

NOAA AVHRR Data Archives System and User's Service in Computer Center Tohoku University

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ABSTRACT

This paper describes a NOAA database system for a local area of Japan. From receiving the NOAA satellite data to making the final image data system, no human intervention needed. The management system of the database is easy maintenance, and storage media is digital tapes. And also this system is connected to Super computer (NEC SX-4/128H4) system. For the special case study, it is possible to temporal analysis of the whole ten years.

INTRODUCTION

Reception and analysis of the National Oceanic and Atmospheric Administration (NOAA) satellite data made by Earth Observation Satellite Center (EOSC) in faculty of science of Tohoku University from 1988. And the advanced NOAA station system has been made by Computer Center Tohoku University (CCTU) since 1996, which system is connected with high speed ATM network and Super computer.

The Advanced Very High Resolution Radiometer (AVHRR) [1] data were received from the daylight NOAA satellite, while crossing Japan during noon. These data have been stored in Japan Image Database (JAIDAS) at CCTU every day. The image area is about 1100 km x 1100 km with East Japan area and West Japan one. The database is for free access to CCTU users and also reduced version of the same area by internetwork.

HARDWARE SYSTEM

The CCTU serves for researchers and graduate students of the universities distributed in Japan. Figure 1 shows the outline of NOAA station and mainly NOAA AVHRR data processing system. The Super computer is NEC SX-4/128H4, which has total 256 Gflops, 32 Gbyte main memory and connect with Power Onyx and Onyx2 by HIPPI (800 Mbps) network. And also mainly computers are connected by the GIGA switch including the data server computer system which has total 1 TB storage disk.

