

Proceedings of the Research Institute of Atmospheric,
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Group 3 Interactive Study of Solar-Terrestrial Environment

The two year project of an interactive study of the energy flow from the heliosphere into the earth's magnetosphere by using domestic network system and the other project to establish an international network system for electronic mails and data exchanges in space science from the institute have been supported by a Grant for Specified Research from Ministry of Education, Science and Culture. In the second year of the project, extensive tests for program and data exchanges were successively carried out due to TSS (NTSS) and N1 mail systems of the Inter-University Network (N1 network). On the establishment of the international network, a network router, Cisco AGS/2 was introduced in order to join IPnet (TCP/IP of Unix) in U.S.A. through the CTC specified communication line (Toyokawa and Nagoya, 9.6kbps), NACSIS network (Nagoya and Tokyo), University of Tokyo and Hawaii University (via PACCOM Network). A test of the Unix network on TCP/IP protocol has begun in March and another test to join the DECnet (connection to SPAN) is scheduled in July, 1990. The international network from the institute is necessary for electronic mails and data exchanges in the interactive study of the solar-terrestrial environment as well as the GBR Situation Center of STEP project and the NASA CDAW-9 project.

Moreover, a graphics supercomputer, Titan was introduced in order to analyze multi-station auroral video data which was obtained from the "Global Aurora Dynamics Campaign" and huge numerical data from the three-dimensional computer simulation of magnetosphere. It has become possible by the graphics supercomputer to make a video movie for the analyzed data of aurora and magnetosphere. The analyzing system of multi-station auroral image data consists of TV image processor, EXCEL, and graphics supercomputer, Titan. The TV auroral image data are digitalized by the pixels of $512 \times 512 \times 8$ bits with EXCEL. The digitalized data are sent to Titan through Ethernet, and they are stored and analyzed by Titan. Since a video movie of aurora patterns on the map over considerably wide area can be made with this system, it is available to examine detailed development of auroras with high time resolution.

A special issue of Proc. Res. Inst. Atmospheric, Nagoya University (Vol. 36, No. 2, T. Watanabe, A. Iwata, and T. Kikuchi, eds), which contains 21 papers presented in the STE (Solar-Terrestrial Environment) Symposium, was published in November 1989.

Construction of data base of solar-terrestrial observations has been continued. A coordinated data book "STE Data Book, No. 2, Solar-Terrestrial Observations

A coordinated data book "STE Data Book, No. 2, Solar-Terrestrial Observations in CDAW-9 Intervals" was published in December 1989 (Watanabe et al., 1990). A majority of data contained in this data book came from Japanese STE (Solar-Terrestrial Environment) community. An STE symposium on the CDAW-9 events was held in Nagoya on 18-19 January 1990. Auroral images were compared with Pi2 and CNA observations to determine substorm timing. It was suggested that the onset of each substorm does not always coincide with the start of relevant Pi2 activity, the enhancement of CNA, and other magnetospheric processes. A workshop to make detailed data analysis of CDAW-9 events was also held in Toyokawa on 23-24 March 1990. An international CDAW-9.3 Workshop will be held also in Toyokawa, tentatively, on 29-31 August 1990.

A data management system has been established to construct machine-readable data base of geomagnetic observations at Onagawa Magnetic Observatory (Kurahashi et al., 1990). The records on analogue magnetic tapes are digitized at a sampling rate of 1 Hz. Frequency-time spectrograms are constructed to estimate $\Sigma Kc3$ and $\Sigma Ki2$ indices, which show average geomagnetic pulsation activities in the Pc3 and Pi2 frequency ranges.

Two and three-dimensional and time-dependent global magnetohydrodynamic (MHD) simulations of the interaction between the solar wind and the earth's magnetosphere have been carried out to study magnetosheath turbulence, magnetotail dynamics and magnetospheric configuration by using a newly developed high resolution MHD code based on a modified leap-frog scheme as well as the two step Lax-Wendroff method with twice higher resolution in space. The magnetosheath turbulence was studied by a two-dimensional MHD code developed from CGL approximation because the effect of plasma pressure anisotropy to the magnetic field was essential. When the interplanetary magnetic field (IMF) is perpendicular to the normal vector of shock surface (for quasi-perpendicular condition), the perpendicular plasma pressure increases about three times higher than the parallel pressure through the bow shock and the mirror instability occurs to produce the magnetosheath turbulence. Moreover, dynamical phenomena near the magnetopause and boundary layers were studied in connection with the IMF Bz component by the three-dimensional high resolution code.

Nishitani has joined our group since July 1, 1989 from Geophysics Research Laboratory, University of Tokyo.

Oguti visited University of Oslo and Norwegian Technical Museum in Norway on October 22-25, discussed future collaboration in Svalbard and helped them in setting up the Birkeland Exhibition corner in the Museum. He attended to the GEM Symposium at University of Maryland in U.S.A. on October 29-31 and gave an invited talk on the Japanese research projects of ground base observations during the STEP interval.

Ogino presented an invited research paper of title, "Magnetic flux ropes in

3-dimensional MHD simulation" in the AGU Chapman Conference on Physics of Magnetic Flux Ropes, which was held at Hamilton Bermuda, on March 27-31, 1989. He gave an invited paper of title, "Three-dimensional global MHD simulation of the earth's magnetosphere" in the 6th Scientific Assembly on International Association of Geomagnetism and Aeronomy, which was held at Exeter, United Kingdom on 24 July - 4 August, 1989. He also attended the Fall AGU Meeting at San Francisco on December 4-8 and CDAW-9.2 at Palo Alto (Stanford University) on December 9-12, 1989.

March 27, 1990

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