Supporting Information

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SI Text

Data of Japanese Prefecture Boundaries. The data of Japanese prefecture boundaries for plotting Figs. 1–3, and Figs. S1, S4, and S6 and Movies S1–S4 were obtained from the following web site: http://www.geocities.jp/ne_o_t/GMT-USE/use-medium/ken.txt.

Details of Dispersion Model Setup. Cesium-137 was simulated using FLEXPART (1) as an aerosol with lognormal size distribution (0.6 μm mean diameter and standard deviation of 0.3). Scavenging coefficients were set to $A = 10^{-4}\ s^{-1}$ for precipitation of 1 mm h^{-1} and a dependency on precipitation rate of $B = 0.80$ (see ref. 1 for an explanation of these parameters). The source strength was constant throughout the period of simulation. Preliminary comparisons with global radionuclide monitoring data suggests that FLEXPART's atmospheric ^{137}Cs concentrations drop off too quickly with distance, likely because of an overestimation of wet deposition. Given that FLEXPART deposition fields are not used in terms of absolute numbers here, not impacting our results strongly. However, proximal deposition values may tend to be too high, whereas distal deposition values may tend to be too low.

Deposition Ratio (DR). Although FLEXPART (1) can treat the transport and deposition process of ^{137}Cs, constant emission from the Fukushima Daiichi NPP was assumed similar to some other studies of this event (2–8) because of missing emission source information. Therefore, using direct deposition fields from FLEXPART is not reliable and we computed relative ^{137}Cs deposition distributions by normalizing the FLEXPART output by the maximum values within the output domain. The normalized output is DR and shows the potential areas of relatively high ^{137}Cs deposition. An example of three-hourly DR maps are shown in Movie S1. In the daily DR calculation, although the effect is negligible, we corrected negative deposition values to zero deposition because of the decay process after a little deposition on the ground. The deposition outputs in each time interval are the difference between two subsequent accumulated fields.

Note on the Root Mean Square Errors (RMSEs) of the Estimated ^{137}Cs Depositions. The RMSEs between observed daily ^{137}Cs deposition in each prefecture and the estimated daily deposition were also computed using the observations on available days between March 20 and April 19 (Fig. S2). When using DR threshold (DRT) = 0.005 during the period, the RMSEs of estimated ^{137}Cs deposition were less than 2,156.7 MBq km^{-2} (Fig. S2). Miyagi prefecture had no observation on the deposition during the period and the RMSE could have not estimated. Yamagata and Fukushima prefectures had missing data and these two important observatories probably do not show actual total depositions and underestimated real deposition amounts between March 20 and April 19 (Fig. 2*B*).

Note on DRT. Our estimates are an observation-based reconstruction of the ^{137}Cs deposition distribution for all of Japan. Although our method is sensitive to the choice of DRT, we tested various DRT values to determine realistic deposition ranges (Fig. S2 and Table S3). The DRT values were determined covering 0.1–10% (0.001, 0.005, 0.007, 0.01, 0.05, and 0.1) of the daily DR maximum (DR = 1). To estimate ^{137}Cs deposition between March 20 and April 19, we concluded that DRT values between 0.005 and 0.01 best explain the observed deposition in main prefectures because the estimates using DRT of 0.001 and 0.05–0.1 showed extremely high RMSEs in some prefectures (Fig. S2). From the viewpoint of precautionary principle, overestimates may be better than underestimates and, thus, we adopted DRT = 0.005 for our best guess estimates of the deposition distribution between March 20 and April 19. In most prefectures of western Japan, ^{137}Cs depositions were not detected at the locations of the observatories during this period. Our estimates using DRT = 0.005 resulted in depositions of less than 100 MBq km^{-2} in most prefectures of western Japan where the observed depositions were not detected (i.e., zero deposition in this study) (Table S3), which roughly represents the uncertainty of our method for the case of DRT of 0.005. Therefore, it seems entirely possible that western Japan was not at all effected by noticeable amounts of ^{137}Cs deposition. Comparisons of future observations with our estimates are essential for a more robust assessment.

Note on Soil Contamination. It is worthwhile to note that the case for DRT = 0.001 is closer to the direct soil observations than results for DRT = 0.005 (Fig. 4), our best guess estimate for the total ^{137}Cs deposition between March 20 and April 19 (Fig. 2*A*). The estimates on the soil contamination from daily deposition observations also showed lower concentrations than those of direct soil observations because the time period in our simulation and observation-based estimate in deposition did not include the period before March 20 and sometimes after April 19, whereas soil samples include the information before March 20 including the period just after the nuclear power plant accident and also after April 19 in some samples as mentioned in the main text. Hence, it is reasonable to say that ^{137}Cs concentration from direct soil samples did show some higher concentrations of ^{137}Cs than our deposition-based estimates for the period between March 20 and April 19. In Fukushima City where deposition observation was carried out, the estimated ^{137}Cs concentration in soil using DRT of 0.001 was closest to the observations but still was somewhat underestimated (Fig. 4*A*). Although our estimate is limited to the period between March 20 and April 19, the estimated soil contamination on ^{137}Cs using DRT of 0.001 are relatively well reconstructed compared to the sporadic soil observations beyond the time period, probably considering the contributions to the total ^{137}Cs depositions before March 20 (Fig. 4). This discussion is similar to the one for the deposition in the main text.

