報道発表

文部科学省 MINISTRY OF EDUCATION, CULTURE, SPORTS, SCIENCE AND TECHNOLOGY-JAPAN

September 28, 2012

Results of the (i) Fifth Airborne Monitoring Survey and (ii) Airborne Monitoring Survey Outside 80km from the Fukushima Dai-ichi NPP

The results of the airborne monitoring survey within a 80km radius of the Fukushima Dai-ichi NPP by MEXT (the fifth airborne monitoring) (announced on June 21, 2012) and the airborne monitoring outside the 80km range from the Fukushima Dai-ichi NPP (announced on March 30, 2012) were summarized today, so they are provided here.

1. Objective of monitoring

In order to ascertain the changes in the situation regarding the effect of radioactive materials, MEXT has continued conducting airborne monitoring[*1] within a 80km radius of the TEPCO Fukushima Dai-ichi NPP, with the latest on November 5, 2011, conducted to ascertain the distribution of air dose rates and the deposition of radioactive cesium[*2] in the target region.

Moreover, in order to ascertain the effect of radioactive materials over a wide area, MEXT conducted airborne monitoring outside 80km from the Fukushima Dai-ichi NPP in all of Eastern Japan (22 prefectures, including Tokyo) from June to November of 2011, and in Western Japan and Hokkaido from January to May of 2012. As a result, we were able to ascertain the distribution of air dose rates and the deposition of radioactive cesium[*3] in these regions.

On the other hand, in order to ascertain the changing trends in the effect of radioactive materials, including those due to environmental circumstances, such as rainfall, the continued airborne monitoring of areas within a 80km radius of the Fukushima Dai-ichi NPP with high air dose rates and deposition amounts of radioactive cesium, and such areas outside 80 km from the Fukushima Dai-ichi NPP (areas centering on western Fukushima prefecture and Ibaraki, Gunma, Tochigi, and Miyagi prefectures) is necessary.

Therefore, in this survey, in order to ascertain the changing trends in the effect of radioactive materials, including those due to environmental circumstances, such as rainfall, from the previous monitoring, we conducted airborne monitoring for:

(i) Areas within a 80km radius of the Fukushima Dai-ichi NPP (the fifth airborne monitoring)

(ii) Areas outside 80km from the Fukushima Dai-ichi NPP, centering on western Fukushima prefecture and Ibaraki, Gunma, Tochigi, and Miyagi prefectures.

*1: Airborne monitoring is a technique in which large, highly sensitive radiation detectors are installed in an aircraft, and gamma rays from radioactive substances accumulated in the ground are quickly measured over a large area, in order to check the surface deposition.

*2: For details, refer to "Results of the Fourth Airborne Monitoring Survey by MEXT" (announced on December 16, 2011)

*3: For details, refer to "Results of Airborne Monitoring Survey by MEXT in Aichi, Aomori, Ishikawa, and Fukui Prefectures" (announced on November 25, 2011) and "(i) Results of Airborne Monitoring Survey in Hokkaido and (ii) Revision to the Results of Airborne Monitoring Survey over the Eastern Part of Japan with Detailed Consideration of the Influence of Natural Radionuclides" (announced on July 27, 2012).

2. Details of monitoring

(i) The fifth airborne monitoring (airborne monitoring within a 80km radius of the Fukushima Dai-ichi NPP)

○ Target area: within a 80km radius of the Fukushima Dai-ichi NPP
○ Monitoring period: June 22 to June 28, 2012 (20 flights in total)
○ Aircraft: Private helicopters (one BELL430 and one AS332)
○ Monitoring institution: Oyo corporation
○ Analyzing institution: Japan Atomic Energy Agency, Japan Chemical Analysis Center, Nuclear Safety Technology Center
○ Items covered: Air dose rates at 1m above the ground surface, and deposition of radioactive cesium on the ground surface, within a 80km radius of the Fukushima Dai-ichi NPP

(ii) Airborne Monitoring Survey Outside 80km from the Fukushima Dai-ichi NPP

○ Target area: Of the areas outside 80km from the Fukushima Dai-ichi NPP, the area and surrounding areas where a relatively high air dose rate and deposition amounts of radioactive cesium were measured[*4] in the airborne monitoring survey that were conducted between June and November 2011.

*4: Area and surrounding areas outside 80km from the Fukushima Dai-ichi NPP with an air dose rate of 0.2μSv/h or higher with a certain level of expansion (western Fukushima prefecture, Ibaraki, Gunma, Tochigi, and Miyagi prefectures, southern Iwate prefecture, northern Chiba prefecture, and eastern Yamagata prefecture).

○ Monitoring period: April 2 to May 7, 2012 (59 flights in total)
○ Aircraft: Private helicopters (one BELL412EP and one BELL430)
○ Monitoring institution: Japan Atomic Energy Agency, Nuclear Safety Technology Center
○ Analyzing institution: Japan Atomic Energy Agency
○ Items covered: Air dose rates at 1m above the ground surface, and deposition of radioactive cesium on the ground surface, outside 80km from the Fukushima Dai-ichi NPP

3. Results of monitoring

(i) Results of the Fifth Airborne Monitoring Survey

○ Based on the survey results from the fifth airborne monitoring survey, the “Distribution Map of Air Dose Rate” showing the distribution of air dose rates at 1m above the ground surface within a 80km radius of the Fukushima Dai-ichi NPP is as given in Attachment 1. Also, the “Distribution Maps of Radioactive Cesium on the Soil Surface” showing the deposition of radioactive cesium on the soil surface within a 80km radius of the Fukushima Dai-ichi NPP are as given in Attachments 2 to 4.

In preparing the maps in Attachments 1 to 4, the values have been decay-compensated to the value for June 28, 2012, which is the final day in which the fifth airborne monitoring survey was conducted.

(ii) Results of the Airborne Monitoring Survey Outside 80km from the Fukushima Dai-ichi NPP

○ Based on the survey results from the airborne monitoring outside 80km from the Fukushima Dai-ichi NPP, the “Distribution Map of Air Dose Rate” showing the distribution of air dose rates at 1m above the ground surface outside 80km from the Fukushima Dai-ichi NPP is as given in Attachment 5. Also, the “Distribution Maps of Radioactive Cesium on the Soil Surface” showing the deposition of radioactive cesium on the soil surface outside 80km from the Fukushima Dai-ichi NPP are as given in Attachments 6 to 8.

In preparing the maps in Attachment 5 to 8, the values have been decay-compensated to the value for June 28, 2012, which was the final day of the airborne monitoring survey outside 80km from the Fukushima Dai-ichi NPP.

Note that snowfall was confirmed in certain regions (western Fukushima prefecture, Gunma prefecture, eastern Yamagata prefecture, etc.) within the range where the monitoring outside 80km from the Fukushima Dai-ichi NPP was conducted. With regard to these regions, it has been expected that the air dose rate measurements are apt to be lower due to the effect of snow coverage. Therefore, in order to distinguish areas covered by snow,[*5] such areas are indicated in white and demarcated with solid lines on the maps.

*5: When identifying areas covered by snow, we used data obtained by NASA’s earth observation satellites, Terra and Aqua, which are available on “JAXA Satellite Monitoring for Environmental Studies” (JASMES), released by the Japan Aerospace Exploration Agency. As they are 500m-grid data, snow coverage over 5cm with an even surface can be indicated correctly, but it is sometimes difficult to accurately identify snow coverage of a shallower depth or with an uneven surface. Therefore, it is possible that there are areas with snow coverage other than those indicated in white and demarcated with solid lines on the maps in Attachment 5 to 8.

Other than that, in order to respond to inquiries concerning the distribution of air dose rates and the distribution of radioactive cesium, we created maps that detail the measurement results of the airborne monitoring of areas within a 80km radius of the Fukushima Dai-ichi NPP (fifth airborne survey) in addition to the measurement results of airborne monitoring of areas outside 80km from the Fukushima Dai-ichi NPP (see Reference 1 to 4).

In preparing the maps in reference 1 to 4, the results for the airborne monitoring of areas outside 80km from the Fukushima Dai-ichi NPP have been decay-compensated to the value for June 28, 2012, which was the final day of the fifth airborne monitoring survey. In this correction, the effects of the transition of radioactive materials due to environmental circumstances such as wind, rain, etc. were not considered.

The details of conditions in creating these maps are given in Reference 5.

4. Considerations regarding this survey

○ In this survey, in order to confirm the situation of changes in the effect of radioactive materials, the monitoring of areas both within and outside 80km from the Fukushima Dai-ichi NPP was conducted. Of this, in the areas outside 80km from the Fukushima Dai-ichi NPP, snow coverage was confirmed in certain areas, such as western Fukushima prefecture, Gunma prefectures, and eastern Yamagata prefecture. Due to this, we were unable to accurately identify a decrease in air dose rates, and thus we were unable to evaluate the changes in the air dose rates. Therefore, with regard to the trend of decreasing air dose rates, considerations were made based on the results for monitoring within a 80km radius of the Fukushima Dai-ichi NPP.

