

# FALLOUT IN KYUSHU FROM THE ACCIDENT OF CHERNOBYL NUCLEAR PLANT (Part II)

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## FALLOUT IN KYUSHU FROM THE ACCIDENT OF CHERNOBYL NUCLEAR PLANT (Part II)

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### Abstract

As shown in our study reported in previous paper<sup>1)</sup>, radioactive fallout from the accident of Chernobyl contaminated especially on east coast of Kyushu. The phenomenon was assured again from gauging pine needles. The strong correlation between contamination and rainfall was found which is also reported in Europe.

### 1 Pine needles as the material for contamination standard

Pine needles were used for good standard of contamination, because pine tree grow every where in Japan. It develops its new branches in every spring, which make us possible to know the contamination of every year by collecting the new born leaf. By simple calculation, pine needle has ten times larger surface area per weight compared to the leaf of broad leaved tree. This make more easy to take in outside material. Many studies about fallout from nuclear experiments have been made using pine needles.

Our samples were collected from 6th Aug. 1987 to 1st Oct. 1987, and selected only developed in 1985.

### 2 Air current from Chernobyl

Fig. 1 shows the computer simulation of the route how the air current from Chernobyl came to Japan. Generally, simulation of actual current is very difficult, one of the reason is number of input data is not enough for accurate calculation. For instance, the meteorological data in Siberia district is too few to be required. We can not have too much expect to it's accuracy.

We knew from the observation at Uji by Dr. Ogino of Kyoto University, Fig. 2, the first current reached there around 3rd May to 4th May. The observation by five districts observatories in Japan, shows similar tendency to that of Ogino.

Though we cannot know the accurate route of the current, it seems sure main part of the current came from the direction of Korean peninsula. From Fig. 3, upper air current on these days was blowing from this direction.

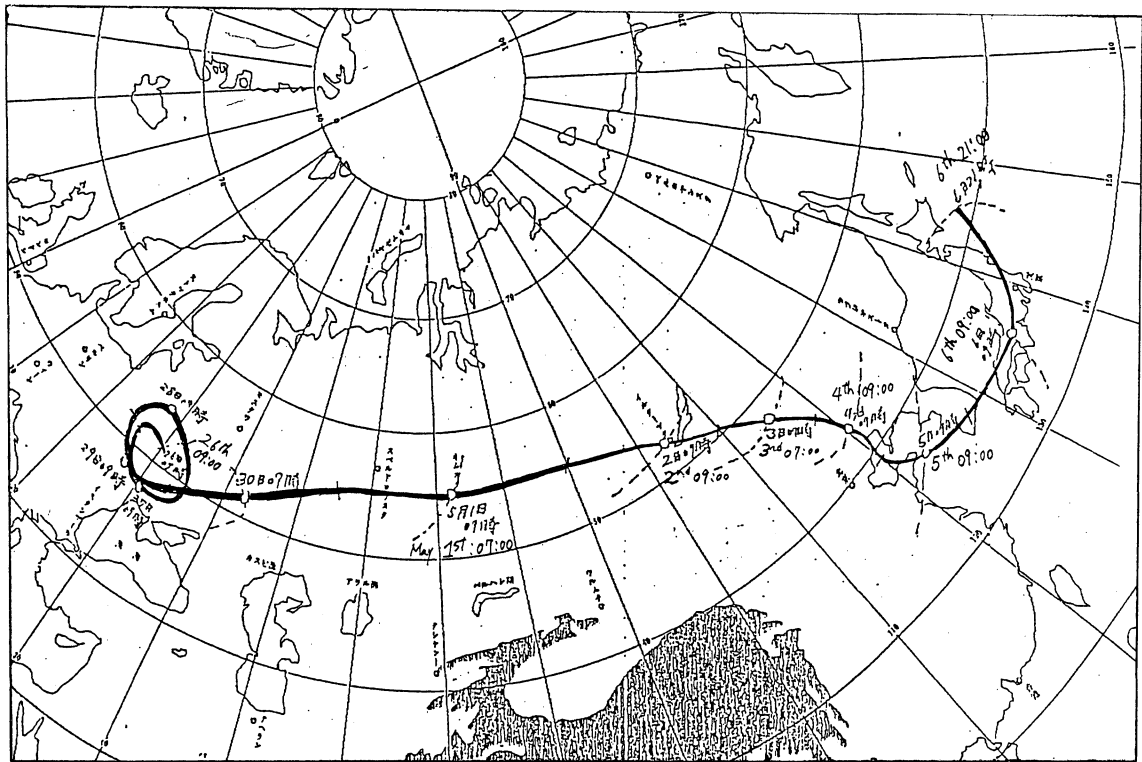


Fig. 1 Computer simulation of the route how the upper air current of 500 mb from Chernobyl came to Japan. The current assumed to start on 9:00 26th April Japan time. Performed by ministry of meteorology department of observation.