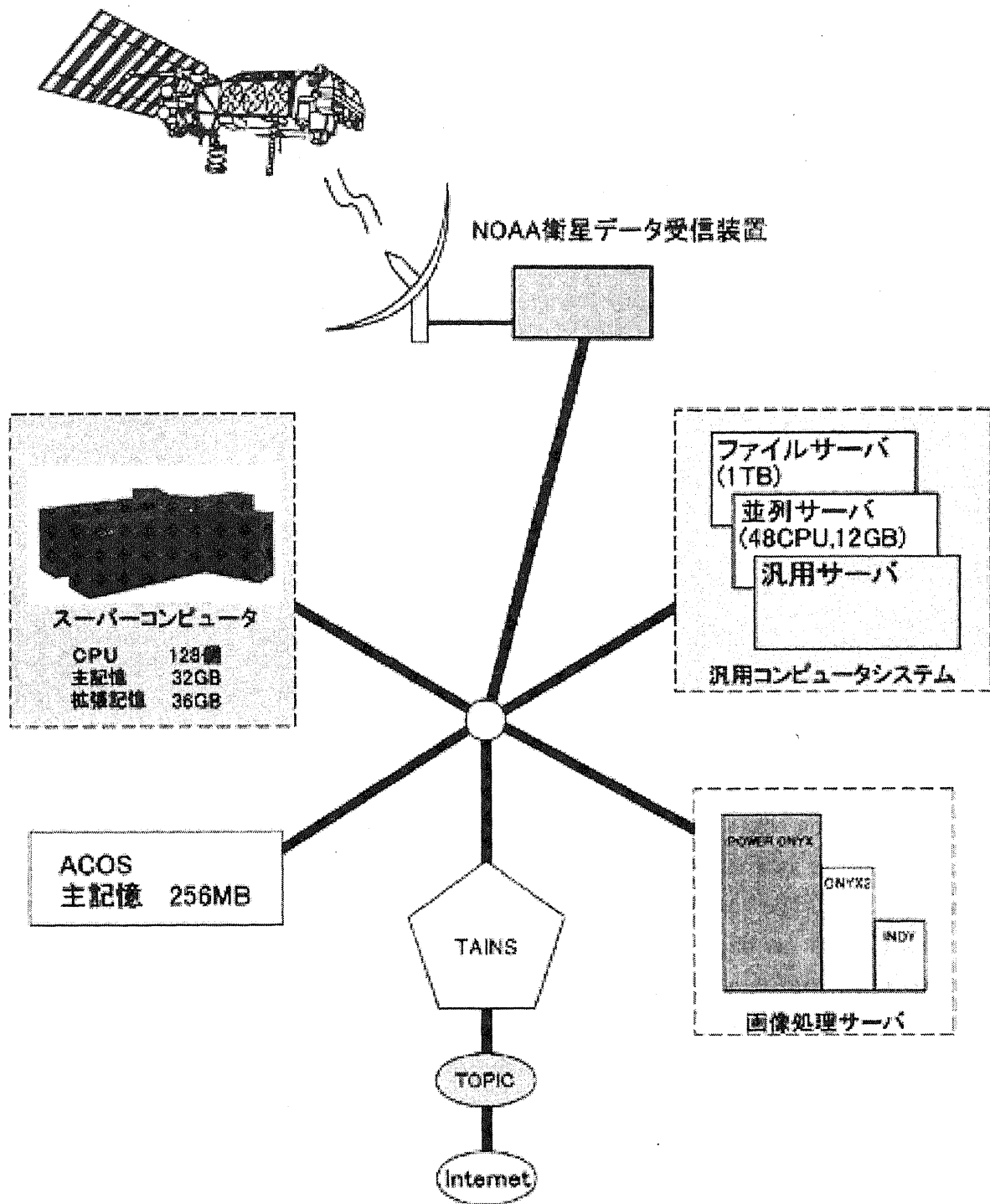


Fig.1 Outline of the Super computer system.

The coverage of NOAA station received in CCTU is shown Fig.2. This area is Far East

Region, especially, Kamchatka Yakutsk and lake Bikal etc Russia territory are interested.

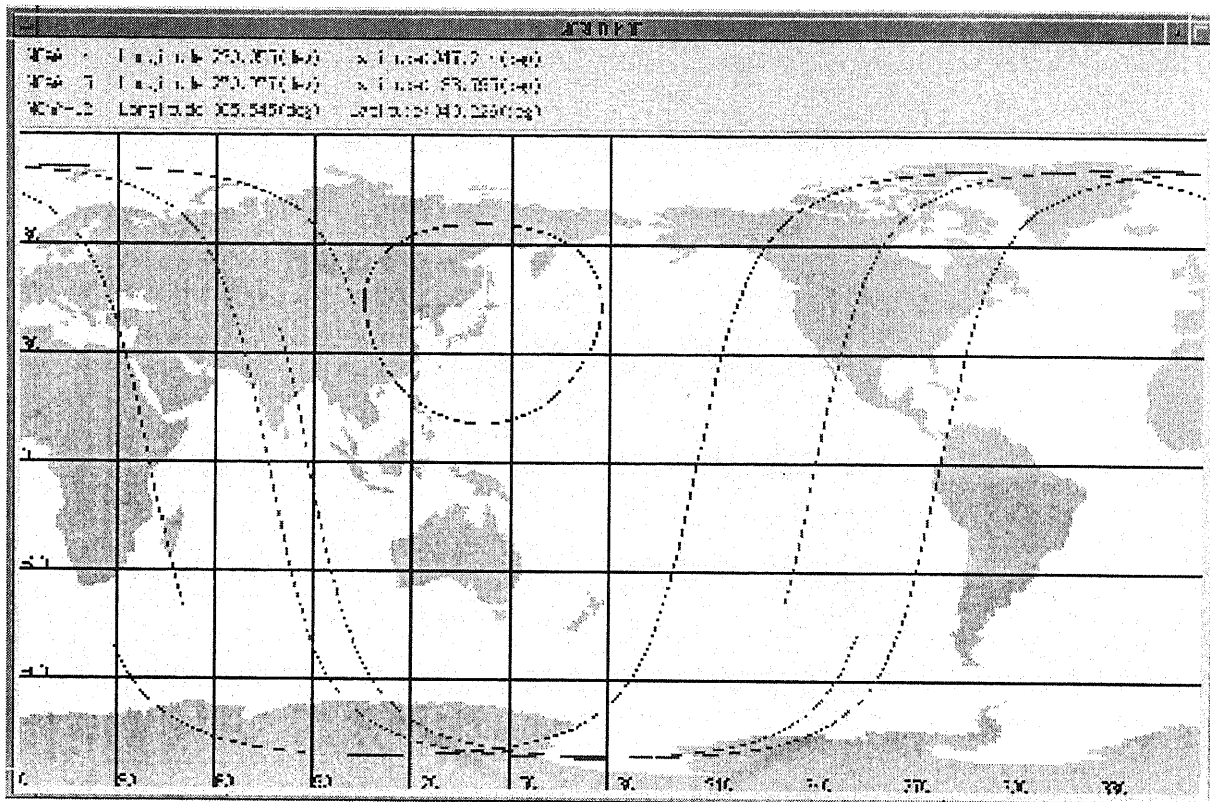


Fig.2 Receiving schedule of the NOAA satellites.