○ In order to confirm changes in air dose rates, we compared the survey results for the fourth airborne survey (air dose rates) (as of November 5, 2011) and the fifth airborne survey (air dose rates) (as of June 28, 2012). As shown in Attachment 9, although each measurement point shows certain variations in changes in air dose rates, we were able to confirm as a trend that the air dose rates decreased by around 23% during the period between the fourth and fifth airborne monitoring (just under eight months). Since the decrease in air dose rates due to the decay of radioactive cesium during the same period was around 14%, it was confirmed that the decrease in air dose rates for areas within a 80km radius of the Fukushima Dai-ichi NPP was larger than the decrease in air dose rates accompanying the decay of radioactive cesium. The reason for this may be attributed to the effects of environmental circumstances, such as rainfall, during the period between the fourth and fifth airborne monitoring. However, the effect of differences in the conversion factor of air dose rates, as well as differences in the flight path and flight altitude in each monitoring may also be considered as a factor. Therefore, in order to confirm the details of the trend of decreasing air dose rates, it is necessary to continue conducting the airborne monitoring.

5. Future plans

○ We will continue to conduct airborne monitoring for the areas within a 80km radius of the Fukushima Dai-ichi NPP, and to confirm the changes in the situation for the effect of radioactive materials for each season. Moreover, with regard to areas outside 80km from the Fukushima Dai-ichi NPP, we will conduct airborne monitoring again after the typhoon season to confirm the changes in the situation concerning the effect of radioactive materials accompanying the effects of the typhoons.

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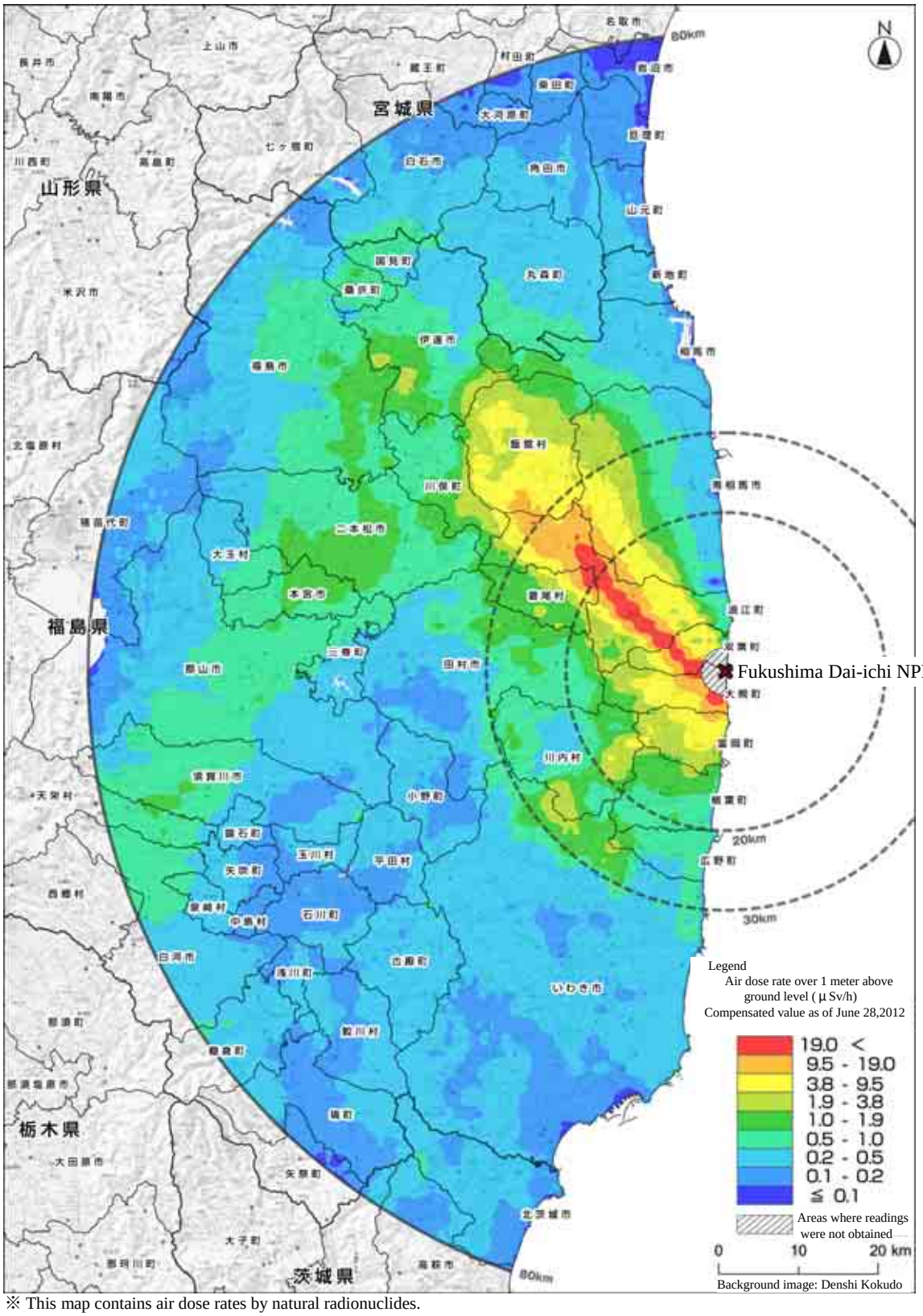
Attachment 1

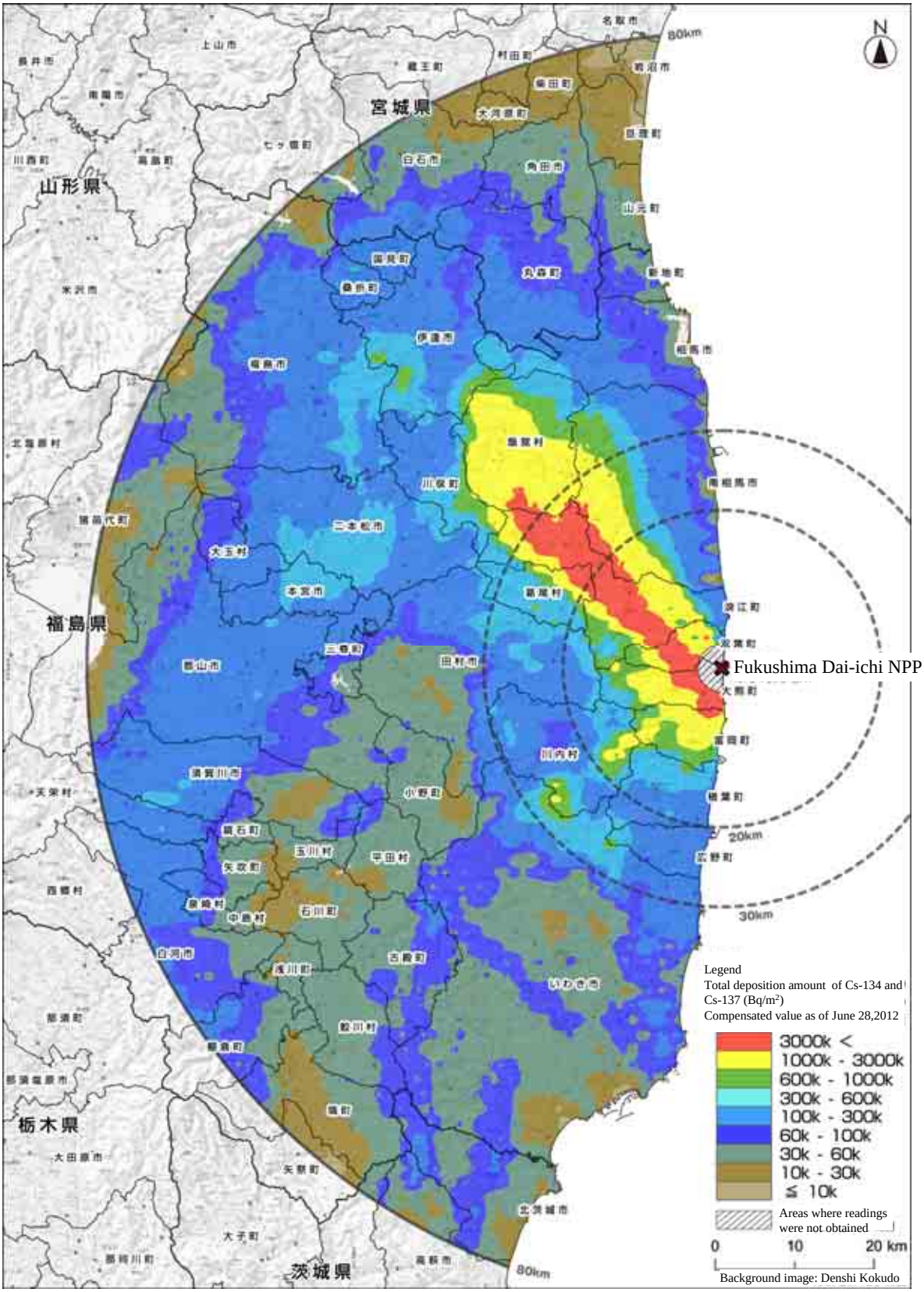
Results of the Fifth Airborne Monitoring Survey by MEXT
(Air dose rates at the height of 1m above the ground surface within a 80 km radius of the Fukushima Dai-ichi NPP)(As of June 28, 2012)



※ This map contains air dose rates by natural radionuclides.

