Press Release

Simulation of Radioactivity Concentrations in the Sea Area（the second report）

April 16, 2011

Ministry of Education, Culture, Sports, Science and Technology

1. Outline

The Ministry of Education, Culture, Sports, Science and Technology (MEXT) has conducted monitoring in the sea area off the coast of the Fukushima Dai-ichi NPP since March 23, 2011. Based on the simulation results obtained by using a numerical ocean forecasting system, JCOPE2,(Note 1) the distribution of radioactivity concentrations off the coast of the Fukushima Dai-ichi NPP was simulated by using JCOPET,(Note 2) which also takes into account the latest data on the wind field and sea tides.

(Note 1) JCOPE2: A model for forecasting path variations, including meander events, and movements of meso-scale eddies, etc. with regard to oceanic current systems such as Kuroshio and Oyashio, which substantially affect the oceanic conditions, in addition to forecasting water temperature and salinity variations in waters close to Japan. Developed by the Japan Agency for Marine-Earth Science and Technology (JAMSTEC). (Reproduction grid size: 8 × 8 km)

(Note 2) JCOPET: A model capable of making high-precision reproduction by increasing the resolution of the above model and incorporating the data on sea tides and more accurate data on ocean winds. Developed by the Japan Agency for Marine-Earth Science and Technology (JAMSTEC). (Reproduction grid size: 3 × 3 km)

2. Method

In this simulation, only the spread of radioactive substances on the sea surface was simulated using the scenario and hypotheses shown below, since no data was available on the amount of radioactive substances discharged from the NPP.

- A scenario was developed conservatively based on the data on radioactivity concentrations in the sea water at the coast up to April 13, as published by Tokyo Electric Power Company (TEPCO). [Figure 1]
- The above-mentioned radioactivity concentrations in the sea water were conservatively hypothesized to be spread out only on the sea surface of 8× 8 km at 1/100 of the concentrations observed at the coast.
- The concentrations of radioactive substances were expressed as indices showing how many times they are higher than the effluent concentration limits for nuclear facilities.
- Fallout of radioactive substances discharged into the air from the NPP onto the sea surface is not taken into consideration.
- The spread of radioactive substances in subsurface sea water was not taken into consideration.
- As for the water near an outlet at the Fukushima Dai-ichi NPP, it was hypothesized that water of the same radioactivity concentration as that observed on April 13 was present until April 16 (the amount of new discharge of water containing radioactive substances was zero on and after April 11).
- The half-lives of radioactive substances (iodine-131: approx. 8 days, cesium-137: approx. 30 years) were taken into consideration.

3. Results

Off southern Tohoku, including Fukushima offing, the oceanic currents of the Japan Current (Kuroshio), a branch of the Tsushima Current (Tsugaru warm current), and the Chishima Current (Oyashio) encounter one another. These currents are complicated and slow-flowing. [Figure 2]

In line with those complicated currents, the radioactive water near the NPP spreads in the offshore direction. [Figure 3-1] to [Figure 3-5]

In particular, although during mid-April in the sea area off the coast of Fukushima Dai-ichi NPP, the radioactive water spread gradually, it is forecast that it will move extremely slowly in the offshore direction, slightly southward. Specifically, simulation results show that radioactive water near the sea area 30 km off the coast of the NPP will attenuate, while spreading its distribution area in the offshore direction slightly southward during the period from April 14 to 20 (the actual measurements taken in the sea area monitoring conducted by TEPCO and MEXT on April 15 showed such a tendency). [Figure 4-1] to [Figure 4-3]

The scenario assumes that levels of iodine-131 will fall below 40Bq/L (the effluent concentration limit for nuclear facilities) around April 21, and that levels of cesium-l37 will dip below 90Bq/L (the same as above) around April 17. [Figure 3-1] to [Figure 3-2]

4. Discrepancy with the preliminary report

There is a difference from the preliminary report on radioactivity concentration distribution due to the variance in the forecasting start dates. In this report, simulation conditions were changed as follows:

-Observation data up to April 13 was incorporated (the preliminary report showed observation data up to April 8).

-The current pattern as of April 11 was used as the initial value (the initial value of the current pattern in the preliminary report was that as of April 2).

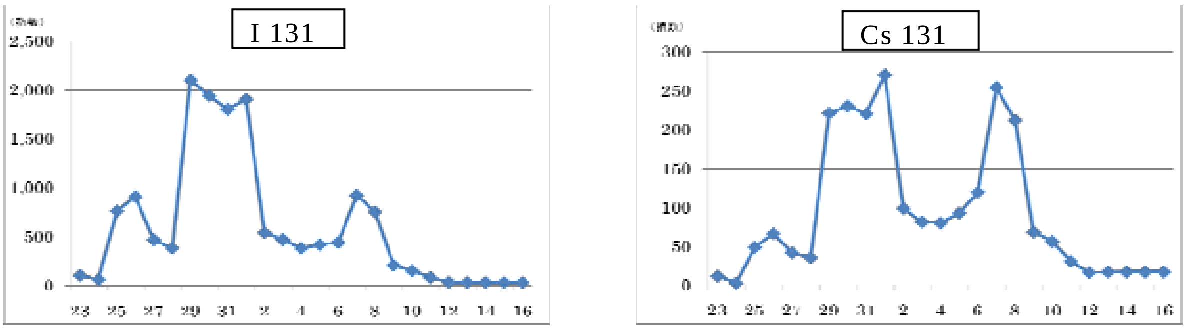
- As for the forecasting of wind conditions which affect the sea surface, the forecast as of April 11 was used (the relevant data in the preliminary report was that as of April 2).