1. Stohl A, Forster C, Frank A, Seibert P, Wotawa G (2005) The Lagrangian particle dispersion model FLEXPART, version 6.2. *Atmos Chem Phys* 5:2461–2474.
2. Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) (2011) System for prediction of environment emergency dose information (SPEEDI). Available at: http://www.nsc.go.jp/mext_speedi/index.html (in Japanese).
3. Japan Meteorological Agency (2011) Environmental emergency response. Available at: http://www.jma.go.jp/jma/kokusai/eer_list.html.
4. Takemura T, et al. (2011) A numerical simulation of global transport of atmospheric particles emitted from the Fukushima Daiichi Nuclear Power Plant. *SOLA* 7:101–104.
5. Visible Information Center Inc. (2011) Simulation on ^{137}Cs deposition due to the emission from Fukushima Daiichi Nuclear Plant. Available at: http://www.vic.jp/fukushima/global/global-e.html.
6. Japan Atomic Energy Agency (2011) A trial calculation on total amount of radiation exposure during 2 month after the accident of Fukushima Daiichi Nuclear Power Plant in TEPCO. Available at: http://www.jaea.go.jp/jishin/kaisetsu03/kaisetsu03.htm (in Japanese).
7. The EURAD project (2011) Potential dispersion of the radioactive cloud over the northern hemisphere. Available at: http://www.eurad.uni-koeln.de/index_e.html.
8. DeutscherWetterdienst (2011) Deutscher Wetterdienst zu den Folgen der Fukushima-Katastrophe Wetter sorgt für starke Verdünnung der radioaktiven Konzentration. Available at: http://www.dwd.de/bvbw/generator/DWDWWW/Content/Presse/Pressemitteilungen/2011/20110323__Japan,templateId=raw,property=publicationFile.pdf/20110323_Japan.pdf.

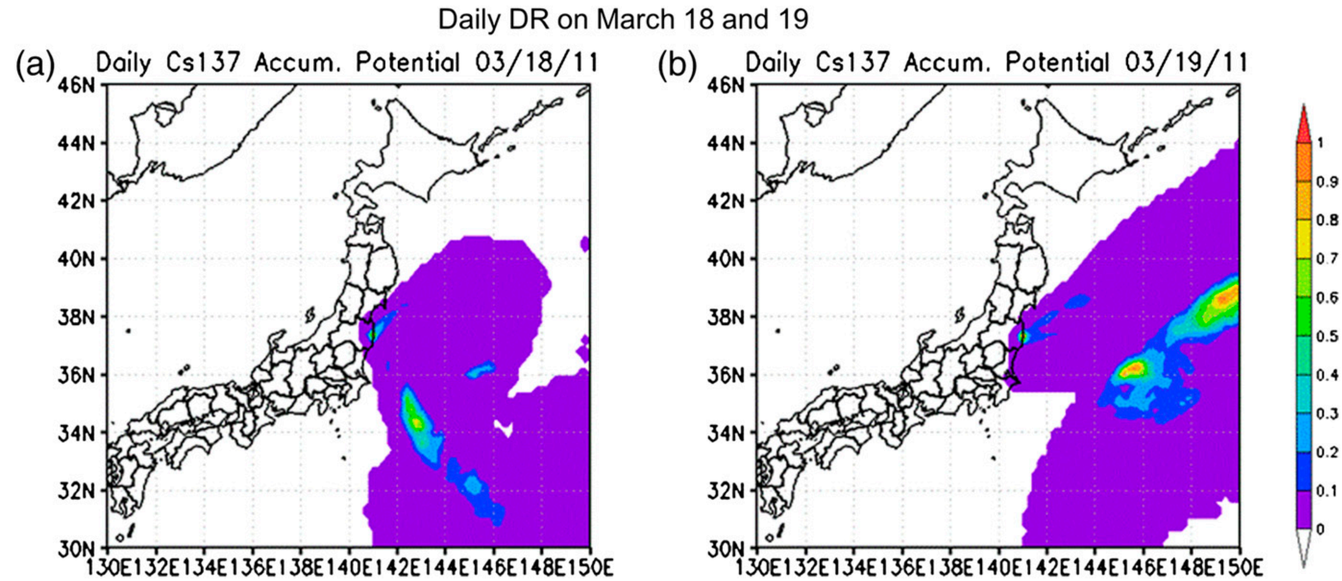


Fig. S1. Daily DR over Japan (*A*) on March 18 and (*B*) on March 19. The DR data with 0.2° × 0.2° were interpolated into finer resolution using cubic interpolation.