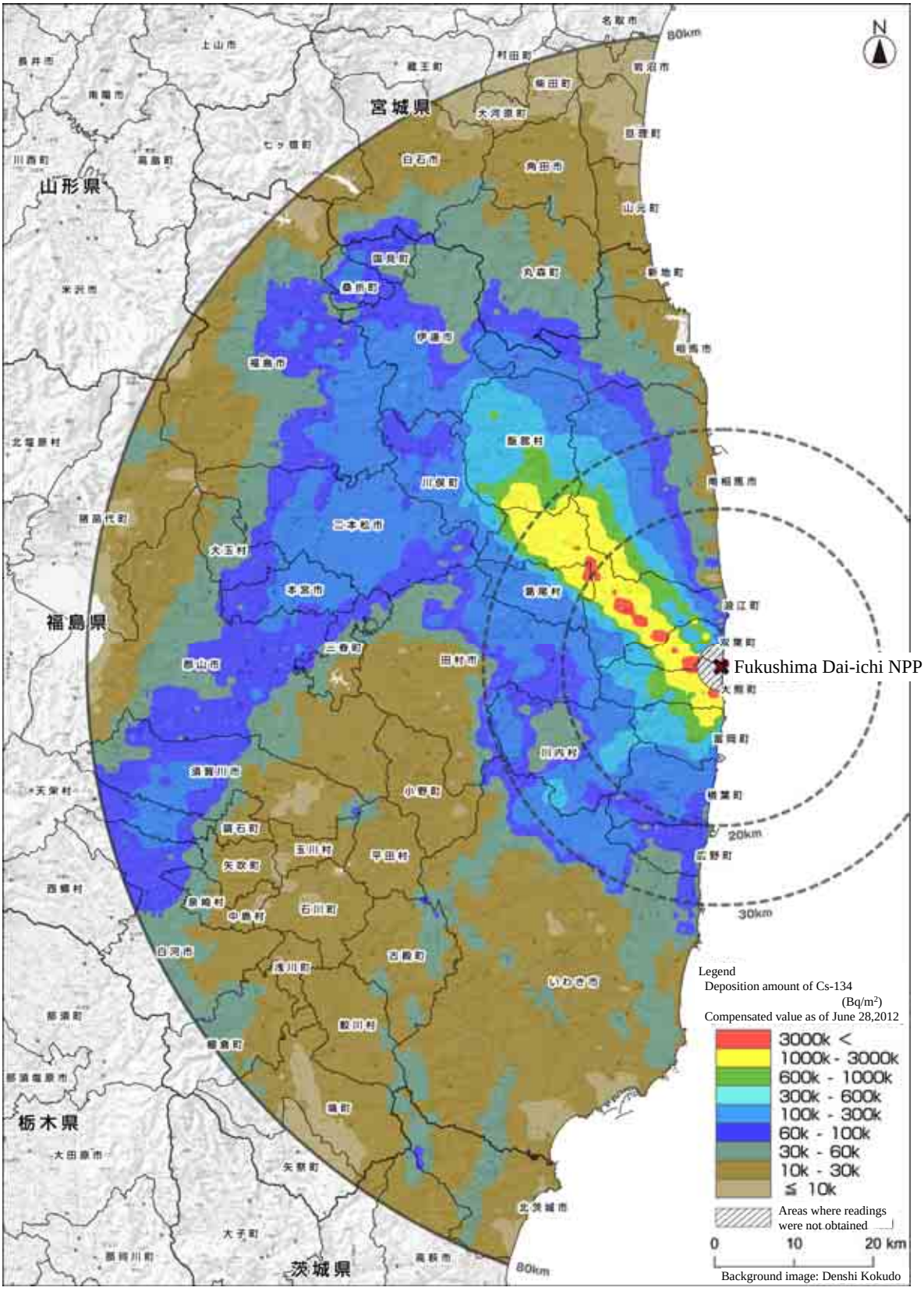
Attachment 2

Results of the Fifth Airborne Monitoring Survey by MEXT
(Total deposition amount of cesium 134 and cesium 137 on the ground surface within a 80 km radius from the Fukushima Dai-ichi NPP)
(As of June 28, 2012)



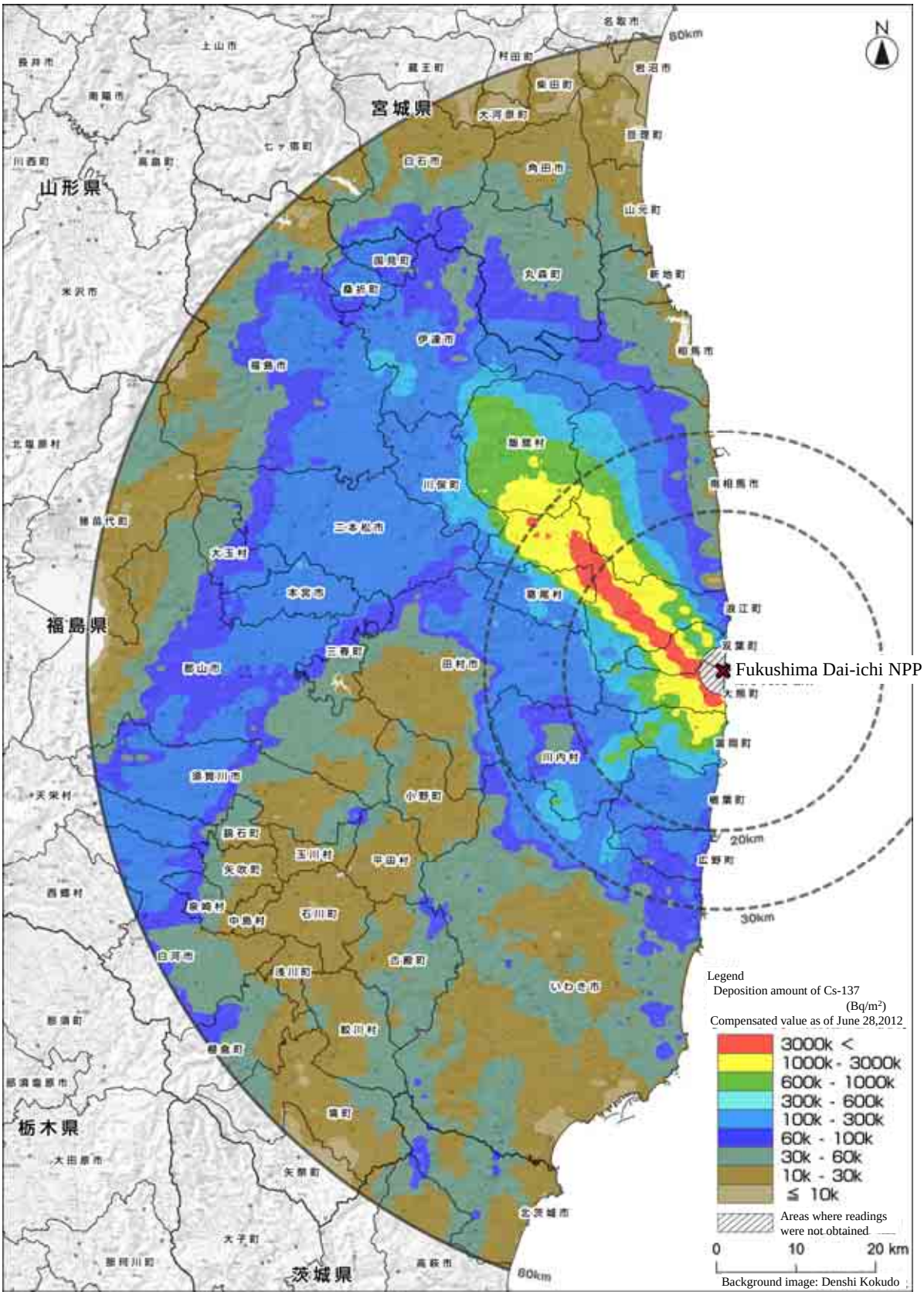
Attachment 3

Results of the Fifth Airborne Monitoring Survey by MEXT
(Deposition amount of cesium 134 on the ground surface within a 80 km radius of the Fukushima Dai-ichi NPP)
(As of June 28, 2012)