The above-mentioned discrepancy in simulation conditions created variance in initial data and simulation results, accordingly.

Thus, differences caused by the use of new observation data, latest current patterns, etc. cannot be avoided.

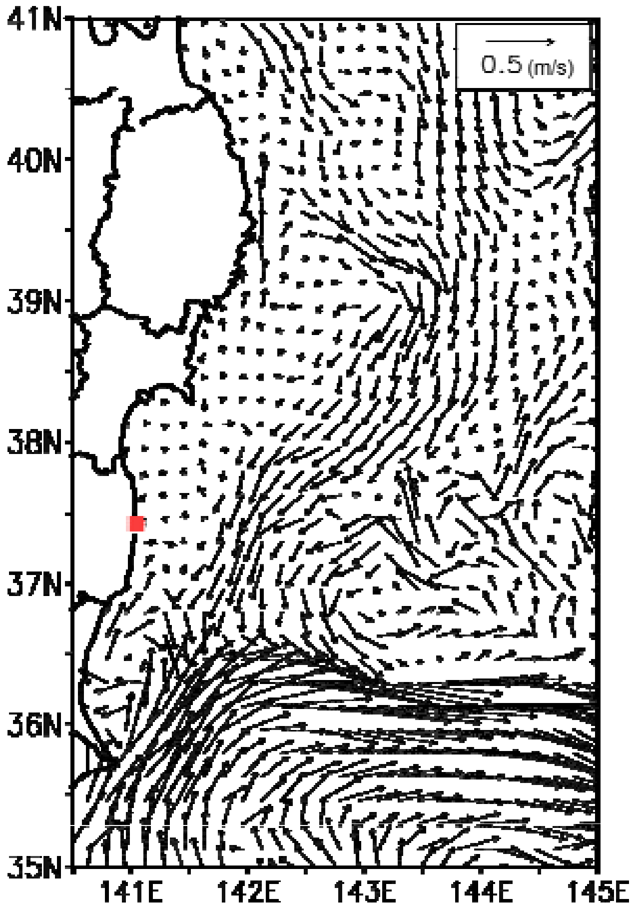
5. Point to note

This forecast is a preliminary report of the results of the simulation conducted by using JAMSTEC's super computer system on April 15, based on the current pattern as of April 11 simulated by JCOPE2, and by incorporating the actual measurements taken by MEXT and TEPCO through monitoring up to April 13. The data will be reviewed in the future by incorporating the actual measurements provided by the latest monitoring results.



[Figure 1] Scenario of Radioactivity Concentrations in the Effluent Discharged from the Fukushima Dai-ichi NPP

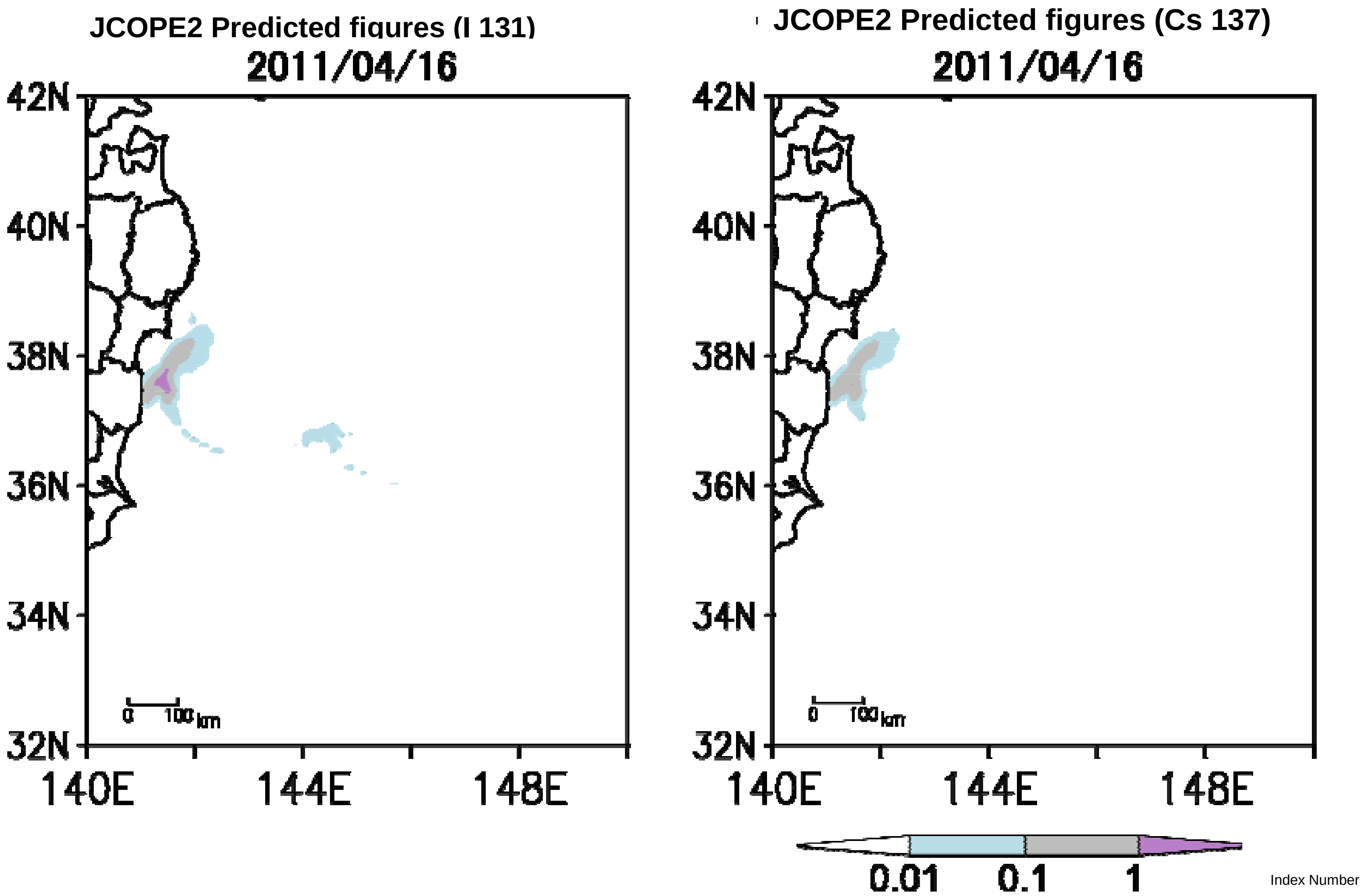
The scenario assumes that radioactive substances spread on the sea surface of 8× 8 km at 1/100 of the concentrations observed at the coast based on "Results of Nuclide Analysis of Seawater" (March 21-April 13) released by TEPCO, and the same level of discharge as that as of April 13 continues until April 16 (the discharge stops on April 11). The vertical axis indicates the assumed radioactivity concentration as an index showing how many times it is higher than the effluent concentration limit for nuclear facilities.



