

ACTIVITY REPORT

Section 1. Propagation of Atmospherics and VLF, ELF Radio Noise

We have continued measurements of the phase changes for the propagated waves from the NWC station (22.3 kHz) and from the OMEGA station (11.3 and 10.2 kHz); Aldra, Haiku, Reunion and N. Dakota. SPA events observed at Toyokawa were reported every month at the Solar-Terrestrial Environment Research Meeting and also to the World Data Center A at Boulder, CO, U.S.A.

A broad band array of 16-element (4X4) conical log-spiral antenna has been constructed. The array covers 20 - 100 MHz, and the expected gain is 19 dB. The beam of the array can be steered by using time-delay lines both in the E-W and N-S directions to track a radio source for 6 hours.

A global computer simulation of the interaction of the solar wind with the earth's magnetosphere was executed by using a three-dimensional magnetohydrodynamic (MHD) model. As a result, we were able to reproduce quasi-steady state magnetospheric configurations and a Birkeland field aligned current system which depends on the polarity of the Z-component of the interplanetary magnetic field (IMF). Twin convection cells and a dawn to dusk electric potential of 30 - 100 kV appeared on the equator in the magnetosphere and four types of field aligned currents were recognized. They are the region 1 and 2 currents observed by Iijima and Potemra (1976). The region 1 currents obtained from the simulation were in good agreement with an estimate from a theoretical analysis of a localized Alfvén mode.

Thus our theoretical analysis and MHD simulation together give a reasonable estimation of the region 1 and 2 field aligned currents in comparison with observations at quiet times.

From April, 1984 Prof. T. Sato, who belongs to the Hiroshima Univ., arrived at our section's post owing to start computer simulation works on solar-terrestrial problems.

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