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## Section 2. Sources of Atmospheric and Atmospheric Electricity

Electrical properties in the atmosphere are studied in this section with a special interest in the effects relating to meteorological factors and at the same time to air pollution.

To see the dispersing trend of aerosol particles over to ocean atmosphere from Japan Islands and to understand the self-scavenging effect of aerosol pollution, the observation by using an aircraft is very effective. In March 1977 two major measurements were made on board YS-11 aircraft under the financial support of Ministry of Education, Science and Culture, Special Project Research "Fundamental Research for the Preservation of Marine Environment", and of Nissan Science Foundation. One flight was for obtaining vertical profiles up to 3000 m on land and on ocean. The other was for the horizontal distribution in the altitude of 1000 m covering Tokai sea-coast to Hachijo-jima oceanic area. The items measured were concentrations of aerosol particles larger than 0.15  $\mu\text{m}$  radius, small particles of 0.006 to 0.4  $\mu\text{m}$  radius, condensation nuclei, radon, NO, NO<sub>2</sub> and O<sub>3</sub> together with temperature and dew point.

The observations on the ground and the sea surface were also made. At Sakushima Observatory the measurements are continued on almost all kinds of electrical and meteorological elements. In February 1977, electrical conductivity, condensation nucleus and its mean size and radon concentration were observed simultaneously at 6 points, Tsuruga, Tarui, Kasugai, Nagoya, Sakushima and Toyokawa, distributing along the direction of north-westerly seasonal wind from Japan Sea-coast to Pacific-coast, in cooperation with Tokyo Science University, Chubu Institute of Technology and Department of Nuclear Engineering, Nagoya University. In July and August, similar observations were carried out at 4 points, Kasugai, Kariya, Sakushima and Irako-misaki, to see the atmospheric conditions in summer. In November the elements such as above were measured on board the vessel from Tokyo to Chichi-jima, Ogasawara and return. The results of these observations are being analysed in view of confirming the present state of atmosphere on the

land and sea and of making clear the fundamental relations between electricity and pollutions of particle or gas phase in the atmosphere.

This year we could not carry out the in-situ observation in the stratosphere by using a large plastic balloon, but new devices for measuring aerosols of large and small size are being developed for the further stratospheric experiments.

It is very essential to know performance of photoelectric condensation nucleus counters which are used everywhere on the world to obtain accurate maps of the global distribution of aerosols. Under the aid of Japan Society for the Promotion of Science, Ishikawa and Morita along with a member from Tokyo Science University visited State University of New York at Albany in September 1977. They carried their counters to get the exact mutual calibration with the counters used in SUNYA. On the way they attended the IAGA-IAMAP Assembly held at Seattle and then stopped at University of Wyoming to discuss the further cooperation on the stratospheric electricity experimental workshop.

The discharge of radioactive materials such as  $^{85}\text{Kr}$  into the atmosphere from nuclear facilities is a new problem also in the field of atmospheric electricity. It leads to an increase in global background ionization. Increase of nuclear power plants is inevitable to resolve the energy problem having been urgent especially since the petroleum crisis. We discussed the effect of  $^{85}\text{Kr}$  to electrical state in the atmosphere in cooperation with investigators in the field of nuclear engineering, atmospheric dynamics and atmospheric electricity. Although the concentration of  $^{85}\text{Kr}$  estimated in around the year 2000 is 1 % of the maximum allowance of radioactive substance for human health, it gives an order comparative with the natural ionization due to cosmic ray above the sea surface and therefore possibility of changing electrical environment of atmosphere including the global electrical structure and thunderstorm activity.

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