[Figure 2] Current Pattern Simulated by JCOPE2 (as of April 11)

The current pattern simulated by JCOPE2 incorporates the on-site observation data and satellite observation data up to April 2. The half-lives of radioactive substances (iodine-131: approx. 8 days, cesium-137: approx. 30 years) are taken into consideration in the simulation.

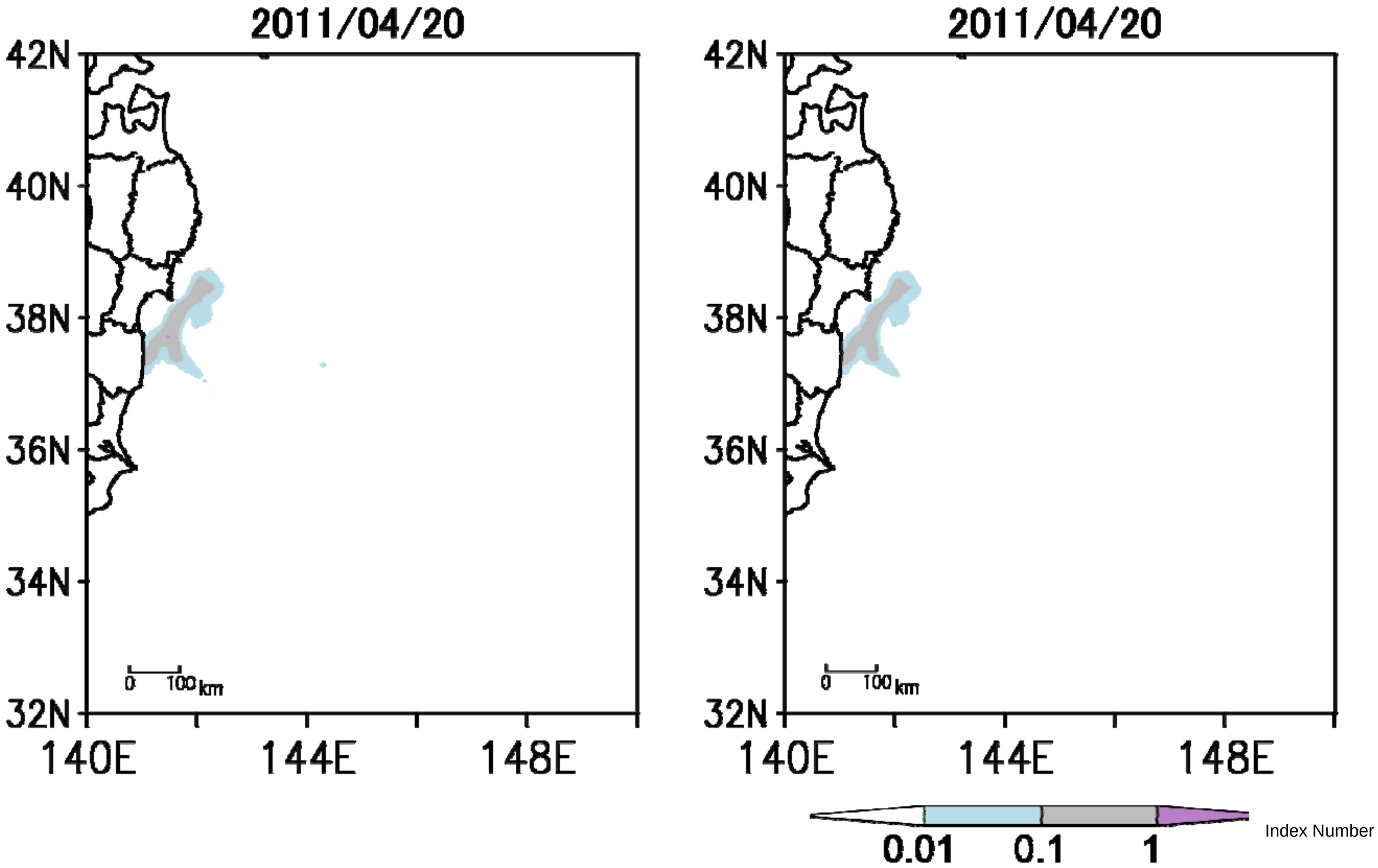
【Figure3-1】Simulation of Radioactivity Concentrations by JCOPE2(April 16th)
((based on data up to April 13th)



