

§1. Separation of Natural Background by Using Correlation of Time-series Data on Radiation Monitoring

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In this study, the method of discrimination facility origin dose from the observed data was developed. A rise of gamma-ray dose rate by rain is a phenomenon which is caused by radon daughter in rain drops. Variation of dose rate due to rainfall often becomes a interfering factor in outdoor radiation monitoring. However, it has its own characteristic at each place as shown in Fig. 1. A high sensitivity rain gauge is used for rain measurement, and its 1 count is equivalent to 0.0083 mm. Then, good correlations of dose rate between monitoring points were obtained by the analysis on 10 minutes-series data of rainy days at 7 points, which were arranged dispersedly in the site of NIFS, and their mutual distances were ranged from 100 m to 900 m. The expression of regression line for one point was derived from the relation of dose rate with the basis point that was selected among the 7 points. Figure 2 shows the correlation diagram. The dose rate drifting due to rain at one point was able to be reconstructed from this expression and measured value of the basis point. As a result, the estimation error was less than 1 nSv /10 minute. The estimated dose differed from the measured data by less than 10 nSv in one rainy day. Therefore, by means of this method, the variation of dose rate due to rain can be reproduced precisely.

In addition, the simulation was conducted that virtual doses from the facility were added to actual measured value at every points. By applying the method in this study, dose due to rain was deducted. As a result, it was shown that the dose from the facility could be evaluated within 5 % error.

This method uses the advantage of plural points measurement. This method can be applied when there are plural measurement points that distance from radiation source is different. This method provides an objective result without vexatious complication. We think that this method can be applied to radiation monitoring for

accelerator institutions as well as for a nuclear fusion plasma experiment institution.

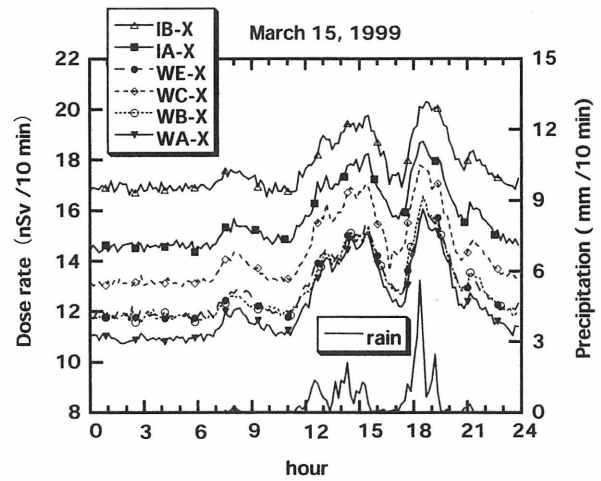


Fig. 1. Time variation of dose rate due to rain.

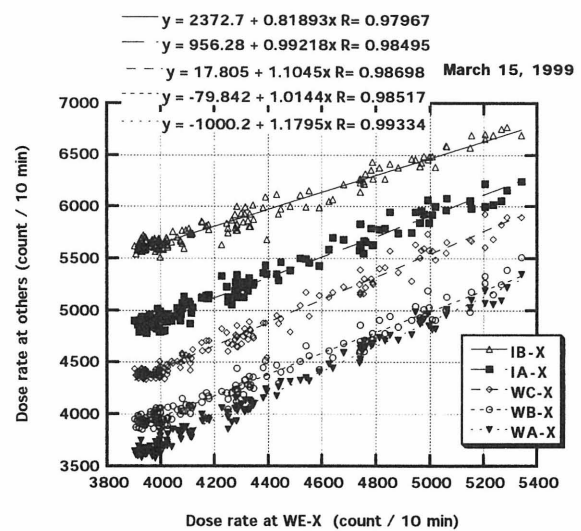


Fig. 2 Relationship of dose rate between the basis point and others.