± 0.4	1.3	149918
IWS	2021/6/17	140.9745	37.8048	31.1	1985 ± 64	15.6 ± 0.5	14.8 ± 8.9	7.9	134223
	2021/7/20			29.0	898 ± 58	4.9 ± 0.3	22.6 ± 0.7	5.5	39780
	2021/8/27			26.7	1780 ± 200	2.2 ± 0.3	12.9 ± 0.5	1.3	138376
	2021/9/24			29.4	641 ± 42	4.4 ± 0.3	10.5 ± 0.5	6.9	60845
	2021/10/28			27.8	788 ± 92	2.2 ± 0.3	7.4 ± 0.5	2.8	106667
	2021/12/24			30.0	399 ± 84	1.0 ± 0.2	5.4 ± 0.4	2.5	74509
	2022/2/8			32.0	436 ± 143	0.5 ± 0.2	3.3 ± 0.4	1.3	133630
	2022/6/23			28.3	398 ± 29	4.1 ± 0.3	14.1 ± 0.5	10.4	28239
	2022/8/30			27.7	340 ± 40	2.1 ± 0.3	11.2 ± 0.5	6.3	30257
	2022/10/27			33.9	286 ± 45	1.2 ± 0.2	10.1 ± 0.5	4.3	28324
	2023/2/22			33.8	177 ± 43	0.4 ± 0.1	4.3 ± 0.3	2.3	40616
UDE	2021/6/17	140.9742	37.8133	32.6	751 ± 34	8.7 ± 0.4	9.5 ± 0.4	11.6	79448
	2021/7/20			30.7	440 ± 28	5.0 ± 0.3	9.4 ± 0.2	11.3	46919
	2021/8/27			28.9	9719 ± 885	3.2 ± 0.3	10.0 ± 0.3	0.3	976626
	2021/9/24			10.4	751 ± 76	2.4 ± 0.2	4.4 ± 0.4	3.2	169362
	2021/10/28			15.7	879 ± 77	2.5 ± 0.2	3.8 ± 0.4	2.9	234156
	2021/12/24			23.7	648 ± 114	1.2 ± 0.2	3.5 ± 0.4	1.8	183115
	2022/2/8			27.2	307 ± 83	0.5 ± 0.1	2.5 ± 0.3	1.5	123684
	2022/6/23			31.9	595 ± 61	2.1 ± 0.2	6.9 ± 0.4	3.5	86026
	2022/8/30			19.5	460 ± 20	7.0 ± 0.3	8.4 ± 0.4	15.2	54988
	2022/10/27			34.6	471 ± 37	3.6 ± 0.3	7.3 ± 0.4	7.7	64978
	2023/2/22			27.2	631 ± 106	1.3 ± 0.2	4.4 ± 0.3	2.1	143594

Table S4

Analytical results of ^{137}Cs activity concentration at Station KZE, WKS, WKO and SKS in Matsukawa-ura lagoon and station URS at offshore of the lagoon. ^{137}Cs activity concentrations were decay-corrected to the sampling date.