＜Remarks： Index number in the figure indicates a multiple of maximum radioactivity concentration determined by the regulation for the drain from nuclear facilities（I131:40Bq/L, Cs137:90Bq/L） predicted on each point.＞

【Figure3-1】Simulation of Radioactivity Concentrations by JCOPE2(April 20th)
(based on data up to April 13th)

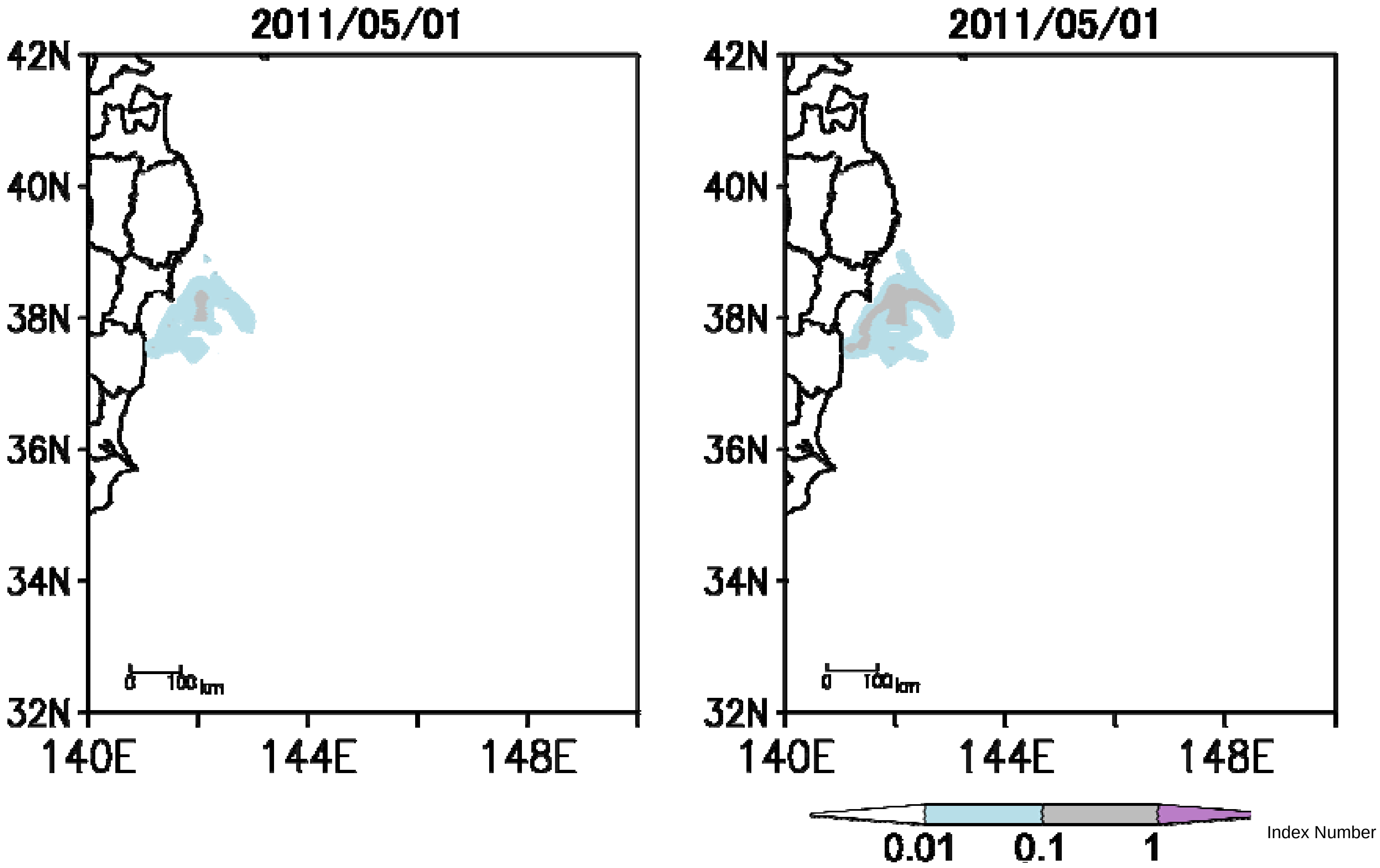
JCOPE2 Predicted figures (I 131) **JCOPE2 Predicted figures (Cs 137)**



＜Remarks：Index number in the figure indicates a multiple of maximum radioactivity concentration determined by the regulation for the drain from nuclear facilities （I131:40Bq/L, Cs137:90Bq/L） predicted on each point.＞