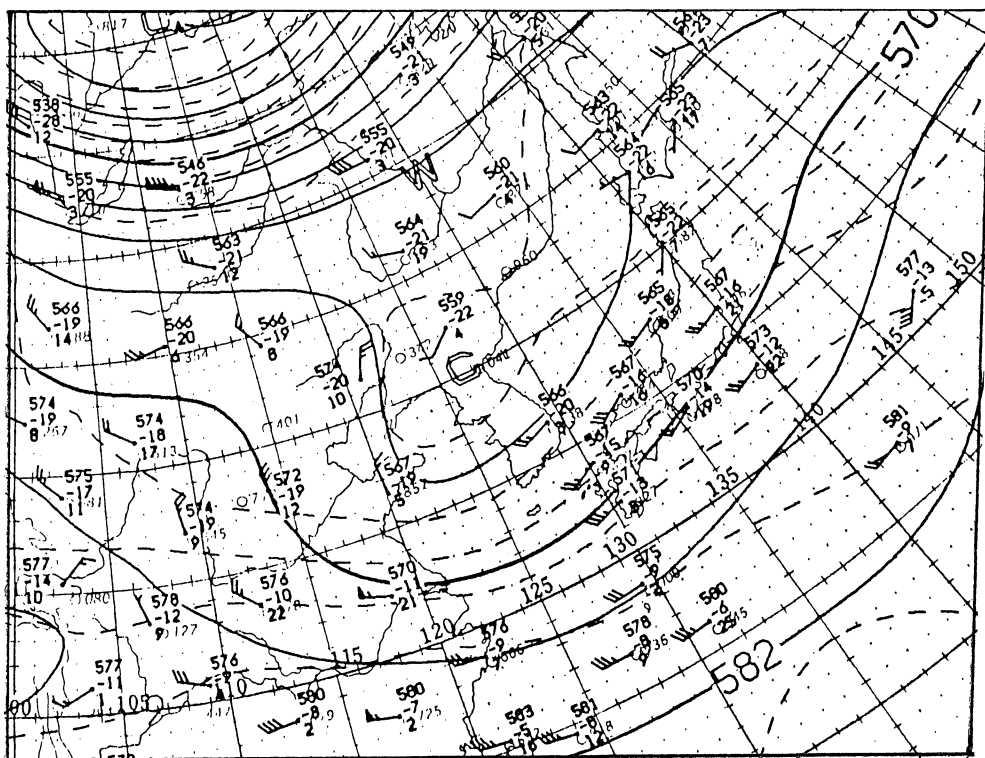


Fig. 2 Upper air current of 500 mb on 4th May 1986. Number on isobar lines show the height from sea level. Direction of air current flow parallel to isobar line because of coriolis' force. Arrange of the map change little after several days. Main part of the current seems to come from the direction of Korean peninsula.

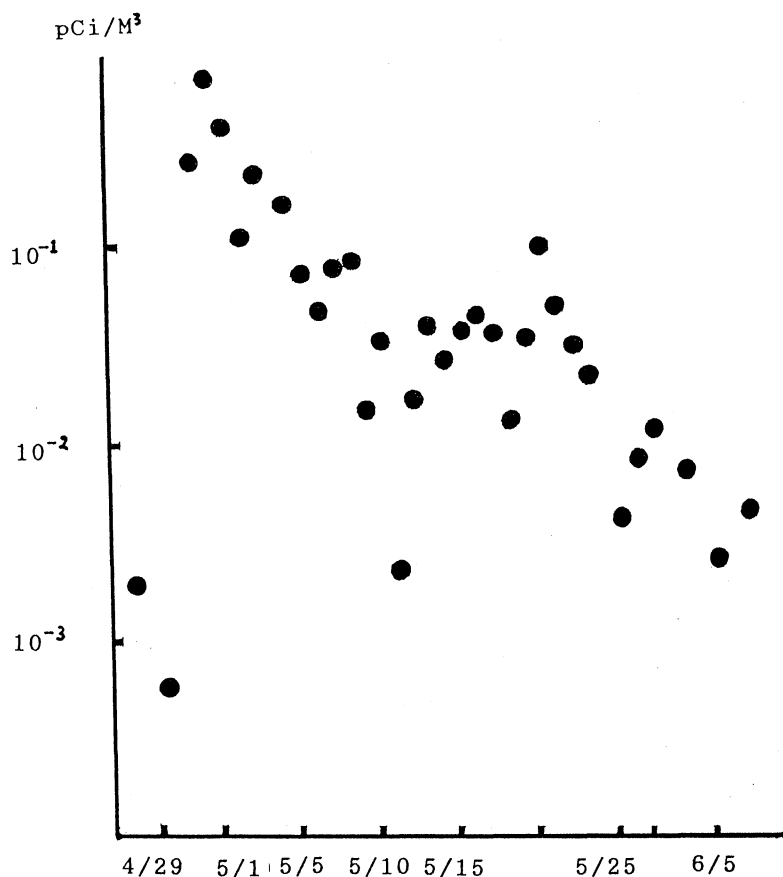


Fig. 3 Daily change of cesium 137 from Chernobyl plant by Dr. Ogino of Kyoto University at Uji. Beginning of May, before the current arrives, is very low level. Horizontal axis is day. Vertical axis is amount of cesium 137 in cubic meter.