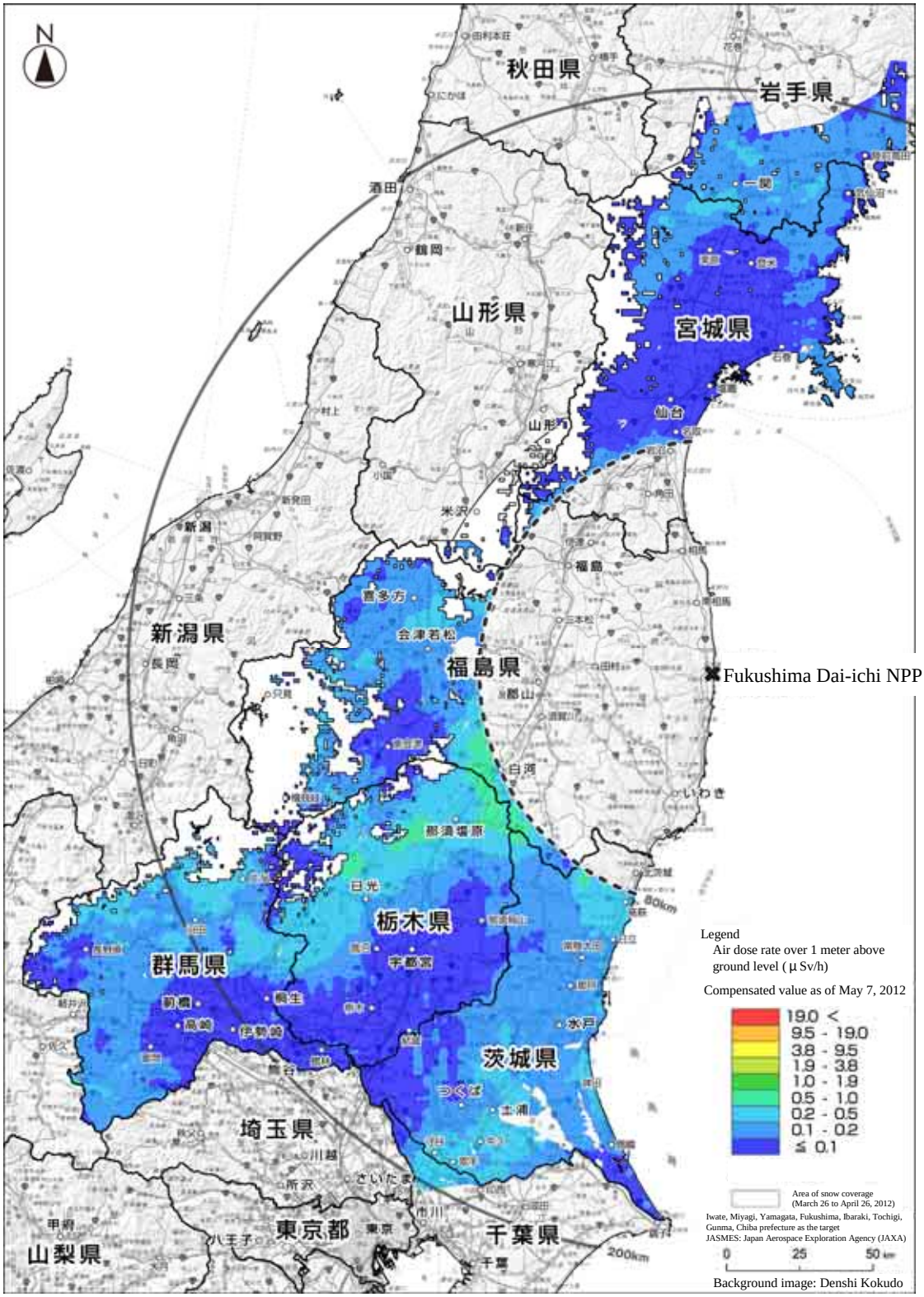
Attachment 4

Results of the Fifth Airborne Monitoring Survey by MEXT
(Deposition amount of cesium 137 on the ground surface
within a 80 km radius of the Fukushima Dai-ichi NPP)
(As of June 28, 2012)



Attachment 5

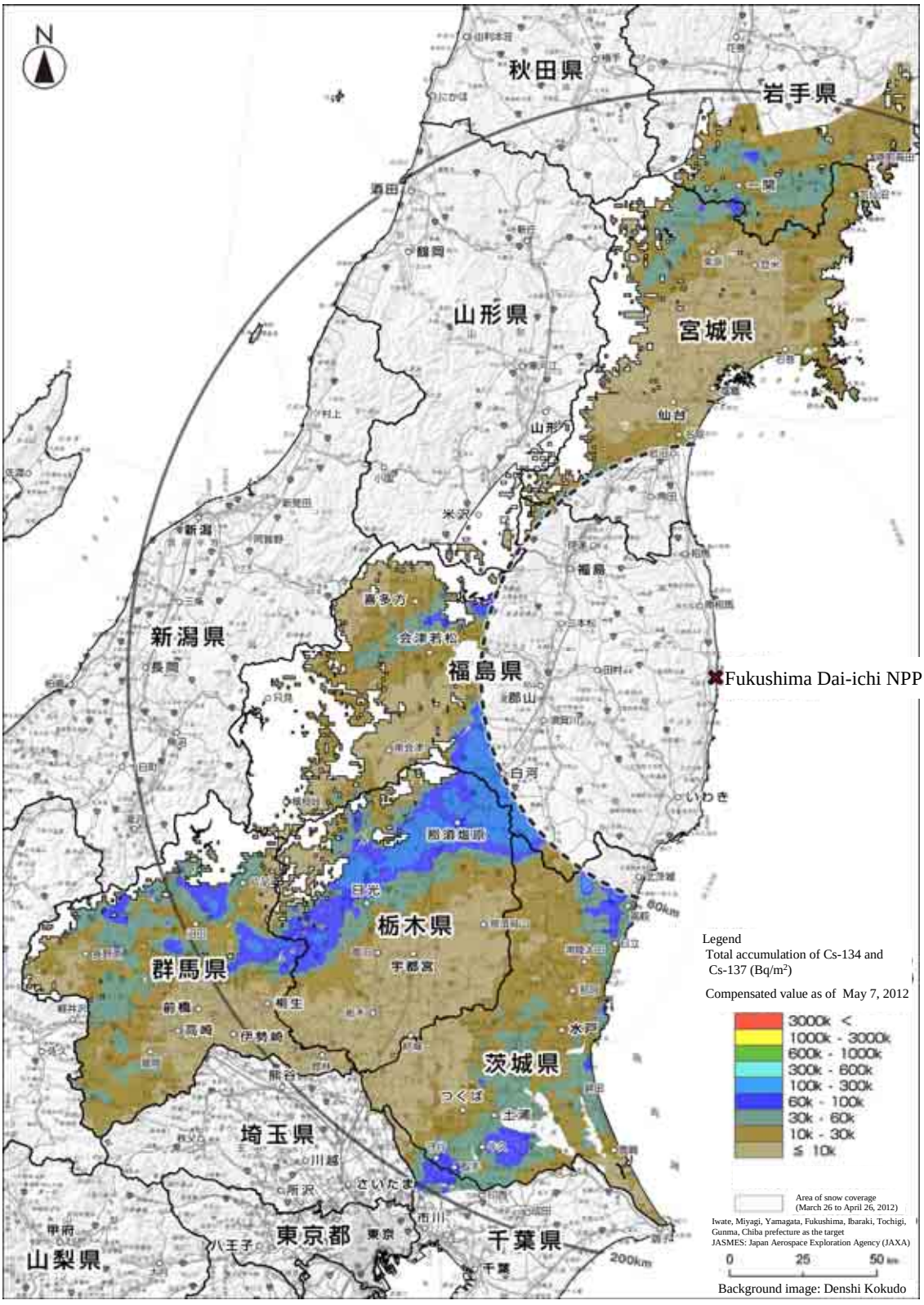
Results of the Airborne Monitoring Survey Outside 80 km from the Fukushima Dai-ichi NPP
(Air dose rates at the height of 1m above the ground surface) (As of May 7,2012)



*This map contains air dose rates by natural radionuclides.
*The parts indicated in white and demarcated with solid lines on the map indicate areas that are covered with snow, and air dose rates in these areas and the surrounding areas may possibly be lower than when there was no snow coverage due to shielding by the snow.