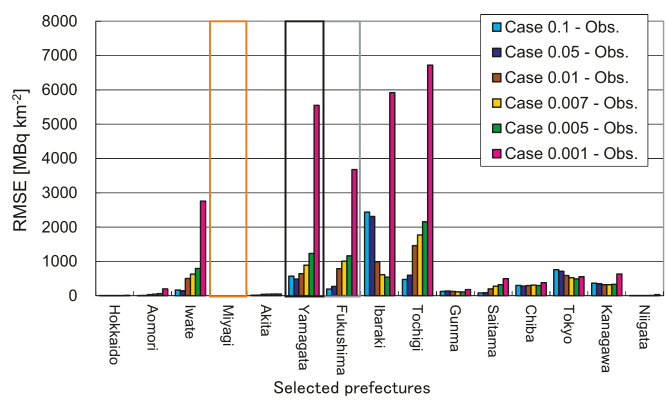


Fig. S2. RMSEs for the selected prefectures between observation-based total deposition on ^{137}Cs and the estimates from this study between March 20 and April 19. Only the daily data for which both the observations and the estimates were available were used for the RMSE calculations. Orange, black, and gray boxes denote no observation and missing observations (Yamagata, between March 29 and April 3; Fukushima, before March 27), respectively.

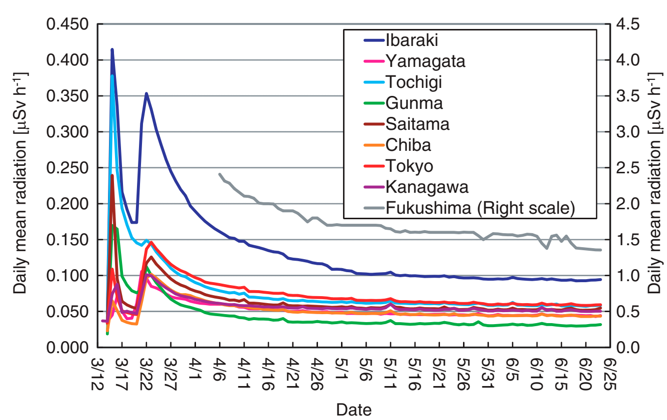


Fig. S3. Daily mean atmospheric radiation amount observed by Ministry of Education, Culture, Sports, Science, and Technology (MEXT) (1) in selected prefectures around Fukushima. For the early period, Fukushima did not observe the atmospheric radiation and data were missing.

1. Japanese Ministry of Education, Culture, Sports, Science, and Technology (MEXT) (2011) Readings of environmental radioactivity level by prefecture. Available at: http://www.mext.go.jp/english/incident/1304080.htm.

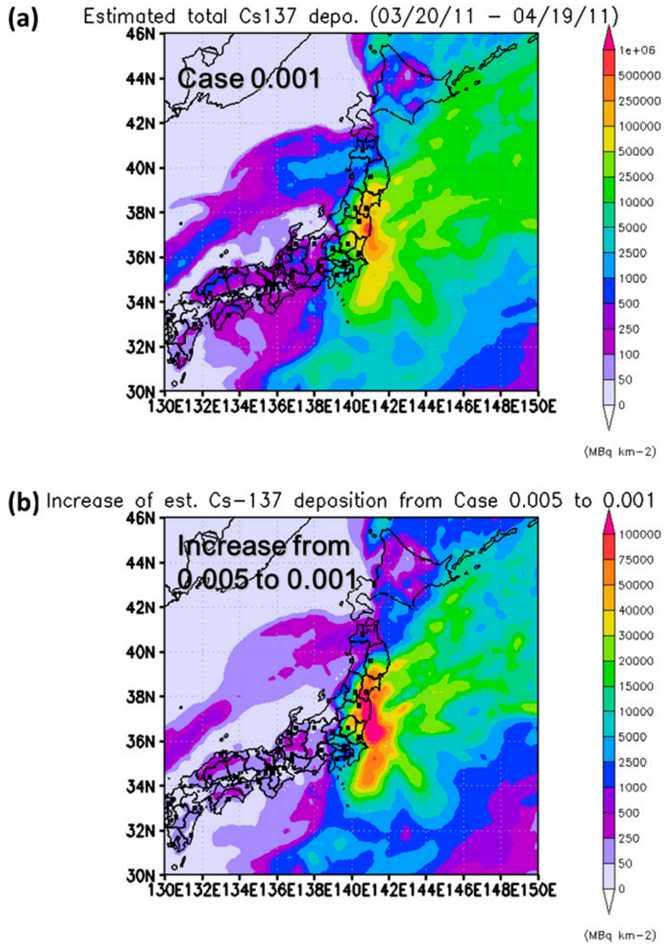


Fig. S4. Comparison between estimates of total ^{137}Cs deposition using different DRT. (*A*) Estimated total ^{137}Cs deposition using DRT of 0.001 (upper bound estimate on ^{137}Cs deposition within all of our estimates with DRTs of 0.001-0.1). (*B*) Increase of estimated total ^{137}Cs deposition from using DRT of 0.005 to 0.001. Squares in black denote the locations of the observatories in each prefecture (Table S2). Outputs with 0.2° × 0.2° in the daily estimates were interpolated into finer resolution using cubic interpolation.