The receiving schedule has been received from NOAA by internet, and received raw data are made as quick look image using channel 2 and channel 4. Figure 3 shows the example of quick look image. We have received totally from 14 to 18 scenes per day. So, total raw data size is over 1 GB per day. All the received data are stored by digital tape system which is automatic change the cassette. One cassette has 42 GB size and over 10 MB/sec read/write functions. The total size of this system is about 1.5 TB.

The CCTU serves JAIDAS database shown Fig.4. This database is automatically made by this system. For east Japan, this image is called TIDAS[2] formerly, which is constructed by Mercator projection with center at latitude 40.0 north and longitude 141.0 east. Each pixel of the image corresponds to a 1.1 square kilometer on the earth surface. The image size is 1024 pixel x 1024 line.

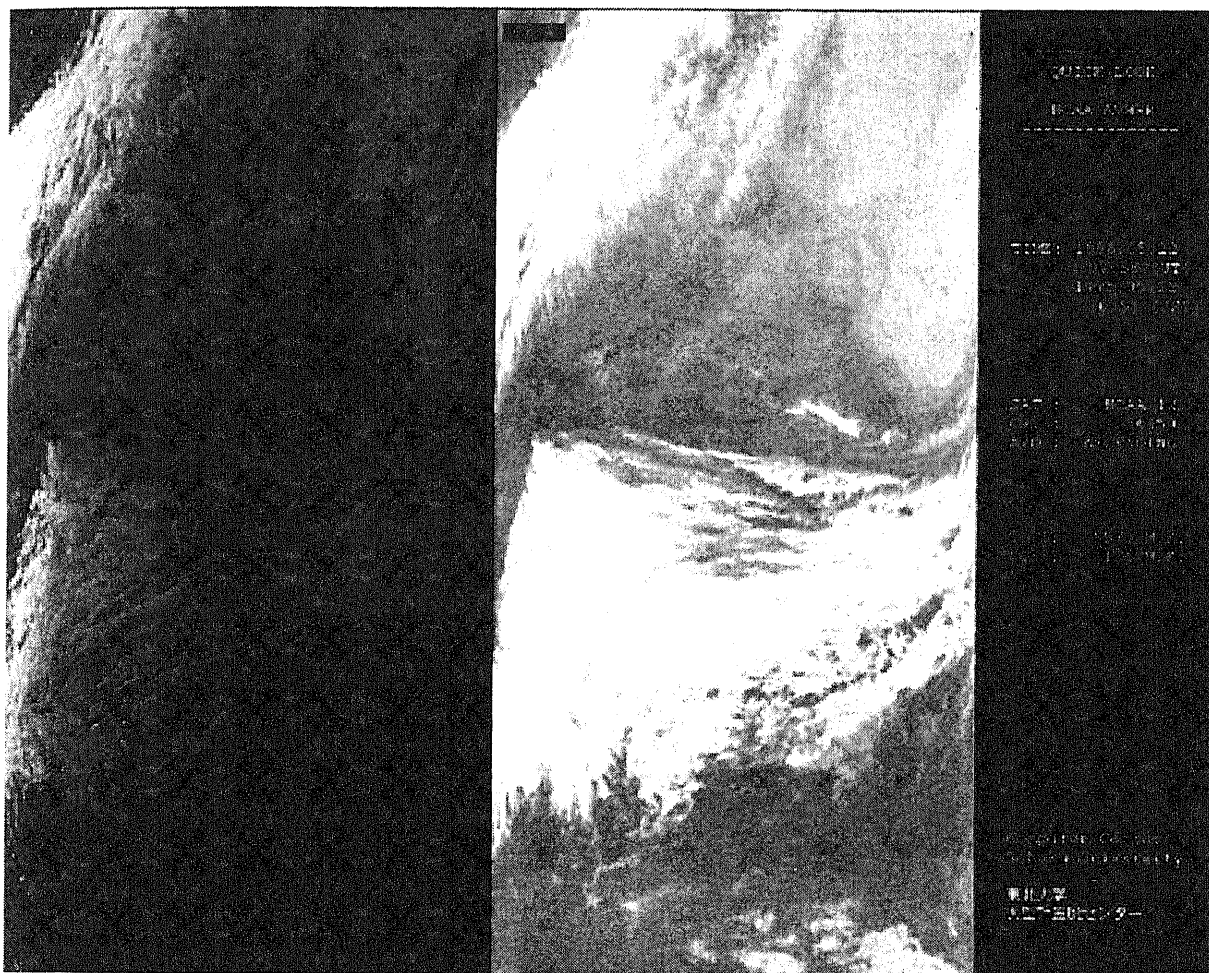


Fig.3 An example of Quick Look image.