Attachment 6

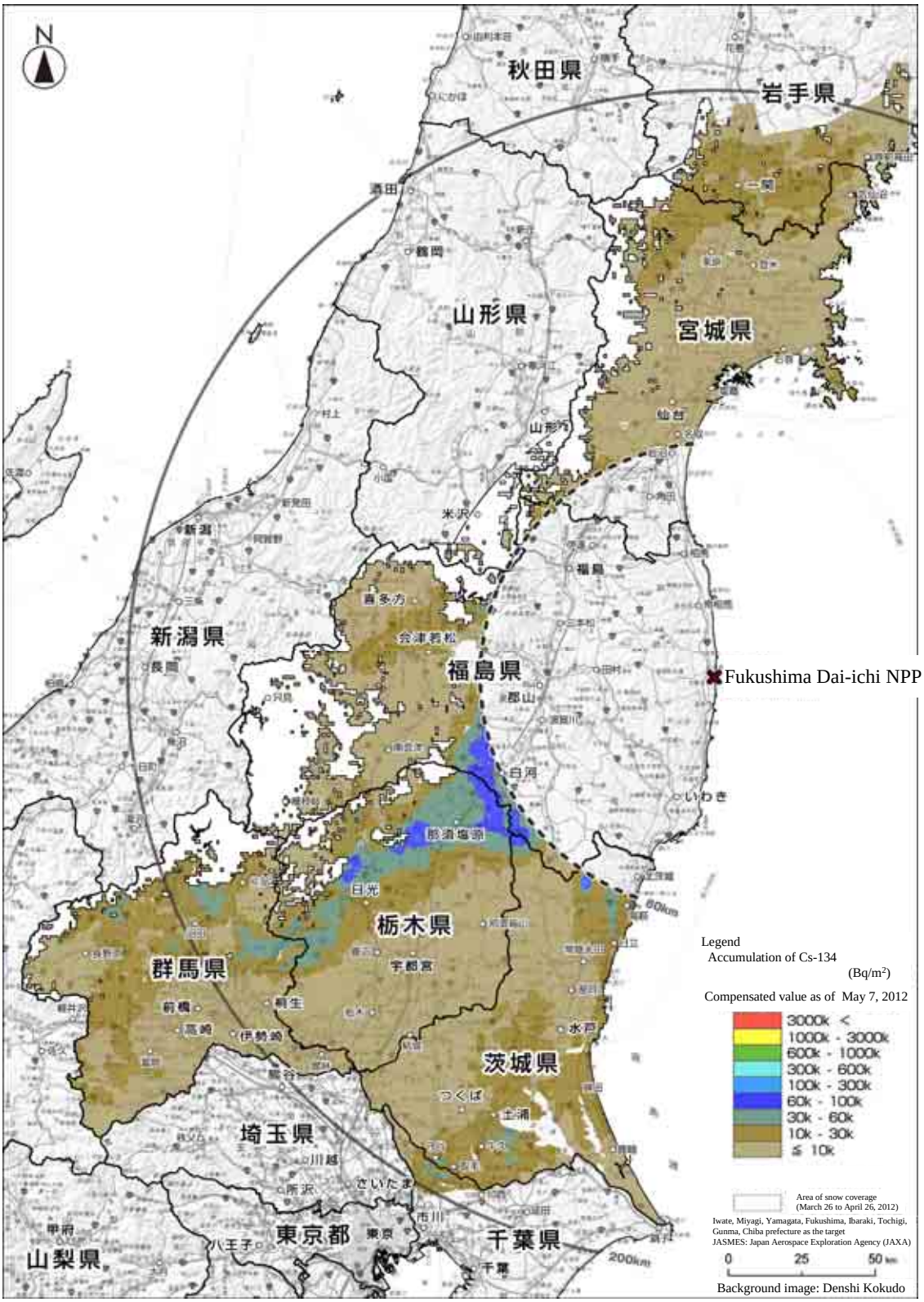
Results of the Airborne Monitoring Survey Outside 80 km from the Fukushima Dai-ichi NPP
(Total deposition amount of cesium 134 and cesium 137 on the ground surface) (As of May 7,2012)



*The parts indicated in white and demarcated with solid lines on the map indicate areas that are covered with snow, and deposition amounts of radioactive cesium in these areas and the surrounding areas may possibly be lower than when there was no snow coverage due to shielding by the snow.

Attachment 7

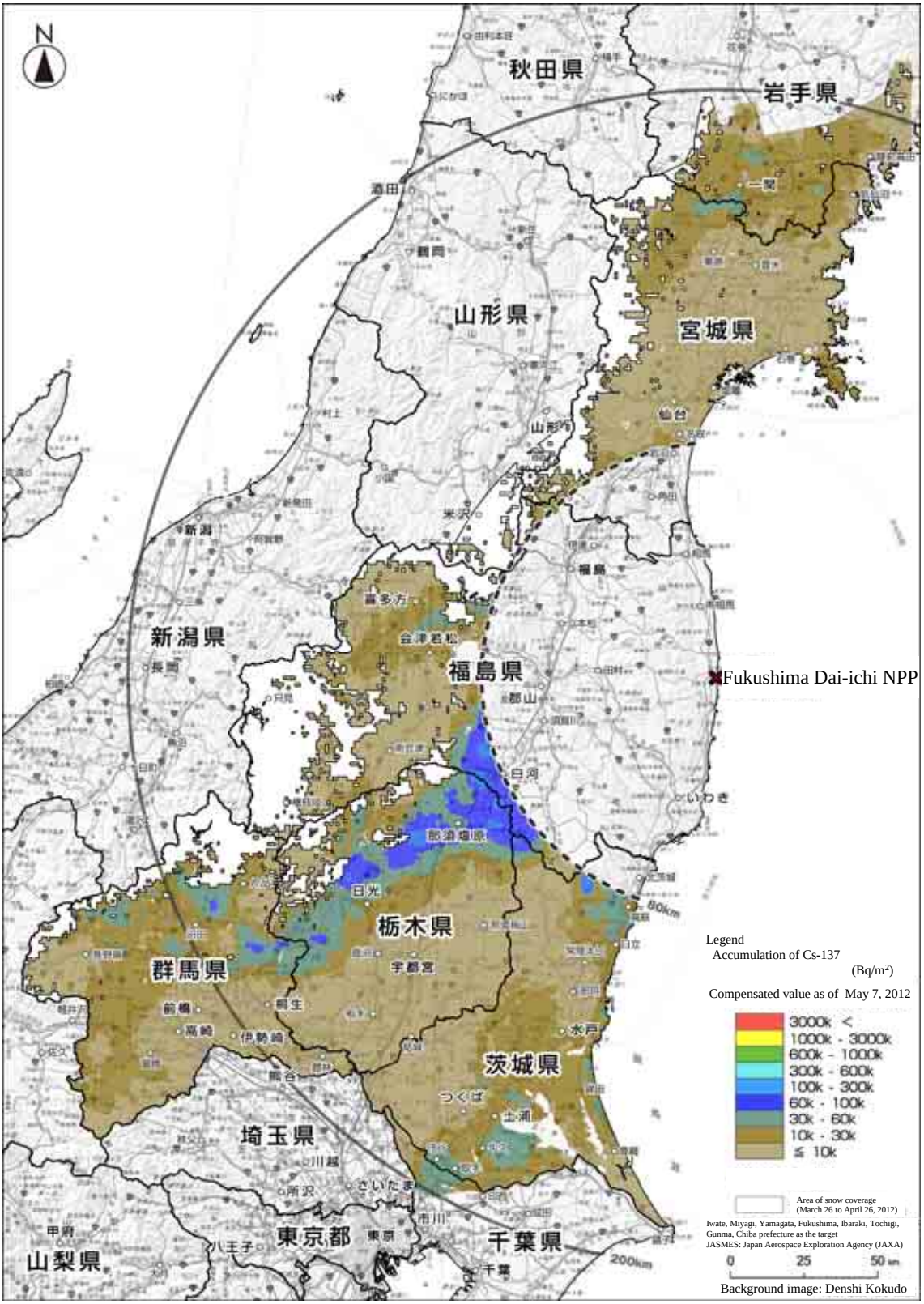
Results of the Airborne Monitoring Survey Outside 80 km from the Fukushima Dai-ichi NPP
(Deposition amount of cesium 134 on the ground surface) (As of May 7,2012)



*The parts indicated in white and demarcated with solid lines on the map indicate areas that are covered with snow, and deposition amounts of radioactive cesium in these areas and the surrounding areas may possibly be lower than when there was no snow coverage due to shielding by the snow.

Attachment 8

Results of the Airborne Monitoring Survey Outside 80 km from the Fukushima Dai-ichi NPP
(Deposition amount of cesium 137 on the ground surface) (As of May 7,2012)



*The parts indicated in white and demarcated with solid lines on the map indicate areas that are covered with snow, and deposition amounts of radioactive cesium in these areas and the surrounding areas may possibly be lower than when there was no snow coverage due to shielding by the snow.

Attachment 9

Comparison between the results of the fourth airborne monitoring survey (air dose rates) and those of the fifth airborne monitoring survey (air dose rates)

- ○ In order to confirm the changing trends in air dose rates, the measurement results of the fourth airborne monitoring survey (air dose rates) (as of November 5, 2011) and those of the fifth airborne monitoring survey (air dose rates) (as of June 28, 2012) were compared.
- ○ Although the comparison showed differences in the changes of air dose rates in the measured areas, it was confirmed that in the areas within a 80km radius of the Fukushima Dai-ichi NPP, the air dose rates had decreased by around 23% during the period (just under 8 months) between the fourth airborne monitoring survey and the fifth airborne monitoring survey.
- ○ As the decrease in air dose rates due to the decay of radioactive cesium during the same period was around 14%, it has been confirmed that as a trend, the decrease in air dose rates was higher than the decay of radioactive cesium in the areas within a 80km radius of the Fukushima Dai-ichi NPP.