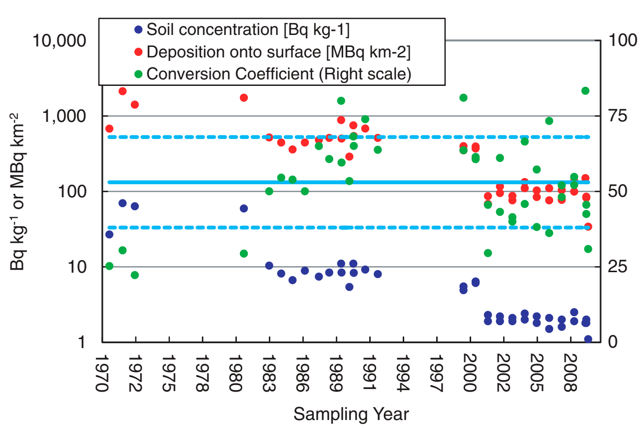


Fig. S5. Relationship between ^{137}Cs deposition and concentration in soil for determining conversion coefficient (CC). The historical observed data were obtained from the environmental radiation database (1) maintained by the Japan Chemical Analysis Center. The observed data at the same location and on the same day in different units of Bq kg^{-1} (top 5 cm soil) and MBq km^{-2} (Bq m^{-2}) are assumed to be the same sample and used the data for calculating the CC (kg m^{-2}). Solid and dotted lines denote mean CC value and its standard deviations, respectively.

1. Japanese Ministry of Education, Culture, Sports, Science, and Technology (MEXT) (2011). Environmental radiation database. Available at: http://search.kankyo-hoshano.go.jp/servlet/search.top.

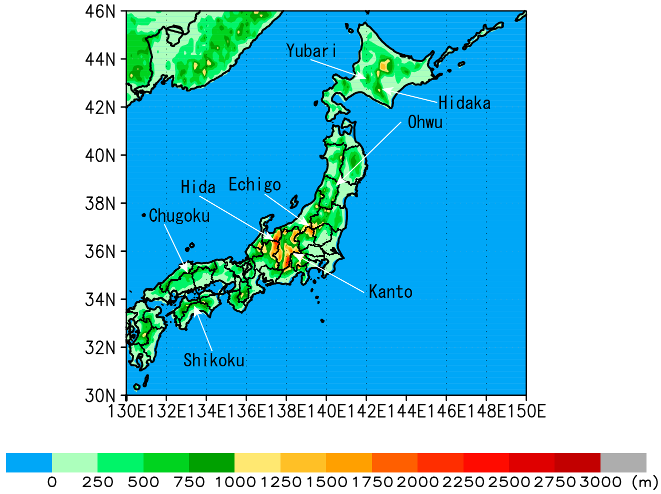


Fig. S6. Topography map over Japan. The Merged IBCAO/ETOPO5 Global Topographic Data Product (1) was used. The names on the mountain ranges are also shown.

1. Holland, DM (2000) Merged IBCAO/ETOPO5 Global Topographic Data Product. National Geophysical Data Center (NGDC), Boulder Colorado. Available at: http://efdl.cims.nyu.edu/project_aomip/forcing_data/topography/merged/overview.html.

Table S1. Data sources for observed ^{137}Cs concentrations in soil or grass in selected prefectures

	Sample	Sample type	Source
Hokkaido	April 18, 19, 25	Soil	http://www.pref.hokkaido.lg.jp/ns/gjf/dojomonitoring230428.pdf
Aomori	May 18	Grass	http://www.pref.aomori.lg.jp/soshiki/nourin/chikusan/files/grass-radi.pdf
Iwate	May 11	Grass	http://www.pref.iwate.jp/download.rbz?cmd=50&cd=32320&tg=3
Miyagi	May 11, 18, 19	Grass	http://www.pref.miyagi.jp/uploaded/attachment/66829.pdf
Akita	May 14	Grass	http://www.pref.akita.lg.jp/www/contents/1305379159624/files/kekka.pdf
Yamagata	April 2, 18, 22	Soil	The website for the data on April 2 and 18 is no longer available.
			http://www.pref.yamagata.jp/ou/kankyoenergy/020072/fukkou/radiation/dojou.pdf
Fukushima*	April 14	School soil	http://radioactivity.mext.go.jp/old/en/1380/2011/04/1305394_0419_1.pdf
	April 20†	Soil	http://www.mext.go.jp/component/english/__icsFiles/afieldfile/2011/06/15/1306622_053110.pdf
Ibaraki	April 8	Soil	http://www.pref.ibaraki.jp/important/20110311eq/20110408_20/files/20110408_20a.pdf
Tochigi	April 8	Soil	http://www.pref.tochigi.lg.jp/kinkyu/houshanou_suiden.html
Gunma	April 1, 2	Soil	http://www.pref.gunma.jp/houdou/f1000020.html
Saitama‡	April 22	Grass	http://www.maff.go.jp/j/kanbo/joho/saigai/syouhi/bokusou_kensa.html#saitama
Chiba	April 21§	Grass	http://www.maff.go.jp/j/kanbo/joho/saigai/syouhi/bokusou_kensa.html#tiba
	March 31	Soil	http://www.pref.chiba.lg.jp/annou/h23touhoku/suidendojo.html
Tokyo¶	April 10, 16	Soil	http://prayforjp.exblog.jp/13594347
			http://savechild.net/wp-content/uploads/2011/05/300467512.jpg
Kanagawa	March 25, 30 and May 16, 17	Soil	http://www.pref.kanagawa.jp/uploaded/life/630428_1401777_misc.pdf
Niigata	April 11	Soil	http://www.pref.niigata.lg.jp/nosanengei/1302818500677.html