### 3 Rainfall during radioactive current had been passing

In Kyushu, it had been raining until 4th to 6th May<sup>2)</sup>, so we can consider the period contributed to fallout is limited from 4th to 6th May. Fig. 4 shows the rainfall map of Miyazaki prefecture.

Fig. 5 shows the fallout of radioactive cesium. We can see strong correlation between rainfall and fallout. Fig. 6 the relation on semilogarithmic graph. The points are limited to the places where each observation point of rainfall and sampling point is same. The graph shows fallout depend very sensitive on rainfall. We can even say if it rained double amount, fallout increases ten times.

### 4 Discussion

As we expected, very clear correlation was found between rainfall and fallout. Generally, local forecast of rain is very unsure. This means if grave accident like Chernobyl accident happened, there is no way to foresee where and when will be contaminated.

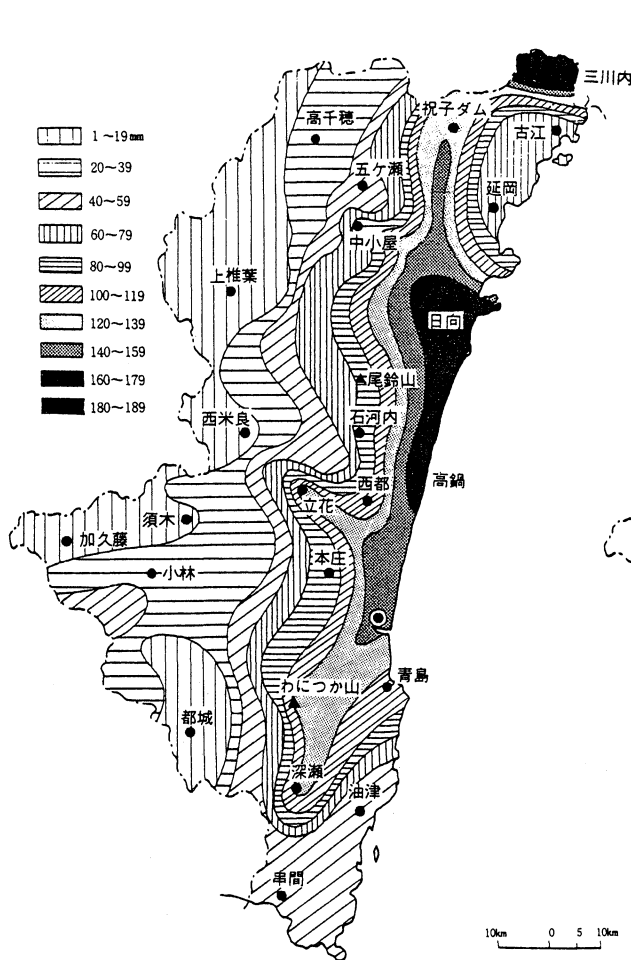


Fig. 4 Rainfall map of Miyazaki prefecture during 4th to 6th May. From Monthly Meteorological Report of Miyazaki Prefecture.