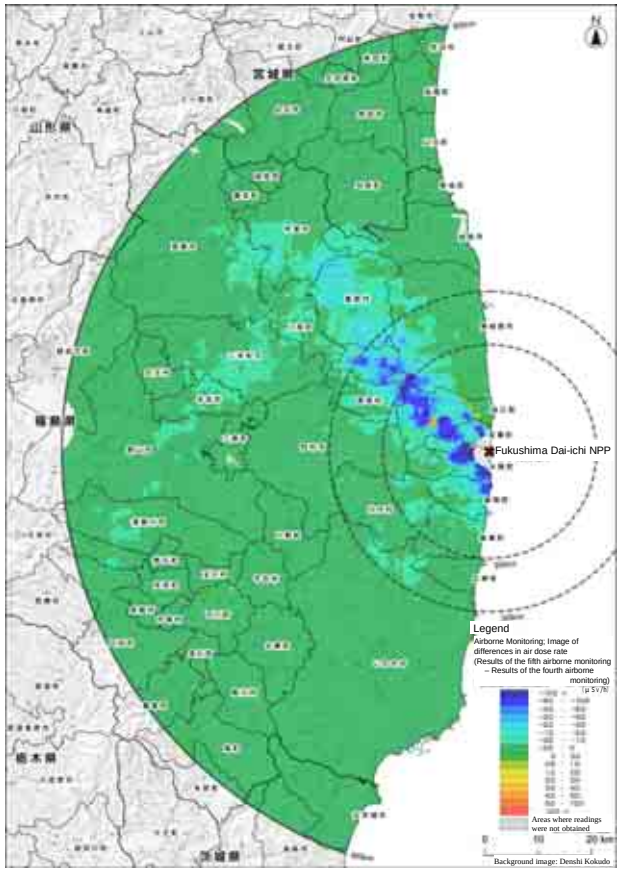


Figure: Distribution of differences between the results of the fourth airborne monitoring survey (air dose rates) and those of the fifth airborne monitoring survey (air dose rates)

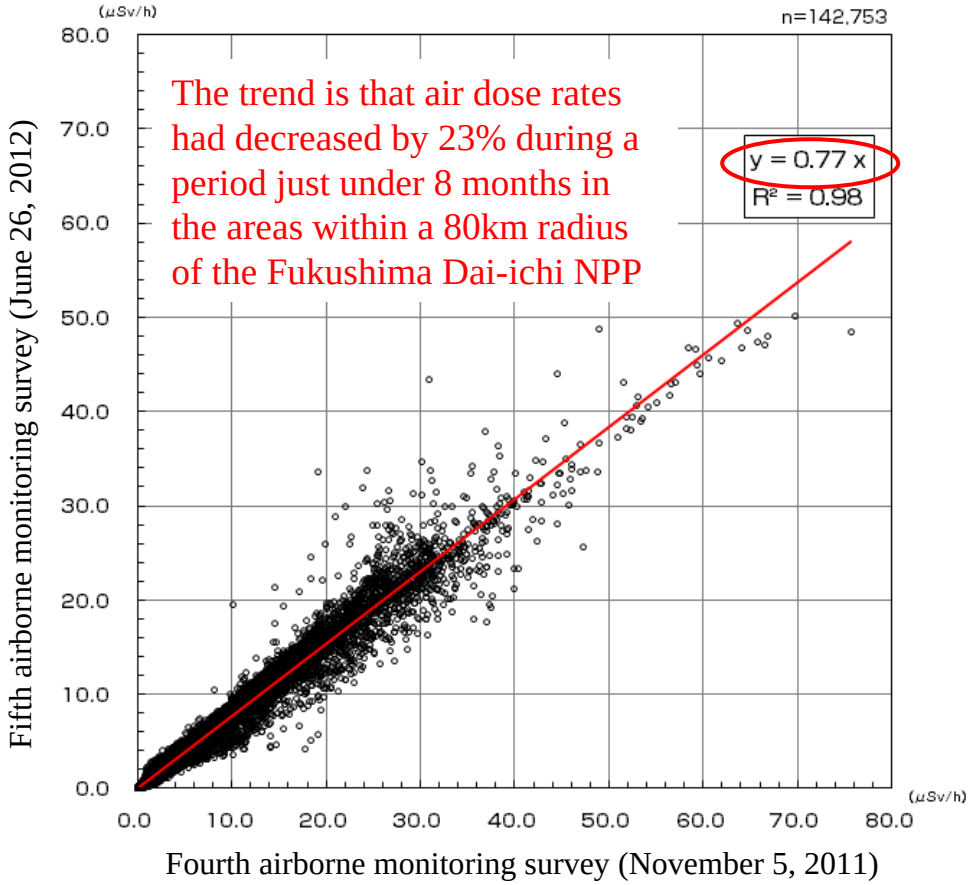
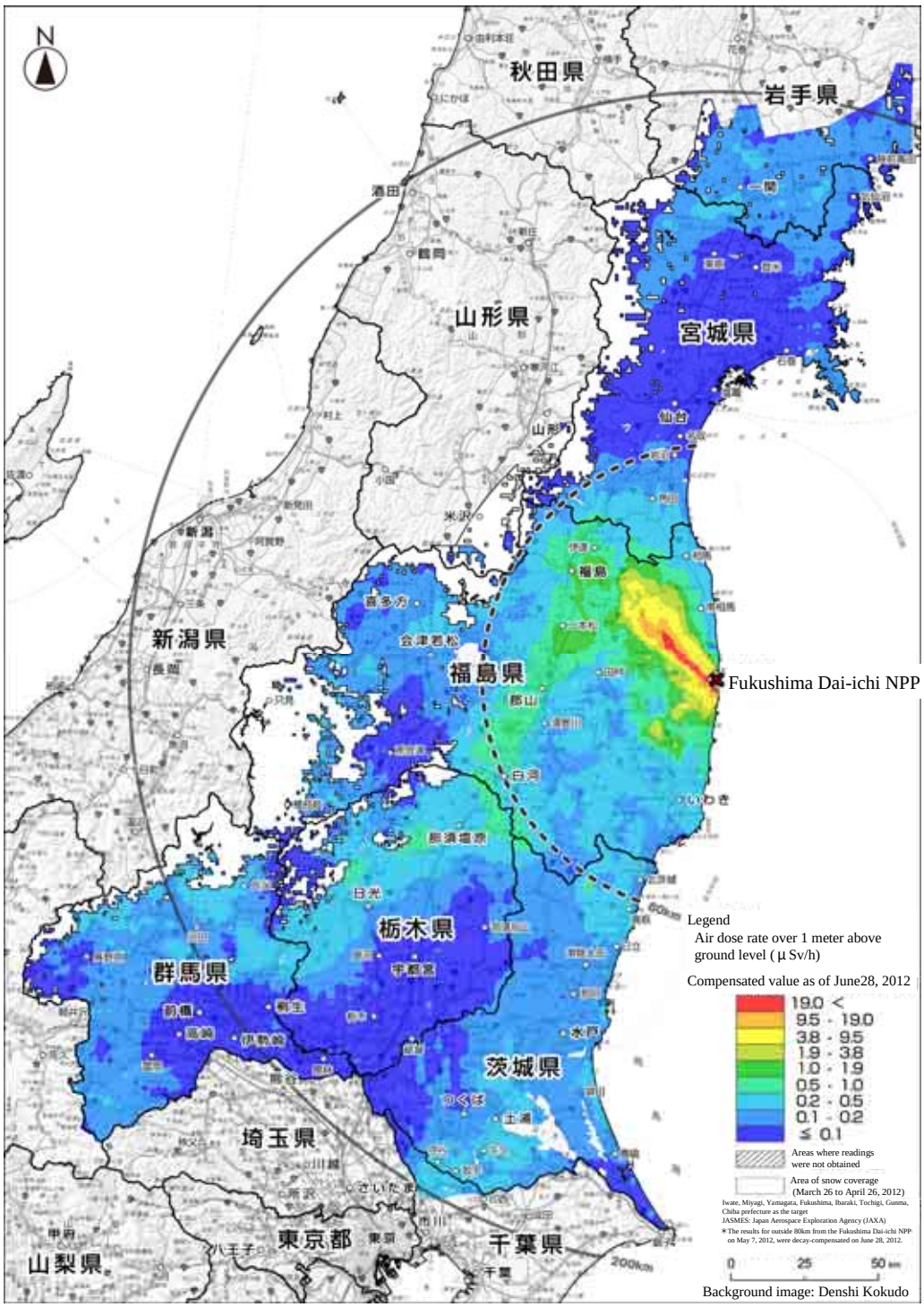


