

## Section 2. Sources of Atmospheric and Atmospheric Electricity

The section has these years been concerned with the study of electrical properties in the atmosphere, especially their relation to air pollution and meteorological conditions. The research works in 1978 are described referring mainly to field observations on the ground surface and in the free atmosphere up to the mesosphere.

The ground observations are continued as routine work at Sakushima Observatory in Mikawa Bay on almost all electrical and meteorological elements. Long term variations in the electric field, conductivity and the other parameters are analyzed. In addition to these items, the measurements of gas pollution such as  $\text{NO}_x$  and  $\text{SO}_2$  were started this year. Interests are taken in the behavior of gas constituents because they have possibility to convert into particles in the natural atmosphere and to affect electrical characteristics.

For a month from February to March, 1978 the observations were also made at Chichi-jima, Ogasawara Islands to investigate the present electrical state of oceanic atmosphere and at the same time to detect probable land effects far extending from Japan Islands over the Pacific Ocean.

The similar observations were made at Hawaii, U.S.A. A. Iwata along with a member of Tokyo Science University visited Hawaii Island for about a month from June to July and measured aerosol and electric parameters at Mauna Loa Observatory, NOAA, which is located at the altitude 3400 m near the summit of the active volcano. This work was a part of Japan-U.S. Cooperative Science Program between State University of New York at Albany and us for the evaluation of background pollutant concentration over the Pacific to standardize aerosol measurements.

Aircraft measurements of pollutants, such as aerosol density and size spectrum, concentrations of  $\text{NO}$ ,  $\text{NO}_2$ ,  $\text{O}_3$  and  $\text{Rn}$ , were carried out on 14th and 19th January, 1978 on board YS-11 aircraft as the continuation of 1977-flight. The objects this time in the season of north-westerly wind are to compare the vertical profiles on land and on sea

at the Pacific coast, and to check the difference of vertical distributions above the Pacific and the Japan Sea, and the horizontal distribution in the height of 1830 m along the wind stream line above the area crossing Honshu from Wakasa Bay through Tsuruga, Sekigahara, Nagoya and Mikawa Bay. These ground and aircraft observations were supported financially by Scientific Research Grant of Ministry of Education, Japan Society for the Promotion of Science and Nissan Science Foundation.

Balloon measurements were carried out in Japan and also in U.S.A. On 29th May, 1978 a plastic balloon of 5000 m<sup>3</sup> capacity (B<sub>5</sub>-85) was launched from Sanriku Balloon Center, University of Tokyo to measure the stratospheric aerosol and ozone. A new system was employed for observing extinction of the solar radiation in the wavelength range 400-1000 nm. Aerosol extinction obtained in the experiment shows a layer structure of aerosol centered at 18 km altitude. The extinction coefficient at 600 nm after subtracting molecular scattering effect is close to the value expected from simultaneous measurement with ozone sonde. The results suggest that the system is effective for satellite monitoring of stratospheric and mesospheric aerosol and ozone.

International stratospheric electricity workshop was held at State University of Wyoming, U.S.A. from July to August, 1978 in aiming at the comparative measurements of conductivity, electric field, air-earth current, ion and aerosol density and others. Eight research groups from five countries participated in the workshop. Y. Morita took along our balloon-use equipments of conductivity, ion density and ionization rate, and measured these items up to about 30 km altitude. The equipments operated satisfactorily and gave good results in comparison with those of the other groups.

Rocket-borne Gerdien probes were developed to measure positive and negative ion densities and conductivity in the mesosphere. The data were obtained in the altitude range of 60-90 km by S-310-6 rocket equipped with this apparatus, which was launched at the sunset on 19th January, 1979 from Kagoshima Space Center, University of Tokyo.

H. Ishikawa together with members of Section 5 stayed at Kiruna Geophysical Institute, Sweden from June to August, 1978 for the second expedition to investigate thunderstorm and atmospheric electricity peculiar to the high latitude. He also attended URSI 19th General Assembly held at Helsinki, Finland in August, 1978 and organized the session on "Global location of atmospheric and lightning instrumentation" taken care by Commission E.

M. Takagi visited University of Paris, France and other several

universities and institutes in England, France and Germany for two months of September and October, 1978. He discussed with many scientists about the recent problems and the further international cooperation in the field of atmospheric electricity.

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