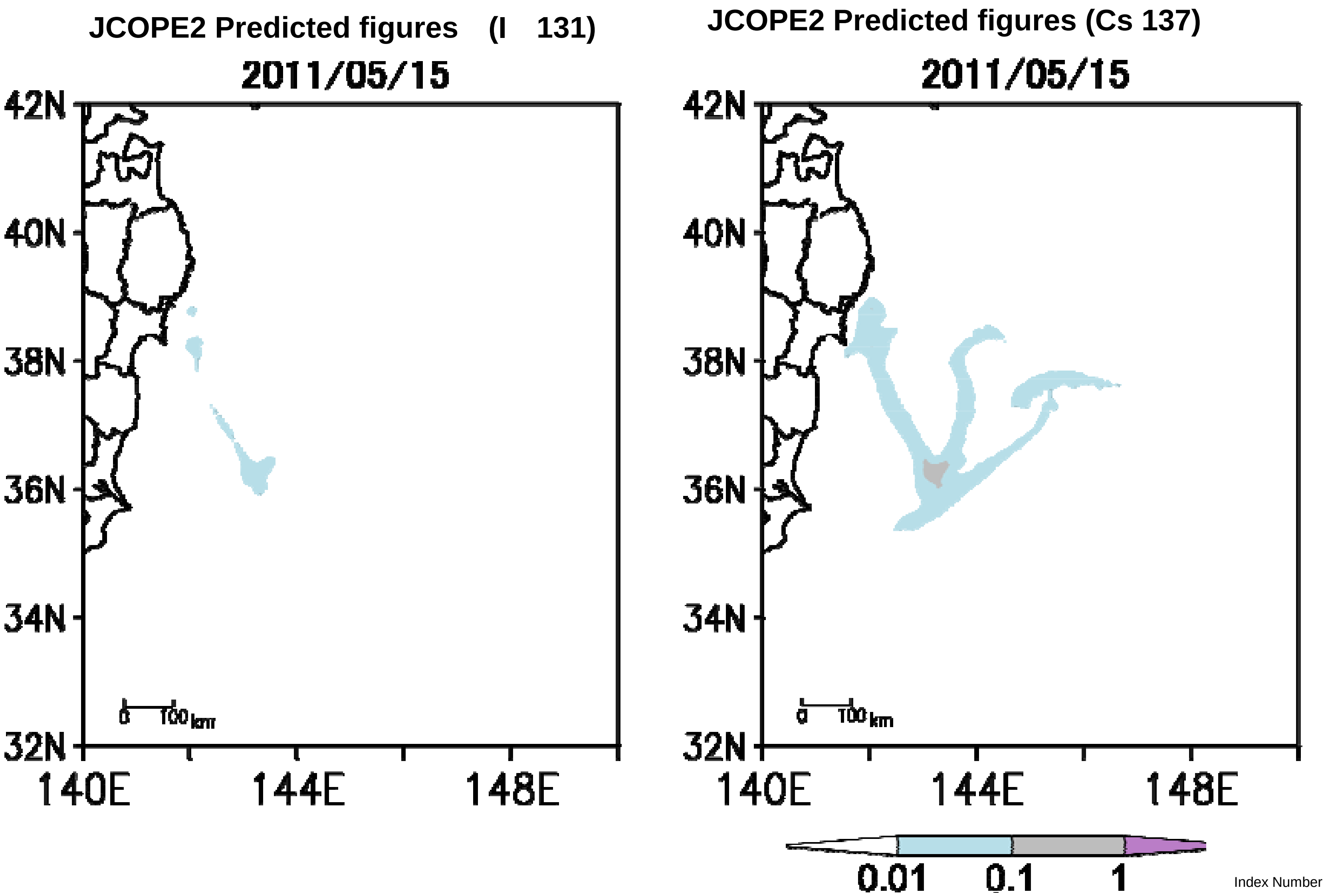
【【Figure3-3】 Simulation of Radioactivity Concentrations by JCOPE2(May 1st)
(based on data up to April 13th)

JCOPE2 Predicted figures (I 131) **JCOPE2 Predicted figures (Cs 137)**



<Remarks: Index number in the figure indicates a multiple of maximum radioactivity concentration determined by the regulation for the drain from nuclear facilities (I131:40Bq/L, Cs137:90Bq/L) predicted on each point.>

