

Ionospheric research during and after IGY

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The ionospheric research had been incorporated into the International Geophysical Year (IGY) for the first time, due to the progress in the radio technique, although it was not included in the second International Polar Year (IPY). By developing the network of vertical ionosphere sounding stations, more than 200 stations were in operation over the globe in 1958. Also the vertical profile of the electron density was studied extensively by the rocket observation.

In concert with the ground-based observations, some innovative scientific results were achieved by the topside sounding by the Canadian Alouette-1, ISIS satellites and the Japanese ISS satellite.

Solar protons precipitating to the polar cap region during the initial stage of magnetic storms cause enhancement of the electron density in the D region. The resultant abnormal absorption of the HF-band radio waves (it is called as PCA; Polar Cap Absorption) was found first by Japanese researchers. Another finding achieved by the Japanese community is the causal relationship between magnetic storms and type VI solar radio bursts.

The National Institute of Information and Communications Technology (NICT) has participated in the Japanese Antarctica observation project since its very first stage, which started with IGY. In this project, NICT has been responsible for the ionospheric observation and made a significant contribution to the ionospheric research, such as, the experimental proof of the equatorial anomaly (Appleton Anomaly) using observations from ships, and the establishment of the relationship between the ionization in the D and E regions and the geomagnetic field and aurora phenomena.

Peoples reconsider the ionosphere with another role, as a medium causing interference and delay for the radio wave propagation, rather than the reflection layer according to the progress of utilization of radio waves from satellites. The recent research efforts have shifted from the observation of the maximum electron density, to the total electron content (TEC) observation, and the global monitoring of the ionospheric disturbances.