Observed by prefecture, unless where indicated. No detection was computationally treated as zero concentration.
*Observed by Ministry of Education, Culture, Sports, Science, and Technology (MEXT).
†Samples picked up before April 20. In the samples, we excluded the data with *1 of top 5-mm soil sample.
‡Observed by Ministry of Agriculture, Forestry, and Fisheries (MAFF). Only April 22 samples were used.
§Observed by MAFF. Only April 21 samples were used.
¶Observed by Prof. Yamazaki et al. at Kinki University and published in the Asahi newspaper on May 15. These sources are examples of the data available on some websites for the Asahi newspaper.

Table S2. Observatory locations in each prefecture

Prefecture	Grid box *X*	Grid box *Y*
Hokkaido	107	91
Aomori	104	80
Iwate	106	74
Miyagi	105	67
Akita	101	74
Yamagata	102	67
Fukushima	103	64
Ibaraki	103	57
Tochigi	100	59
Gunma	96	58
Saitama	99	55
Chiba	101	53
Tokyo	99	54
Kanagawa	97	52
Niigata	95	65
Toyama	86	59
Ishikawa	84	58
Fukui	82	56
Yamanashi	93	54
Nagano	91	59
Gifu	85	53
Shizuoka	91	49
Aichi	85	52
Mie	83	50
Shiga	80	50
Kyoto	79	50
Osaka	78	49
Hyogo	76	49
Nara	80	49
Wakayama	76	47
Tottori	70	53
Shimane	66	53
Okayama	70	48
Hiroshima	63	48
Yamaguchi	58	46
Tokushima	73	46
Kagawa	71	47
Ehime	63	43
Kochi	68	43
Fukuoka	53	43
Saga	52	42
Nagasaki	50	40
Kumamoto	54	39
Oita	59	41
Miyazaki	58	35
Kagoshima	53	33
Okinawa	39	6

Grid numbers of *X* and *Y* correspond to the grid boxes of the observatories (*X*, *Y*) within 0.2° × 0.2° horizontal resolution domain starting from 120 °E to eastward and from 25 °N to northward. Although Miyagi did not observe any deposition during the time period in this paper, the location for atmospheric radiation measurement in Miyagi was temporarily put here for our calculation process.

Table S3. Comparisons of ^{137}Cs depositions at each observatory location in each prefecture during March 20–April 19

(MBq km^{-2})	Hokkaido	Aomori	Iwate	Miyagi	Akita	Yamagata	Fukushima	Ibaraki
Sum of observations	2.3	0.0	795.8	N/A	24.5	8622.9	2253.7	28429.7
Case 0.1 estimate	13.0	23.8	2461.0	8419.5	137.5	3622.4	4361.2	6990.8
Case 0.05 estimate	13.1	47.5	2328.8	11041.1	167.7	4297.1	6101.3	8004.8
Case 0.01 estimate	14.0	213.6	4399.2	29823.7	309.1	9056.1	16616.3	19136.2
Case 0.007 estimate	14.3	297.7	5122.3	36852.4	354.1	10710.0	20859.3	22803.4
Case 0.005 estimate	16.0	401.7	6022.7	44696.6	366.6	12755.5	24718.4	26368.9
Case 0.001 estimate	74.4	1252.4	17030.9	135474.8	415.9	36987.0	68671.3	60912.8

(MBq km^{-2})	Tochigi	Gunma	Saitama	Chiba	Tokyo	Kanagawa	Niigata	Toyama
Sum of observations	2669.1	1302.8	3752.7	4844.1	6872.5	3665.3	15.0	0.0
Case 0.1 estimate	5030.9	2143.5	2590.7	1927.2	1674.2	687.9	8.4	1.3
Case 0.05 estimate	6017.6	2304.9	2875.3	2096.9	1998.9	909.9	14.3	2.5
Case 0.01 estimate	12221.8	2514.7	4034.5	2446.1	3080.7	1847.0	48.6	9.0
Case 0.007 estimate	14633.3	2385.3	4746.7	2570.4	3645.6	2174.7	63.5	11.6
Case 0.005 estimate	17380.7	2317.9	5256.1	2878.0	4063.0	2435.5	77.2	13.4
Case 0.001 estimate	48054.4	3316.3	8719.8	5269.3	6971.7	5533.7	232.6	25.3