Station	Sampling date	Long E	Lat N	Salinity	^{137}Cs in suspended particles (Bq kg^{-1})	Particulate ^{137}Cs (Bq m^{-3})	Dissolved ^{137}Cs (Bq m^{-3})	Suspended particle concentration (Bq m^{-3})	Apparent distribution coefficient (L kg^{-1})
KZE	2021/6/17	140.9617	37.8208	32.3	644 ± 32	6.8 ± 0.3	20.3 ± 0.4	10.6	31758
	2021/7/20			30.4	361 ± 34	2.9 ± 0.3	11.5 ± 0.5	8.0	31282
	2021/8/27			30.4	2240 ± 171	4.3 ± 0.3	12.3 ± 0.3	1.9	181685
	2021/9/24			29.6	466 ± 14	14.5 ± 0.4	11.8 ± 0.5	31.0	39624
	2021/10/28			30.7	704 ± 70	2.5 ± 0.2	6.8 ± 0.5	3.5	102786
	2021/12/24			30.0	193 ± 63	0.4 ± 0.1	4.7 ± 0.3	2.2	41199
	2022/2/8			32.3	555 ± 153	0.8 ± 0.2	4.7 ± 0.3	1.5	118216
	2022/6/23			27.8	905 ± 42	7.5 ± 0.3	15.5 ± 0.6	8.3	58171
	2022/8/30			29.7	483 ± 25	6.5 ± 0.3	12.0 ± 0.5	13.4	40271
	2022/10/27			34.1	375 ± 72	1.4 ± 0.3	7.7 ± 0.5	3.6	48482
	2023/2/22			33.9	401 ± 76	1.1 ± 0.2	5.0 ± 0.4	2.8	79378
WKS	2021/6/17	140.9807	37.8199	29.0	160 ± 14	4.1 ± 0.3	13.4 ± 0.6	25.5	11979
	2021/7/20			31.5	171 ± 49	1.0 ± 0.3	7.5 ± 0.2	6.0	22819
	2021/8/27			29.2	1790 ± 254	2.0 ± 0.3	13.6 ± 0.4	1.1	131290
	2021/9/24			29.6	583 ± 54	3.4 ± 0.3	10.9 ± 0.5	5.8	53455
	2021/10/28			31.4	1086 ± 106	3.3 ± 0.3	6.2 ± 0.5	3.0	175107
	2021/12/24			29.6	557 ± 165	0.7 ± 0.2	5.6 ± 0.4	1.3	100232
	2022/2/8			32.3	347 ± 107	0.5 ± 0.1	4.9 ± 0.3	1.3	71415
	2022/6/23			31.8	404 ± 58	0.8 ± 0.1	8.4 ± 0.5	1.9	48078
	2022/8/30			26.1	407 ± 65	1.5 ± 0.2	11.1 ± 0.5	3.7	36777
	2022/10/27			34.2	9604 ± 261	15.4 ± 0.4	7.9 ± 0.5	1.6	1209155
	2023/2/20			34.6	204 ± 29	0.2 ± 0.0	3.5 ± 0.4	1.0	57484
WKO	2021/6/17	140.9756	37.8219	31.4	699 ± 71	2.3 ± 0.2	7.2 ± 0.2	3.3	96859
	2021/7/20			31.3	287 ± 20	4.0 ± 0.3	6.5 ± 0.2	13.8	44141
	2021/8/27			30.0	553 ± 77	1.8 ± 0.2	8.0 ± 0.3	3.2	68885
	2021/9/24			29.6	1097 ± 102	2.3 ± 0.2	10.4 ± 0.5	2.1	105583
	2021/10/28			30.9	1202 ± 192	1.6 ± 0.2	6.8 ± 0.5	1.3	176470
	2021/12/24			30.2	1007 ± 218	1.1 ± 0.2	5.1 ± 0.4	1.1	199352
	2022/2/8			32.9	100 ± 29	0.1 ± 0.0	2.9 ± 0.3	1.5	34702
	2022/6/23			32.0	590 ± 106	1.3 ± 0.2	5.6 ± 0.4	2.2	106005
	2022/8/30			29.8	871 ± 157	1.2 ± 0.2	7.6 ± 0.5	1.4	114686
	2022/10/27			33.3	1044 ± 81	3.8 ± 0.3	7.1 ± 0.4	3.7	146499
	2023/2/22			34.4	765 ± 220	0.4 ± 0.1	4.1 ± 0.4	0.6	185232
SKS	2021/6/17	140.9774	37.8277	31.4	190 ± 42	0.9 ± 0.2	7.6 ± 0.6	4.5	25102
	2021/7/20			29.6	199 ± 35	0.9 ± 0.2	14.2 ± 0.3	4.7	14047
	2021/8/27			30.0	2024 ± 263	1.7 ± 0.2	7.9 ± 0.4	0.9	255302
	2021/9/24			29.0	208 ± 44	0.4 ± 0.1	7.1 ± 0.4	2.1	29456
	2021/10/28			28.7	631 ± 160	0.9 ± 0.2	7.2 ± 0.5	1.4	87242
	2021/12/24			29.4	387 ± 98	0.6 ± 0.2	6.8 ± 0.5	1.6	57160
	2022/2/8			32.3	522 ± 127	0.9 ± 0.2	4.0 ± 0.4	1.7	130624
	2022/6/23			30.1	749 ± 102	1.8 ± 0.2	9.4 ± 0.5	2.5	80067
	2022/8/30			29.3	148 ± 37	0.2 ± 0.1	6.2 ± 0.4	1.6	23764
	2022/10/27			34.1	551 ± 62	2.3 ± 0.3	9.0 ± 0.4	4.3	61196
	2023/2/22			33.7	1256 ± 329	0.9 ± 0.2	4.4 ± 0.4	0.7	286949
URS	2021/8/2	141.0039	37.8000	32.0	ND	ND	3.1 ± 0.2	3.0	-
	2021/10/14			30.5	167 ± 53	0.2 ± 0.1	4.8 ± 0.4	1.0	34840
	2022/2/1			34.4	403 ± 76	0.4 ± 0.1	3.1 ± 0.4	1.0	131808
	2022/6/1			33.7	122 ± 28	0.4 ± 0.1	2.8 ± 0.3	3.2	43007
	2022/8/3			32.7	ND	ND	2.7 ± 0.3	0.8	-
	2022/10/3			33.4	247 ± 61	0.8 ± 0.2	2.5 ± 0.3	3.2	98023
	2023/2/7			34.3	175 ± 48	0.2 ± 0.1	2.2 ± 0.3	1.2	77673