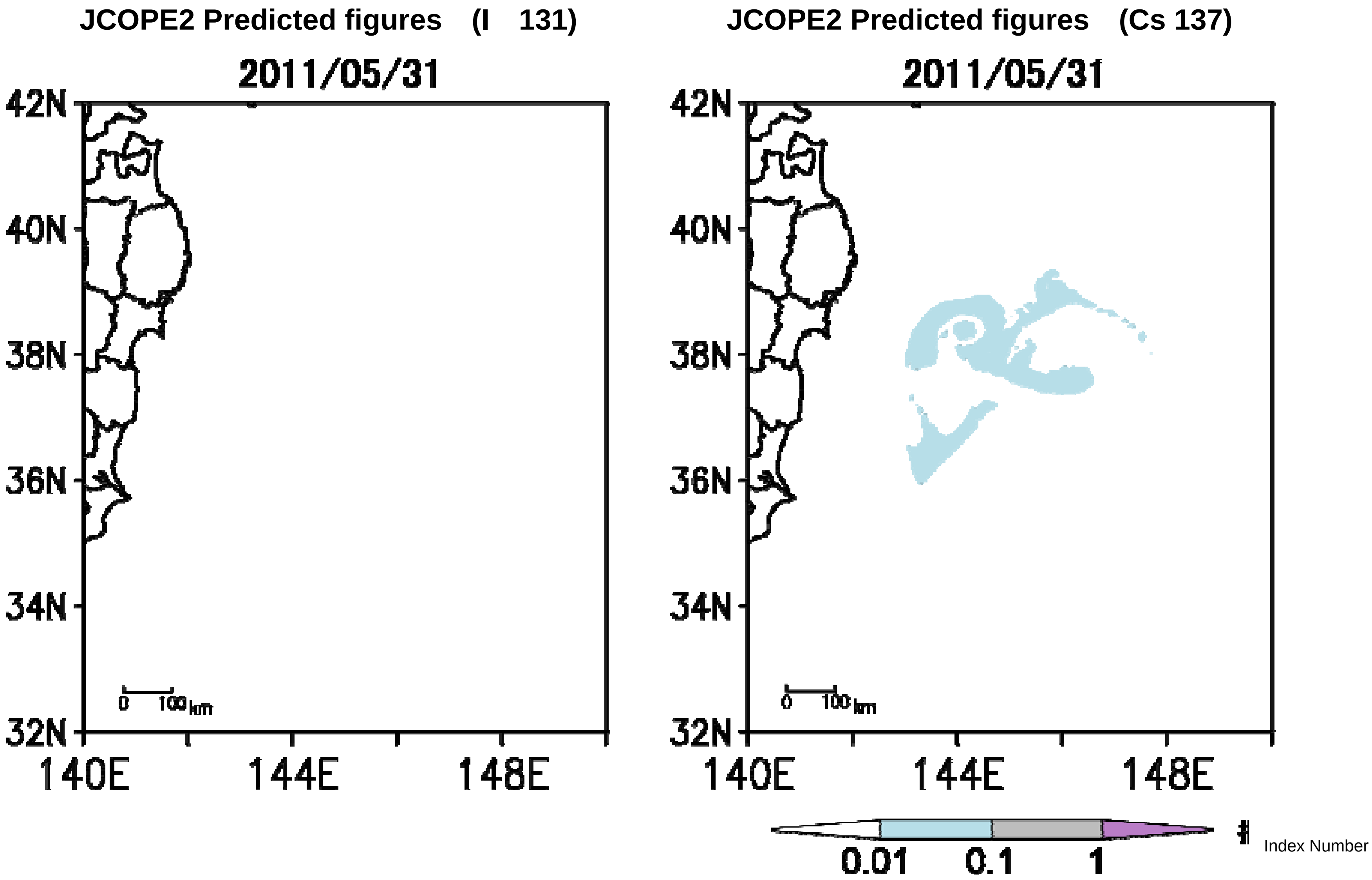
【Figure3-4】Simulation of Radioactivity Concentrations by JCOPE2(May 15th)
(based on data up to April 13th)



<Remarks： Index number in the figure indicates a multiple of maximum radioactivity concentration determined by the regulation for the drain from nuclear facilities (I131:40Bq/L, Cs137:90Bq/L) predicted on each point.>

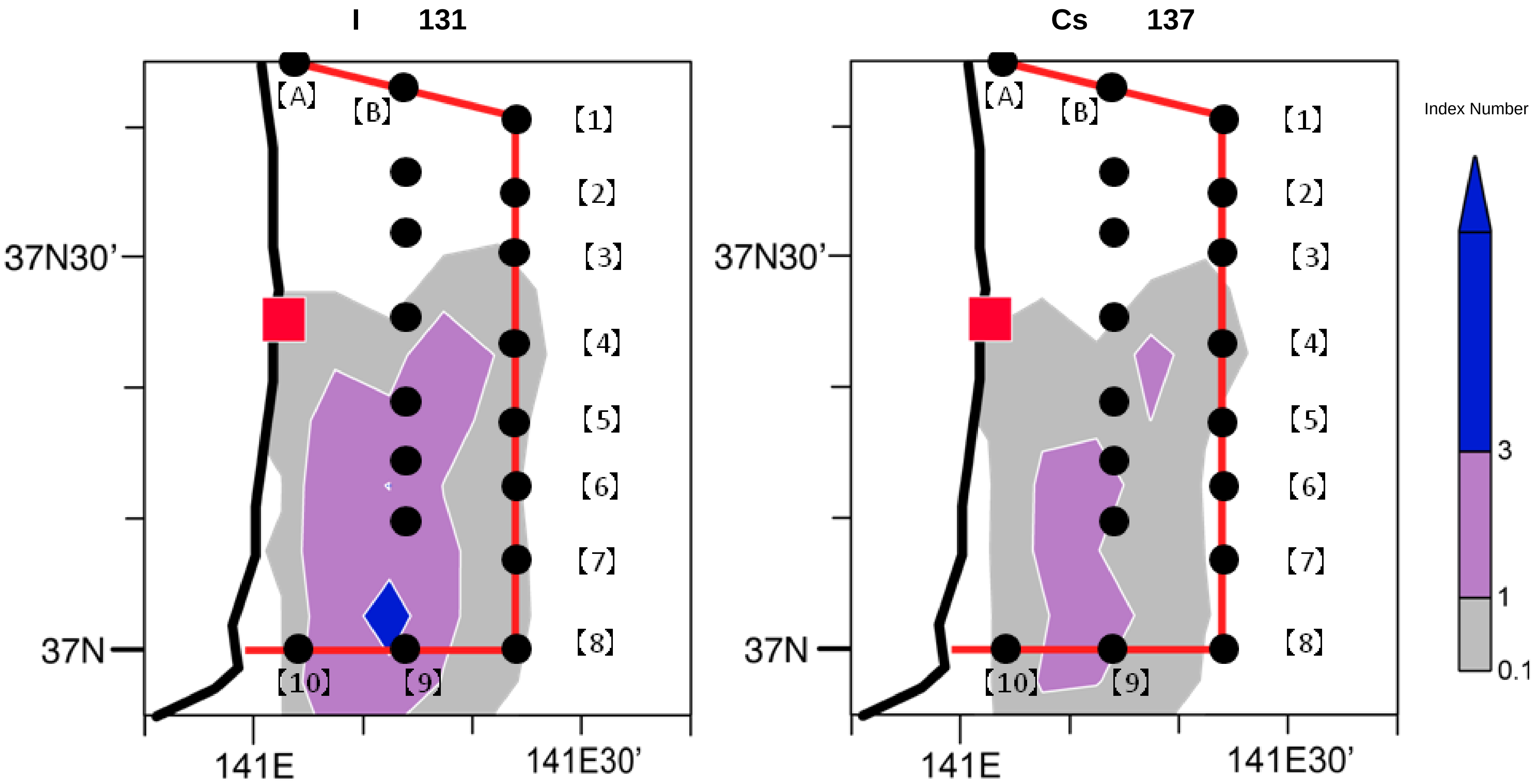
【Figure3-4】Simulation of Radioactivity Concentrations by JCOPE2(May 31th)