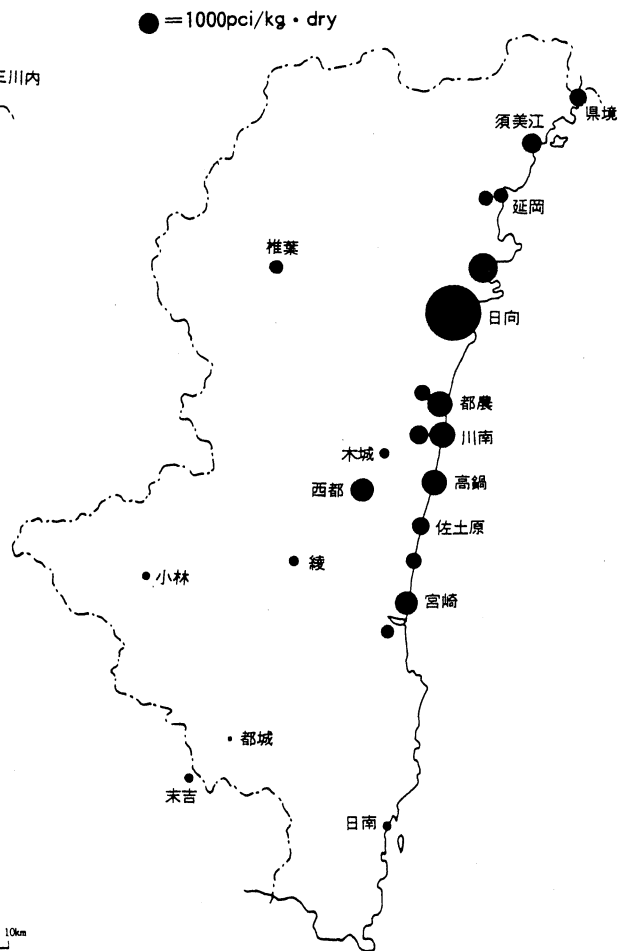


Fig. 5 Fallout of radioactive cesium, Cs-134 + Cs-137, in Miyazaki prefecture. Area of dark circle is proportional to amount of activity.

Actually, contamination map of Chernobyl accident found out very irregular, no one could foresee.

There are only two official observatories for radioactive fallout in Kyushu, Genkai in Saga prefecture and Sendai in Kagoshima prefecture, each place has nuclear plant. Our study made it clear, the number of observatories is quite few for sufficient observation.

Upper limit defined by administration for imported food is 10000 pCi. On the contrary, maximum value of our sample was 8100 pCi. From statistical view point, it is natural to anticipate the existence of over 10000 pCi. Fine official research should have been done for the health of local people.

From meteorological record, we are able to seek for other district of heavy rain just when radioactive current had been passing. This is not limited in Japan. Further study is required.

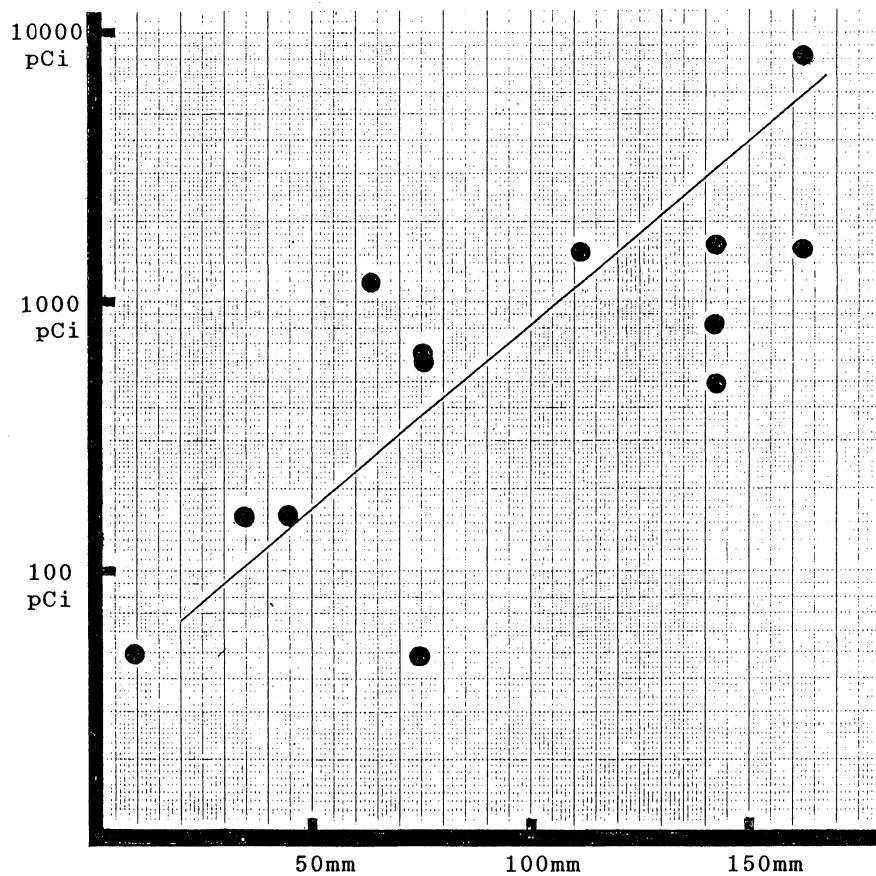


Fig. 6 Correlation between rainfall and radioactive fallout. Horizontal axis (linear gauge) is amount of rainfall, vertical axis (logarithmic gage) is amount of fallout, Cs-134 + Cs-137

### Acknowledgments

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### References

- 1) T. Hashizume, *Fallout in Kyushu from the accident of Chernobyl nuclear plant*, Rep. Fac. Sci., Kagoshima Univ. (Math., Phys. & Chem.), No. 20, p. 63-69, 1987
- 2) *Monthly meteorological Report of Miyazaki prefecture*, Published by Miyazaki Meteorological Observatory.