Preface

One of the main research items of Japanese programs of "International Magnetospheric Study" (IMS) in Antarctica is the exploration of the southern polar ionosphere and austral auroras by use of sounding rockets. Starting with a single-stage sounding rockets, S-160, which has a diameter of 160 mm and can reach an altitude of about 85 km, the sounding rocket technology itself under the special conditions in Antarctica has been steadily developed with close cooperation by scientific staffs of the Institute of Space and Aeronautical Science, University of Tokyo.

The second step of development of the Antarctic sounding rocket technology is represented by sounding rockets of S-210 type, which are 210 mm in diameter and can reach about 130 km in altitude. Up to the present time, 31 rockets of S-210 type have been successfully launched from Syowa Station, Antarctica, with a number of fruitful scientific results well coordinated with the ground-based observation data. Four papers in this volume deal with such scientific results obtained aboard S-210 type sounding rockets. The studied items are profiles of electron density and temperature, precipitating electrons, VLF emissions and attitudes of launched rockets for reference.

The third step of Antarctic rocket development is the success of launching S-310 type rockets, which are 310 mm in diameter and can reach an altitude of 210–220 km. The first rocket of this type, S-310JA-1, was launched in the local daytime of February 13, 1976, when the magnetospheric condition was comparatively quiet. The main purpose of this experiment was to clarify the standard condition of the day-time polar ionosphere. Four papers in this volume are concerned with some significant results obtained by this experiment. The studied scientific items are profiles of electron density and temperature, precipitating electrons and VLF emissions.

S-310JA-2 rocket was launched on February 10, 1977, when a magnetospheric substorm was in its expansion phase. A paper in this volume deals with the flux of precipitating electrons in this case. Results of other measurements in conjunction within this event will be reported later. Launchings of sounding rockets of S-210 and S-310 types have been continued in 1977 and 1978 at Syowa Station in coordination with polar orbitting satellite observations as well as the ground-based observation network. Scientific results of these continued rocket-borne measurements of the polar ionosphere on quiet and disturbed conditions will be reported in the near future.

This volume of "Proceedings of the Second Symposium on Rocket Experiments

in Antarctica" can be considered the second report of such a series of rocket experiments for studying the southern polar ionosphere and its substorm.

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