Figure: Relationship between the results of the fourth airborne monitoring survey (air dose rates) and those of the fifth airborne monitoring survey (air dose rates)

（Reference 1）

Results of the Airborne Monitoring Survey
(Air dose rates at the height of 1m above the ground surface) (As of June 28, 2012)
(The results for airborne monitoring survey outside 80km from the Fukushima Dai-ichi NPP*1 were added to the results of the fifth airborne monitoring survey)



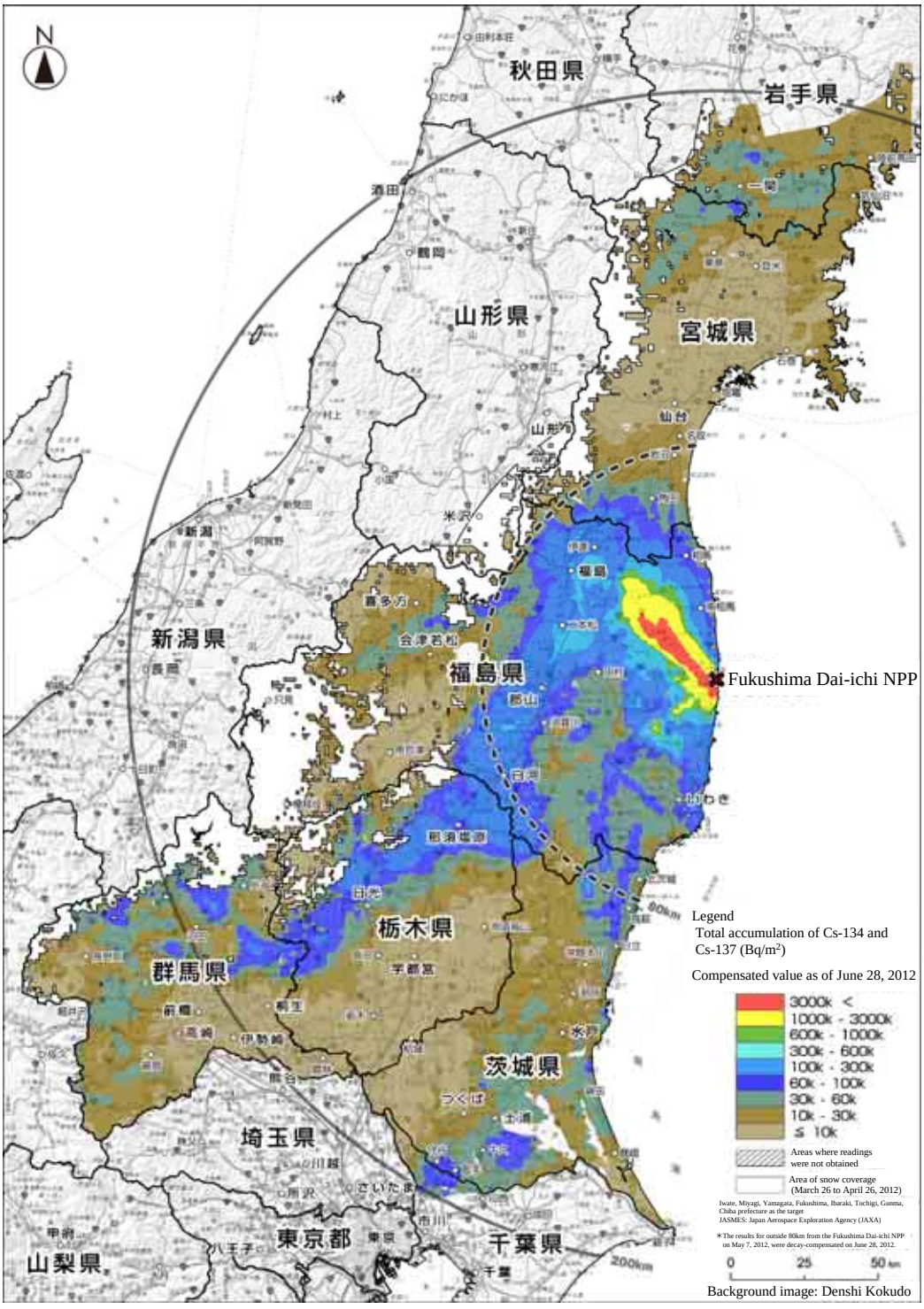
*1: The measurement results for outside 80km from the Fukushima Dai-ichi NPP were decay-compensated to the value for the measurement results at the time of the fifth airborne monitoring (as of June 28, 2012.) The effects of the transition of radioactive materials due to environmental circumstances, such as wind and rain, were not considered.

*2:The parts indicated in white and demarcated with solid lines on the map indicate areas that are covered with snow, and air dose rates in these areas and the surrounding areas may possibly be lower than when there was no snow coverage due to shielding by the snow.

*3：This map contains air dose rates by natural radionuclides.

（Referance 2）

Results of the Airborne Monitoring Survey
(Total deposition amount of cesium 134 and cesium 137 on the ground surface) (As of June 28, 2012)
(The results for airborne monitoring survey outside 80km from the Fukushima Dai-ichi NPP*1
were added to the results of the fifth airborne monitoring survey)

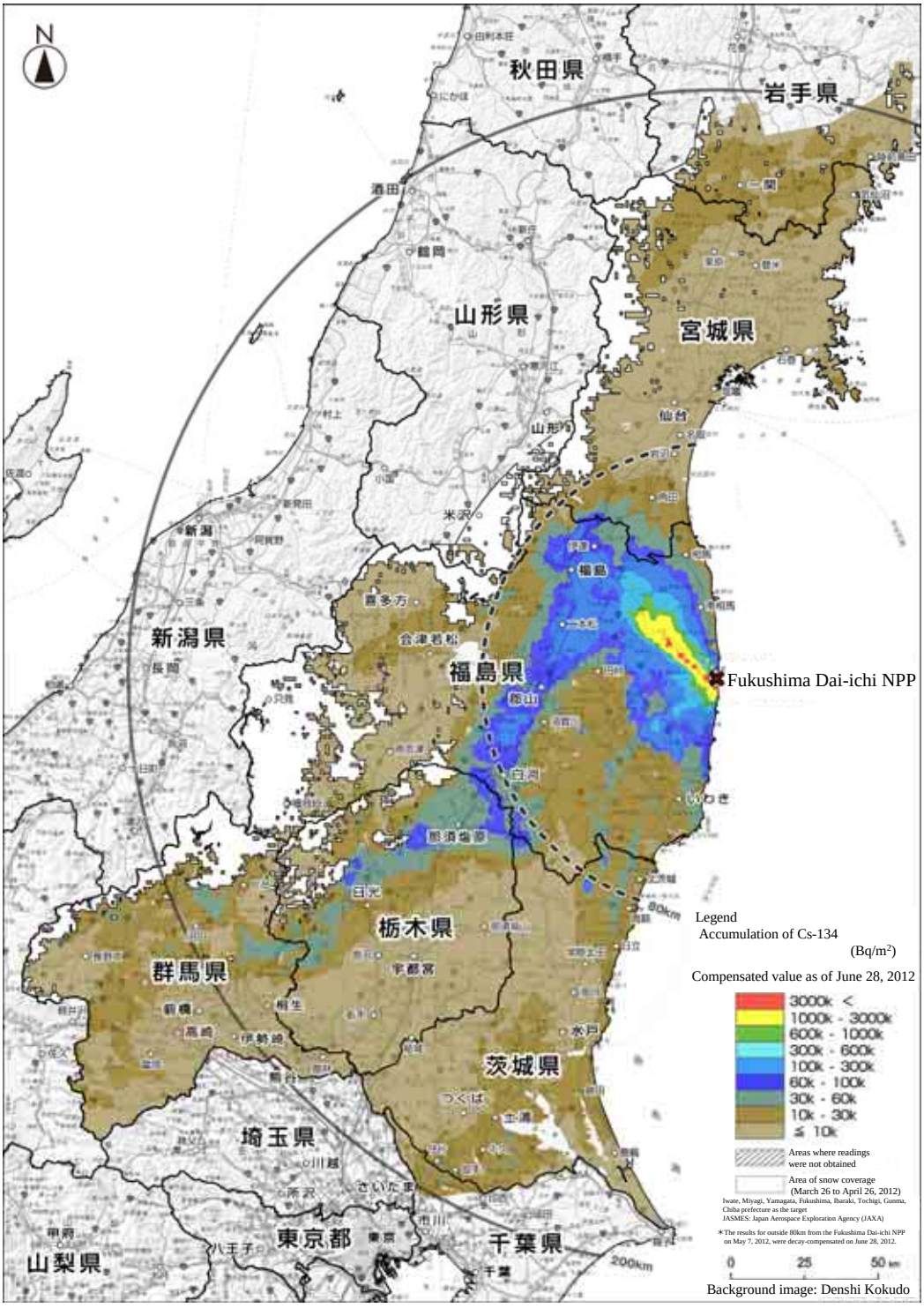


*1: The measurement results for outside 80km from the Fukushima Dai-ichi NPP were decay-compensated to the value for the measurement results at the time of the fifth airborne monitoring (as of June 28, 2012.) The effects of the transition of radioactive materials due to environmental circumstances, such as wind and rain, were not considered.