(based on data up to April 13th)



＜Remarks： Index number in the figure indicates a multiple of maximum radioactivity concentration determined by the regulation for the drain from nuclear facilities （I131:40Bq/L, Cs137:90Bq/L） predicted on each point.＞

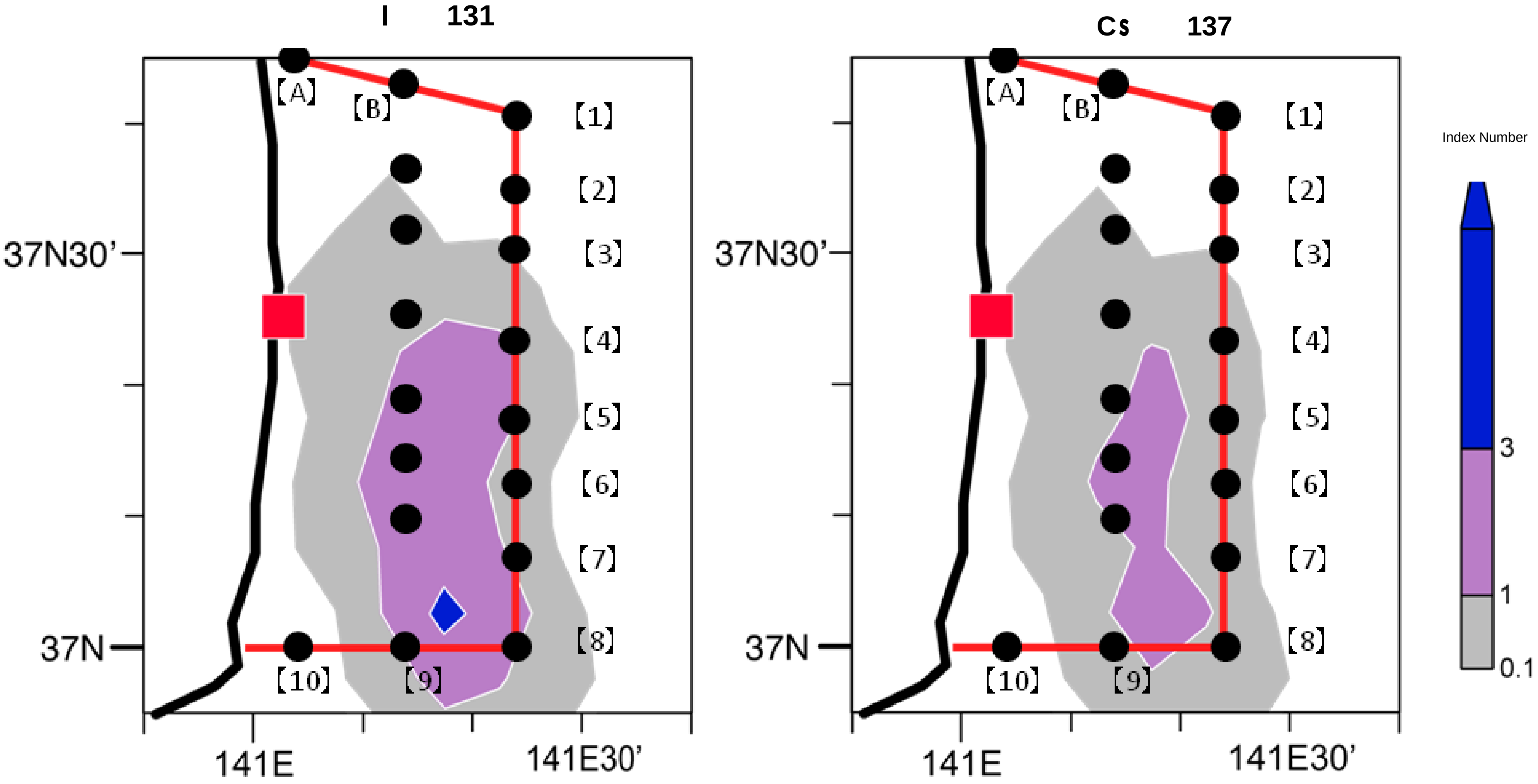
【Figure4-1】Simulation of Radioactivity Concentrations by JCOPET (April 4)
(based on data up to April 13th)



JCOPET suppose a half-life of I 131 as 8 days and one of Cs 137 as 30 years in the simulation.

