§1. Time Variation of Background Radiation Observed with RMSAFE

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RMSAFE (Radiation Monitoring System Applicable to Fusion Science) is an area-monitoring network system installed in the Toki Site. This is capable of accumulating the burst-like exposures due to plasma experiments as well as observing the continuous background radiation levels. The system has been brought into operation since 1992. Because no significant radiative experimental activities have been carried out as yet, the main interests in this test-run phase are given on the background database establishment and the reliability check of the system characteristics.

In the BG Mode of the system operation, signal counts from each monitoring sensor are sampled every 30 seconds, and dealt with by a central processor. There are 7 points of observation and for the environmental investigations the data from argon pressurized ionization chambers are main concern.

There are several factors governing the variation of natural background radiations. For the short time period up to a few hours, local climate conditions, such as rainfall, wind direction and atmospheric temperature profiles, are very important. We have found growths in exposure rates at rain falls, and also typical diurnal changes in radiation levels to be most likely dependent on the wind and temperature profiles. These may be related with environmental behaviors of radon.

Radon and its daughters are partly constructed nucleus of rain drop. They are sometimes absorbed rain drop in cloud. When rain drop falls from cloud to the ground, it is collected some radon daughters in the atmosphere. Therefore, rain drops contain radon and its decay products. The specific activity of rainfall depend on rain intensity, rain interval, and the origin of cloud whether it come from continental air mass or not. While rain drops reach to the ground, radon daughters deposit the surface of the ground and monitoring posts. ^{214}Pb and ^{214}Bi, these are one of short lives radon progeny, release gamma rays. X(gamma) ray detector observed them.

The observed exposure rate increases apparently correlating with the rain falls. However, we could not detect when it started rain, since the precipitation monitor used before was able only to detect 5 mm rain fall as minimum detection limit.

In this study, we use a high sensitive precipitation detector to confirm the time starting rain. The detector is sensitive 0.01mm rainfall at the minimum unit. It generates pulse signals which is consistent to the amount of rain drops. Figure 1 shows time variation of exposure rate and precipitation at the point WD. When it starts rain, exposure rate increases gradually. The intensity of its rain is quite weak, but these sensors catch the phenomena. It gives one of the process that gamma radiation due to radon decay products elevate natural background radiation level.

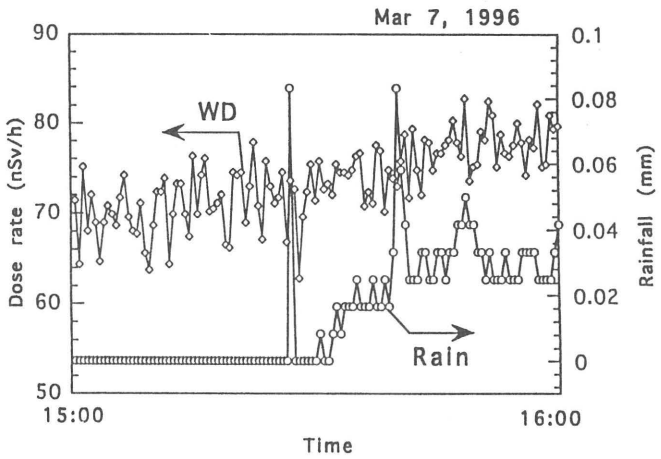

Fig. 1. Time variation of precipitation and exposure rate.