So the subject area is about 1100 square kilometer around the center of Sendai city. For west Japan, the image structure is same with center at (31.1 N, 133.3 E). The search and browse the image are operated by internet browse such a Netscape.

JAIAS was used for total over 80,000 images by internet in 1997.

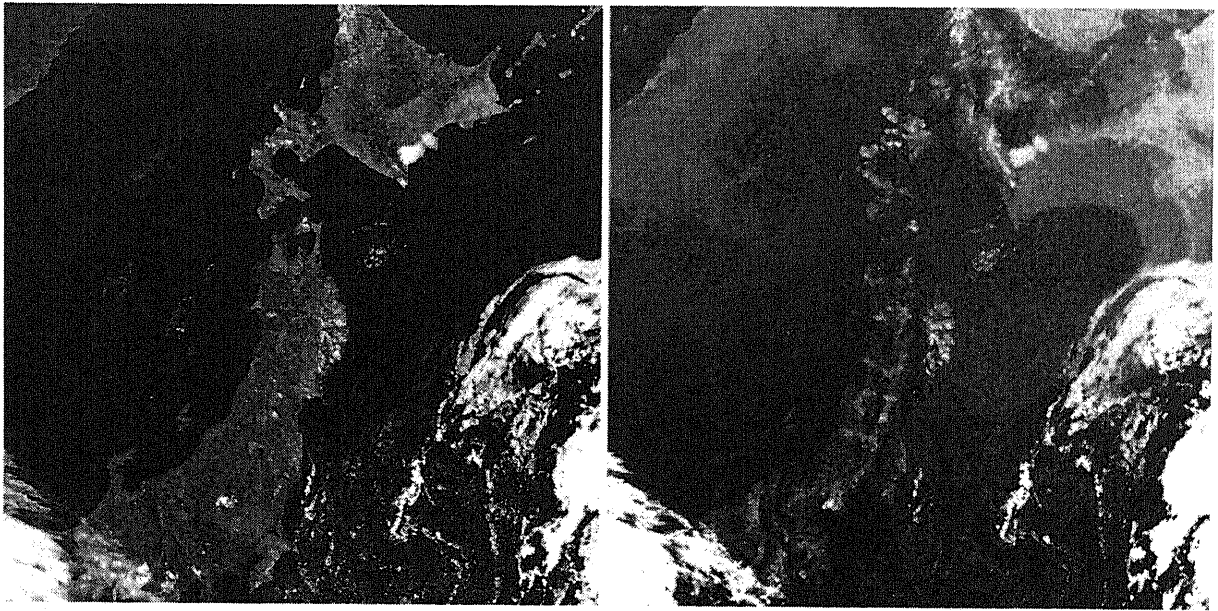


Fig.4 One scene of JAIDAS image for East Japan.

EXAMPLE STUDY USING SUPER COMPUTER OF AVHRR PROCESSING

A-HIGHERS was studied by H. Kawamura[3]. In this study, by using the archived AVHRR data from 1988 to 1997, they produced MCSST data set for the oceans around Japan. The processing area is 0.01 degree. Each AVHRR scene is processed and mapped on the processing area with the equal grided pixels of SST value. Each image consists of 4001 x 4001 pixels with the cloud and ancillary information. The volume of processed image is about 60 MB. Several test showed that the processing time in SX-3/44R, which is previous Super computer (25.6 Gflops and 4 GB memory), is about 15 minutes. Now SX-4 takes about 1/5 time of the same size data processing.

Forest fire problem for the Siberia is studied by J. Kudoh[4]. In this study, 99 scenes NOAA AVHRR images used of the Khabarovsk-Sakhalin region from April to October in 1998. Figure 5 shows the results of total burned area with red points and calculated about 2400 square kilometer. This study needed the very large size of memory of the Super computer.