<Remarks： Index number in the figure indicates a multiple of maximum radioactivity concentration determined by the regulation for the drain from nuclear facilities (I131:40Bq/L, Cs137:90Bq/L) predicted on each point.>

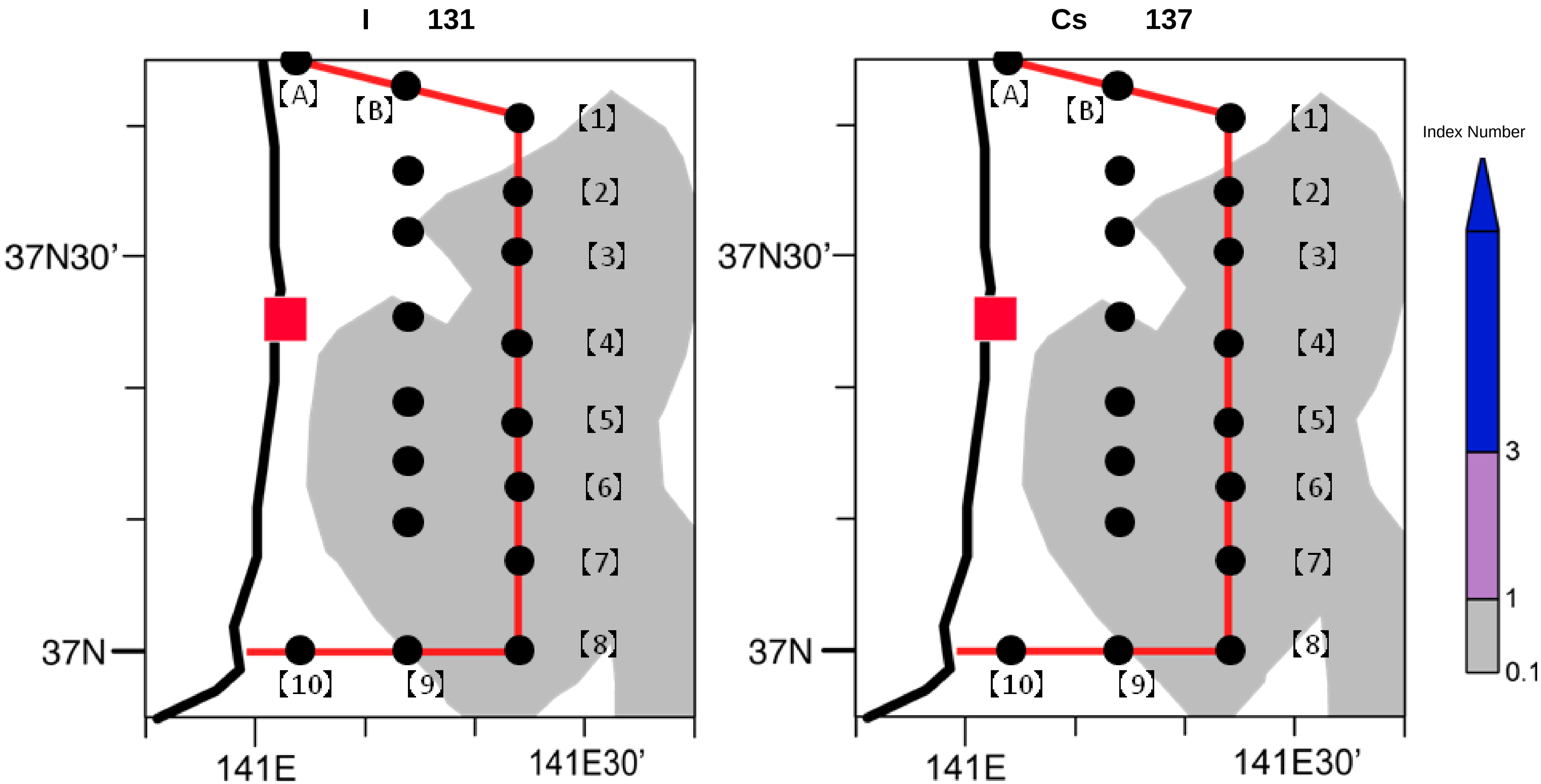
【Figure4-2】Simulation of Radioactivity Concentrations by JCOPET (April 16)
(based on data up to April 13th)



JCOPET suppose a half-life of I 131 as 8 days and one of Cs 137 as 30 years in the simulation.

<Remarks： Index number in the figure indicates a multiple of maximum radioactivity concentration determined by the regulation for the drain from nuclear facilities (I131:40Bq/L, Cs137:90Bq/L) predicted on each point.>

【Figure4-3】Simulation of Radioactivity Concentrations by JCOPET (April 20)
(based on data up to April 13th)



JCOPET suppose a half-life of I 131 as 8 days and one of Cs 137 as 30 years in the simulation.

＜Remarks： Index number in the figure indicates a multiple of maximum radioactivity concentration determined by the regulation for the drain from nuclear facilities (I131:40Bq/L, Cs137:90Bq/L) predicted on each point.＞