(MBq km^{-2})	Ishikawa	Fukui	Yamanashi	Nagano	Gifu	Shizuoka	Aichi	Mie
Sum of observations	0.0	3.9	114.6	0.0	4.7	127.3	0.0	0.0
Case 0.1 estimate	4.1	7.8	46.5	3.9	7.4	46.0	4.9	7.6
Case 0.05 estimate	7.9	14.2	62.0	7.5	12.9	74.5	9.3	13.6
Case 0.01 estimate	30.1	54.0	130.1	26.0	45.9	209.6	32.9	42.4
Case 0.007 estimate	39.2	70.1	141.4	33.0	59.5	255.7	41.4	48.4
Case 0.005 estimate	48.1	88.3	146.8	36.7	73.8	284.7	48.1	51.0
Case 0.001 estimate	117.7	251.1	164.0	55.6	185.1	460.7	96.7	64.6

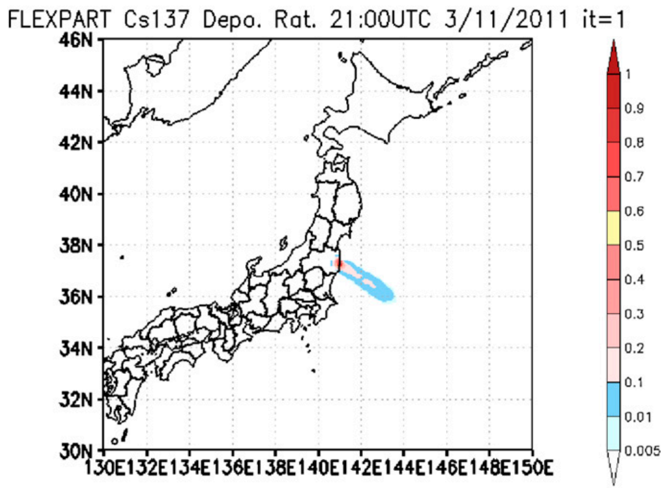
(MBq km^{-2})	Shiga	Kyoto	Osaka	Hyogo	Nara	Wakayama	Tottori	Shimane
Sum of observations	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Case 0.1 estimate	3.6	4.1	2.1	3.5	3.1	4.0	8.6	1.8
Case 0.05 estimate	6.7	7.8	4.1	6.8	5.7	7.6	16.6	3.6
Case 0.01 estimate	24.5	30.0	15.3	25.9	20.2	26.0	61.0	18.0
Case 0.007 estimate	31.1	39.1	19.9	33.9	25.0	32.6	79.3	25.6
Case 0.005 estimate	37.1	48.4	24.0	41.6	29.2	36.1	93.1	35.7
Case 0.001 estimate	91.0	135.7	65.7	107.6	70.8	63.0	224.0	154.0

(MBq km^{-2})	Okayama	Hiroshima	Yamaguchi	Tokushima	Kagawa	Ehime	Kochi	Fukuoka
Sum of observations	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0
Case 0.1 estimate	1.6	4.4	0.6	5.7	1.8	2.4	24.5	0.4
Case 0.05 estimate	3.1	8.8	1.2	10.2	3.3	4.6	41.3	0.8
Case 0.01 estimate	11.4	43.6	5.9	35.6	12.3	20.8	123.0	4.2
Case 0.007 estimate	14.6	62.2	8.5	43.1	15.4	28.8	130.5	6.0
Case 0.005 estimate	17.5	87.0	11.8	51.0	18.9	38.4	137.0	8.5
Case 0.001 estimate	44.6	390.8	51.4	141.5	58.0	154.7	201.0	38.3

(MBq km^{-2})	Saga	Nagasaki	Kumamoto	Oita	Miyazaki	Kagoshima	Okinawa
Sum of observations	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Case 0.1 estimate	0.4	0.4	0.3	1.4	0.6	0.5	0.0
Case 0.05 estimate	0.8	0.7	0.5	2.8	1.2	1.0	0.1
Case 0.01 estimate	4.0	3.4	2.5	13.8	5.9	4.8	0.4
Case 0.007 estimate	5.6	4.9	3.6	19.8	8.4	6.8	0.6
Case 0.005 estimate	7.9	6.8	5.1	27.7	11.7	9.5	0.8
Case 0.001 estimate	35.6	30.4	22.7	126.1	53.3	43.3	3.6