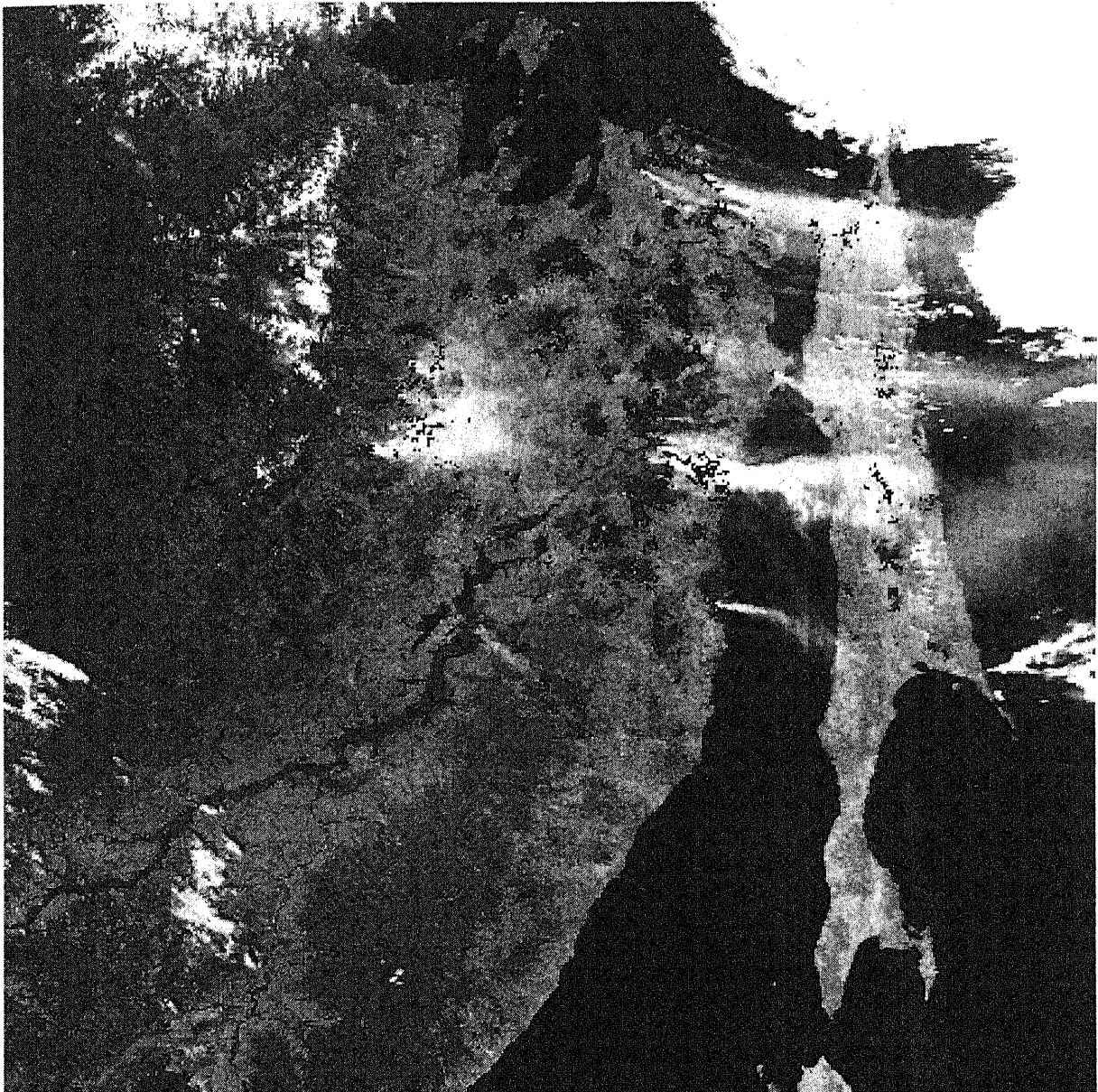


Fig.5 Forest fire study for Far East region of Russia (Khabarovsk-Sakhalin) in 1998.

CONCLUSIONS

The Super computing of NOAA AVHRR images is worth as follows;

(1) Temporal analysis for a long time periods, which need a high speed calculation and large size of data storage.

(2) Multidimensional analysis for a temporal image processing, which needs a very

large size of main memory.

Computer technology makes progress rapidly, so the CPU power is higher and memory price is lower. And also progress of large disk size and lower price are simultaneously. In near future, these super computing process will be done by personally.

REFERENCES

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- [4] J. Kudoh, Forest Fire Analysis with NOAA AVHRR images of the Far East Region of Russia in 1998, (submitted).