*2: The parts indicated in white and demarcated with solid lines on the map indicate areas that are covered with snow, and deposition amounts of radioactive cesium in these areas and the surrounding areas may possibly be lower than when there was no snow coverage due to shielding by the snow.

（Reference 3）

Results of the Airborne Monitoring Survey
(Deposition amount of cesium 134 on the ground surface) (As of June 28, 2012)
(The results for airborne monitoring survey outside 80km from the Fukushima Dai-ichi NPP*1 were added to the results of the fifth airborne monitoring survey)

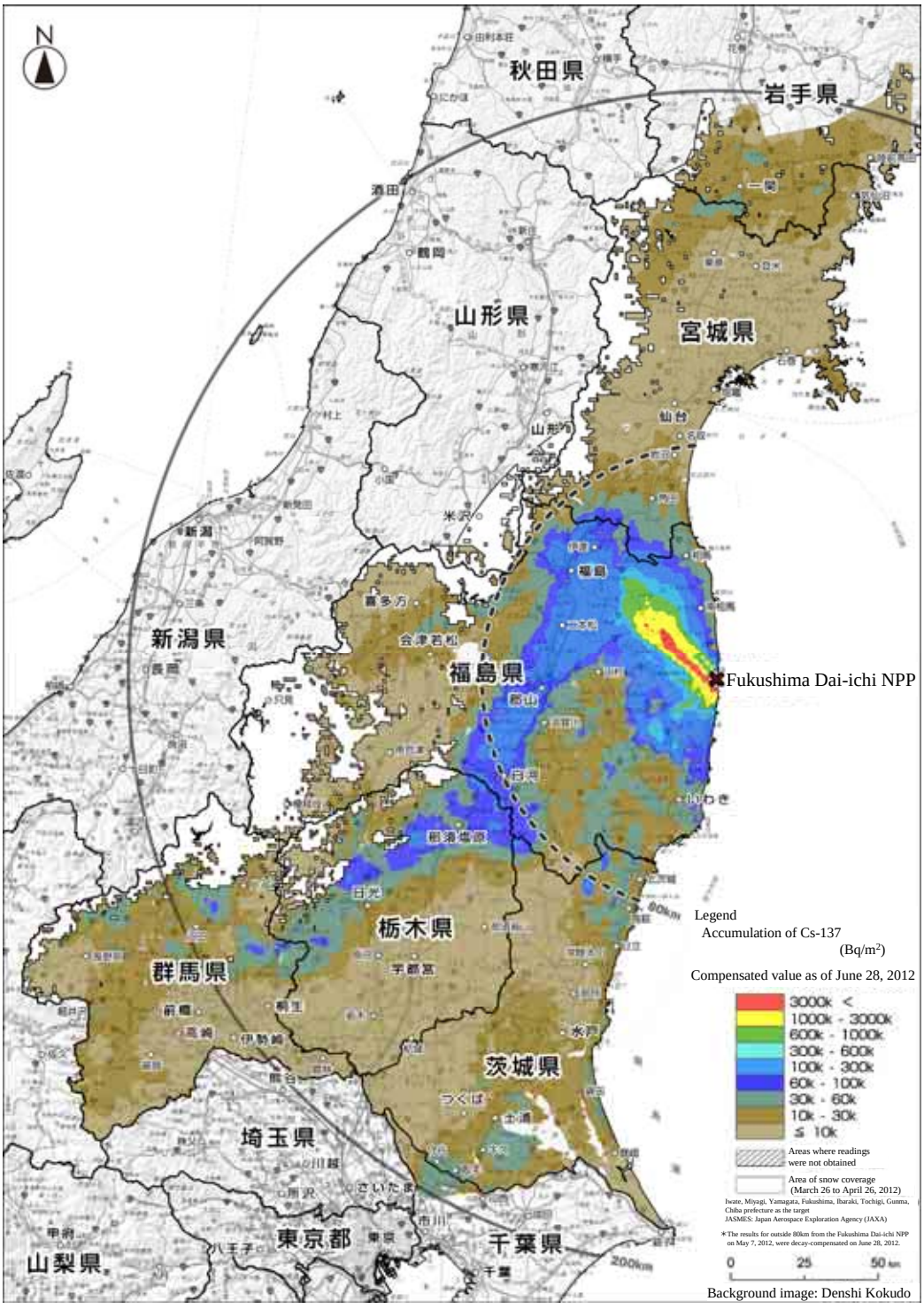


*1: The measurement results for outside 80km from the Fukushima Dai-ichi NPP were decay-compensated to the value for the measurement results at the time of the fifth airborne monitoring (as of June 28, 2012.) The effects of the transition of radioactive materials due to environmental circumstances, such as wind and rain, were not considered.

*2: The parts indicated in white and demarcated with solid lines on the map indicate areas that are covered with snow, and deposition amounts of radioactive cesium in these areas and the surrounding areas may possibly be lower than when there was no snow coverage due to shielding by the snow.

（Reference 4）

Results of the Airborne Monitoring Survey
(Deposition amount of cesium 137 on the ground surface) (As of June 28, 2012)
(The results for airborne monitoring survey outside 80km from the Fukushima Dai-ichi NPP*1 were added to the results of the fifth airborne monitoring survey)



*1: The measurement results for outside 80km from the Fukushima Dai-ichi NPP were decay-compensated to the value for the measurement results at the time of the fifth airborne monitoring (as of June 28, 2012.) The effects of the transition of radioactive materials due to environmental circumstances, such as wind and rain, were not considered.

*2: The parts indicated in white and demarcated with solid lines on the map indicate areas that are covered with snow, and deposition amounts of radioactive cesium in these areas and the surrounding areas may possibly be lower than when there was no snow coverage due to shielding by the snow.

(Reference 5)

Details on the Conditions in Creating the Distribution Maps of Air Dose Rate and Radioactive Cesium on the Soil Surface that Utilizes the Survey Results of the Fifth Airborne Monitoring Survey and Airborne Monitoring Survey in Areas Outside 80 km From the Fukushima Dai-ichi NPP

○ The flight altitude for this monitoring survey was around 300m from the ground, and the measurement value is the average of the measurement values within a circle of around 600 m in diameter (changes depending on flight altitude) under the aircraft.

○ The width of the flight path of the aircraft is around 1.85 km in the fifth airborne monitoring, and around 3 km for the airborne monitoring outside 80 km from the Fukushima Dai-ichi NPP.

○ In order to prepare distribution maps of air dose rates, we first obtained the relationship between counting rates (cps) measured by airborne survey above the test line established at each of the monitoring areas and air dose rates (μSv/h) at the height of 1 m above the ground measured around the test line using NaI scintillators, and then calculated air dose rates at the height of 1 m above the ground using counting rates measured by airborne survey above respective measuring points.

○ Maps showing deposition amounts of radioactive cesium were prepared by first assessing the characteristics of the energy spectra of gamma rays measured in the air by type of helicopter and measuring equipment used, and then sorting out areas where the energy spectra of radioactive cesium (Cs-134 and Cs-137) were detected significantly and those were they were not (for details on this method, refer to Attachment 9 of “Results of Airborne Monitoring Survey by MEXT in the Kyushu Region and Okinawa Prefecture” [Announced on May 11, 2012]). The details are as follows:

(i) Areas where the energy spectra of radioactive cesium were detected significantly

・ In order to calculate the amount of radioactive cesium in detail, we used the method for conducting detailed assessment of the influence of natural radionuclides based on the energy spectra of gamma rays measured in the sky that were applied in western Japan and Hokkaido.

・ Based on this method, deposition amounts of radioactive cesium were calculated by deducting the contribution by natural radionuclides from the measurement results of air dose rates at respective measuring points, and also based on the correlation between air dose rates and the results of the in-situ measurement* using germanium semiconductor detectors, which was conducted by the Japan Chemical Analysis

Center in the course of the project by the 2011 Strategic Funds for the Promotion of Science and Technology, entitled “Establishment of the Base for Taking Measures for Environmental Impact of Radioactive Substances — Study on Distribution of Radioactive Substances” (June–August, 2011).

* In-situ measurement using germanium semiconductor detectors: A means to analyze the concentration of radionuclides accumulated in soil by setting up transportable germanium semiconductor detectors in the environment and detecting gamma rays that are emitted from radiation sources distributed in soil.

(ii) Areas where the energy spectra of radioactive cesium were not detected significantly

・ As with before, these were indicated on maps as areas showing the minimum range of radioactive cesium ($\leq$10kBq/m^2) for the sake of simplicity.