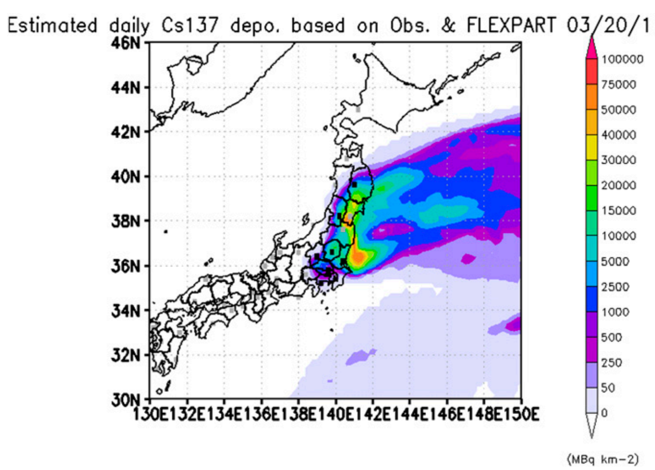
Table S4. Comparisons of ^{137}Cs contamination in soil at each observatory location in each prefecture [conversion coefficient (CC) = 53 kg m^{-2}].

($Bq\ kg^{-2}$)	Hokkaido	Aomori	Iwate	Miyagi	Akita	Yamagata	Fukushima	Ibaraki
Sum of observations	0.0	0.0	15.0	N/A	0.5	162.7	42.5	536.4
Case 0.1 estimate	0.2	0.4	46.4	158.9	2.6	68.3	82.3	131.9
Case 0.05 estimate	0.2	0.9	43.9	208.3	3.2	81.1	115.1	151.0
Case 0.01 estimate	0.3	4.0	83.0	562.7	5.8	170.9	313.5	361.1
Case 0.007 estimate	0.3	5.6	96.6	695.3	6.7	202.1	393.6	430.3
Case 0.005 estimate	0.3	7.6	113.6	843.3	6.9	240.7	466.4	497.5
Case 0.001 estimate	1.4	23.6	321.3	2556.1	7.8	697.9	1295.7	1149.3
($Bq\ kg^{-2}$)	Tochigi	Gunma	Saitama	Chiba	Tokyo	Kanagawa	Niigata	Toyama
Sum of observations	50.4	24.6	70.8	91.4	129.7	69.2	0.3	0.0
Case 0.1 estimate	94.9	40.4	48.9	36.4	31.6	13.0	0.2	0.0
Case 0.05 estimate	113.5	43.5	54.3	39.6	37.7	17.2	0.3	0.0
Case 0.01 estimate	230.6	47.4	76.1	46.2	58.1	34.8	0.9	0.2
Case 0.007 estimate	276.1	45.0	89.6	48.5	68.8	41.0	1.2	0.2
Case 0.005 estimate	327.9	43.7	99.2	54.3	76.7	46.0	1.5	0.3
Case 0.001 estimate	906.7	62.6	164.5	99.4	131.5	104.4	4.4	0.5
($Bq\ kg^{-2}$)	Ishikawa	Fukui	Yamanashi	Nagano	Gifu	Shizuoka	Aichi	Mie
Sum of observations	0.0	0.1	2.2	0.0	0.1	2.4	0.0	0.0
Case 0.1 estimate	0.1	0.1	0.9	0.1	0.1	0.9	0.1	0.1
Case 0.05 estimate	0.1	0.3	1.2	0.1	0.2	1.4	0.2	0.3
Case 0.01 estimate	0.6	1.0	2.5	0.5	0.9	4.0	0.6	0.8
Case 0.007 estimate	0.7	1.3	2.7	0.6	1.1	4.8	0.8	0.9
Case 0.005 estimate	0.9	1.7	2.8	0.7	1.4	5.4	0.9	1.0
Case 0.001 estimate	2.2	4.7	3.1	1.0	3.5	8.7	1.8	1.2
($Bq\ kg^{-2}$)	Shiga	Kyoto	Osaka	Hyogo	Nara	Wakayama	Tottori	Shimane
Sum of observations	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Case 0.1 estimate	0.1	0.1	0.0	0.1	0.1	0.1	0.2	0.0
Case 0.05 estimate	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.1
Case 0.01 estimate	0.5	0.6	0.3	0.5	0.4	0.5	1.2	0.3
Case 0.007 estimate	0.6	0.7	0.4	0.6	0.5	0.6	1.5	0.5
Case 0.005 estimate	0.7	0.9	0.5	0.8	0.6	0.7	1.8	0.7
Case 0.001 estimate	1.7	2.6	1.2	2.0	1.3	1.2	4.2	2.9
($Bq\ kg^{-2}$)	Okayama	Hiroshima	Yamaguchi	Tokushima	Kagawa	Ehime	Kochi	Fukuoka
Sum of observations	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Case 0.1 estimate	0.0	0.1	0.0	0.1	0.0	0.0	0.5	0.0
Case 0.05 estimate	0.1	0.2	0.0	0.2	0.1	0.1	0.8	0.0
Case 0.01 estimate	0.2	0.8	0.1	0.7	0.2	0.4	2.3	0.1
Case 0.007 estimate	0.3	1.2	0.2	0.8	0.3	0.5	2.5	0.1
Case 0.005 estimate	0.3	1.6	0.2	1.0	0.4	0.7	2.6	0.2
Case 0.001 estimate	0.8	7.4	1.0	2.7	1.1	2.9	3.8	0.7
($Bq\ kg^{-2}$)	Saga	Nagasaki	Kumamoto	Oita	Miyazaki	Kagoshima	Okinawa	
Sum of observations	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Case 0.1 estimate	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Case 0.05 estimate	0.0	0.0	0.0	0.1	0.0	0.0	0.0	
Case 0.01 estimate	0.1	0.1	0.0	0.3	0.1	0.1	0.0	
Case 0.007 estimate	0.1	0.1	0.1	0.4	0.2	0.1	0.0	
Case 0.005 estimate	0.1	0.1	0.1	0.5	0.2	0.2	0.0	
Case 0.001 estimate	0.7	0.6	0.4	2.4	1.0	0.8	0.1	