Table S5

Mass balance of dissolved ^{137}Cs in Matsukawau-ra lagoon.

	Time after the accident	Input of seawater into Matsukawa-ura lagoon[a]	Input of river water into Matsukawa-ura lagoon	Dissolved ^{137}Cs in coastal water (station URS)	Weighted mean dissolved ^{137}Cs in lagoon	Potential flux of ^{137}Cs	Flux of riverine dissolved ^{137}Cs	Desorable fracton of riverine particulate ^{137}Cs[b]	Flux of ^{137}Cs desorbed from bottom sediment	Flux of dissolved ^{137}Cs outflowing to Pacific Ocean
	day	Mm^3 12 h^{-1}	Mm^3 12 h^{-1}	Bq m^{-3}	Bq m^{-3}	MBq 12 h^{-1}	MBq 12 h^{-1}	MBq 12 h^{-1}	MBq 12 h^{-1}	MBq 12 h^{-1}
Jun-21	3751	7.2	0.11	2.2 - 4.8	17.0	88 - 106	0.27	0.036	87 - 106	124
Jul-21	3784	7.2	0.24	2.2 - 4.8	19.0	102 - 121	0.61	0.060	102 - 120	142
Aug-21	3822	7.2	0.44	2.2 - 4.8	13.1	60 - 78	1.23	0.077	58 - 77	100
Sep-21	3850	7.2	0.26	2.2 - 4.8	13.5	62 - 81	0.57	0.078	62 - 80	100
Oct-21	3884	7.2	0.23	2.2 - 4.8	8.5	27 - 45	0.38	0.086	26 - 45	63
Dec-21	3941	7.2	0.11	2.2 - 4.8	5.4	4.7 - 23	0.25	0.021	4.4 - 23	40
Feb-22	3987	7.2	0.02	2.2 - 4.8	5.3	3.4 - 22	0.03	0.0031	3.3 - 22	38
Jun-22	4122	7.2	0.30	2.2 - 4.8	15.0	74 - 93	0.64	0.053	73 - 92	113
Aug-22	4190	7.2	0.15	2.2 - 4.8	11.0	44 - 63	0.23	0.40	44 - 62	81
Oct-22	4248	7.2	0.10	2.2 - 4.8	10.6	42 - 61	0.20	0.010	42 - 60	77
Feb-23	4366	7.2	0.05	2.2 - 4.8	5.5	4.8 - 24	0.08	0.0052	4.8 - 23	40

[a] Kamo et al.(2014).

[b] Assumed that 5.5% of riverine particulate ^{137}Cs were desorbed as dissolved ^{137}Cs (Takata et al., 2021)