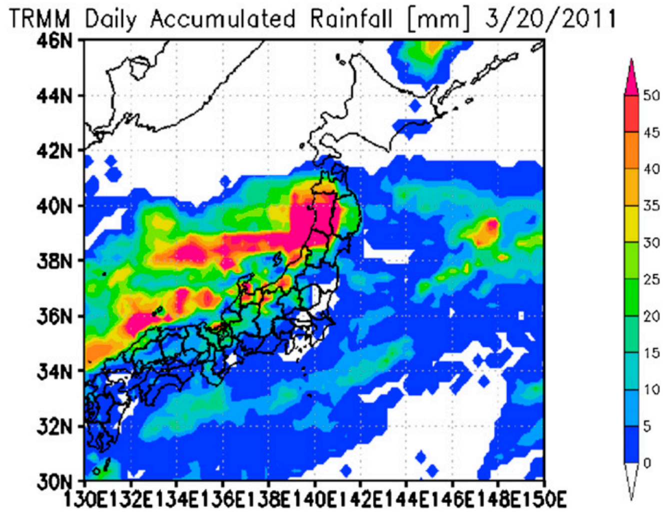
Movie S1. Three-hourly DR over Japan, 0.2° × 0.2° outputs were interpolated into finer resolution using cubic interpolation.

Movie S1 (MOV)



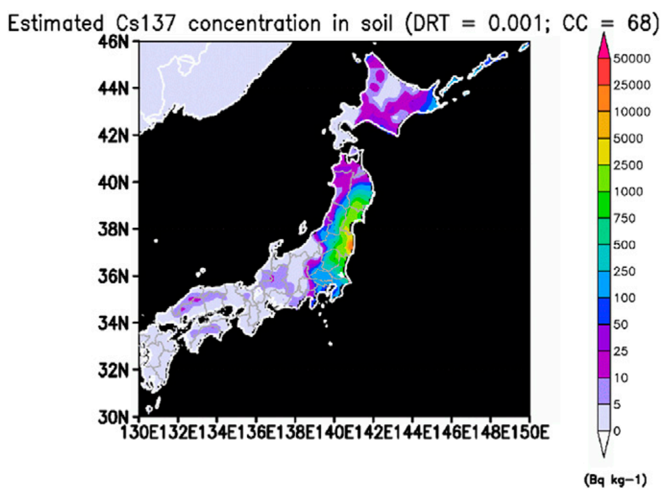
Movie S2. Daily estimate of total ^{137}Cs deposition using DRT of 0.005. Outputs with 0.2° × 0.2° in the daily estimates were interpolated into finer resolution using cubic interpolation. Squares in gray and black denote observatories (Table S2) that did have computational zero ^{137}Cs deposition (unavailable, missing, or no detection) or daily DR = 0, and detected the depositions used for making the estimation map for the deposition, respectively.

Movie S2 (MPG)



Movie S3. Daily accumulated precipitation by tropical rainfall measuring mission (TRMM, 3B42 V6 product) satellite data.

Movie S3 (MOV)



Movie S4. Estimated ^{137}Cs concentration range in soil using DRT of 0.001 (upper bound estimate on ^{137}Cs deposition within all of our estimates with DRTs of 0.001-0.1) and conversion coefficient (CC) of 38, 53, and 68 kgm−2 over Japan. CCs of 38, 53, and 68 kgm−2 correspond to -1σ, mean value, and $+1\sigma$ in Fig. S5, respectively. Outputs 0.2° × 0.2° were interpolated into finer resolution using cubic interpolation. The Merged IBCAO/ETOPO5 Global Topographic Data Product (1) was used to mask out ocean area below 0 m above sea level (a.s.l.).

Movie S4 (MOV)

1. Holland, DM (2000) Merged IBCAO/ETOPO5 Global Topographic Data Product. National Geophysical Data Center (NGDC), Boulder Colorado. Available at: http://efdl.cims.nyu.edu/project_aomip/forcing_data/topography/merged/overview.html.