THE DESIGN OF WEATHER SATELLITE GROUND STATION

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ABSTRACT

A series of weather satellite ground station STAR-1,2,3
are designed to meet different level of users and various
applications. the design considerations are discussed.

1,INTRODUCTION

In recent years China finds the TIROS-N data more and
more valuable in applications not only in meteolorogy,
but also in many other fields. May 1987, the forest fire
in Da-Xing-An-Ling destroyed 1,300,000 hectares of
original forest. In this historical disaster the chinese
authority realized the weather satellite data as one of
important source of fire discovering and monitoring. In
August 1987, we have some urgent request for TIROS-N
data from Chinese Ministry of Oil and Gas, there strongly
worried about possible flood in Da-Qing oil field, which
yields almost one half of the crude oil product in China.
No other means was possible within such a short time.
In China 17 privinces and cities were organized to
study agriculture applications of TIROS-N data. Many
Research Institutes and universities are interested in
obtaining large quantities of 1B format CCT tapes for SST
observation in oceanographic and fishery applications.
Japanese GMS S.VISSR data will provide high frequency
digital data both in visible and infrared channels.
Chinese new polar orbit weather satellite FY-1 will
provide new channels for AVHRR data for water color
observation. Our university have had a design of ground
station based on PDP-11 called STAR-1, providing AVHRR
data on 1B format CCT tapes, floppy disketts or paper
prints for many users at no cost since 1987. But for
provinces far from Beijing peoples are still difficult
to have those data on time, due to large territory and
lack of high speed communication media. A microVAX based
STAR-2 is designed to meet those high end user's
requirements and a PC based low cost STAR-3 makes such
ground stations available to a large quantity of small
users with a cost of about US$ 50,000 including the
traking antenna and receiver.

2, STAR-1 SYSTEM

The STAR-1 system is based on a PDP-11/73 hostcomputer
with a 344MB disk and 512 x 512 x 12 color display. The
function menu is shown in Fig.1. Fig.2 shows the picture
of AVHRR band 1 and band 3 for Da-xing-an-ling forest fire
received at May 18th, 1987.   The STAR-1 system will be
installed at Da-xing-an-ling before September this year
in order to make the locol goverment able to monitor any
disaster by themselves. A special software pakage dedicated
for forest fire monitoring is under development in
coorperation with Harbin Research Institute of Forest
Protection.


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FUNCTION MENU:
        tBUS        ORBit       RECeive     PLAyback
        1BTape      1BDisk      COPy(1B T--D)
        TEMperature_&_albedo_table
        QUIck_display_1Btape TAPe_read  SECtor   GRId
        INItial_display       DISplay_image       LUT_write
        ZOOm        SCRoll      HIStogram  CURsor  TRUe_color
        CAMera      LISt        DELete     MEDian_filter
        VEGetation BOX_print               SAVe_image
        MERcator    ROAm_mercator_image  RWMercator_tape
        BASmap      SST         LOCator_of_sector
        SUB_image_output      TRAns_mercator
        PSEudo_colour
        (CTRL/Z  to exit)     (@TIROS to re_enter)
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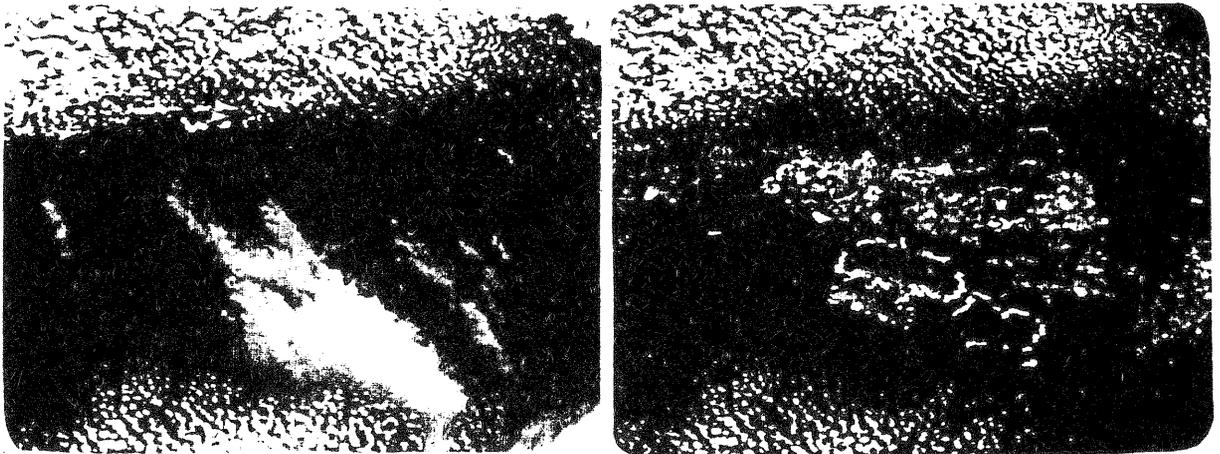
Fig.1 Function Menu of STAR-1

Fig.2   Forest Fire in Da-Xing-An-Ling (received in
        Tsinghua University at May 18, 1987.)
        Band 1 (left) and Band 3 (right)

2, STAR-2 SYSTEM

The STAR-2 system is based on a microVAX-II host with 1 GB disk, which makes possible to store large amount of satellite data, including compressed SST data and non-compressed but geo-corrected data. An image database system with IQBE (Image Query By Example) provides capability of arithmetic and logic calculation of SST and vegetation for any predefined area and time interval. A quick hardware based display processor TJ-82, designed by our own is used for many quick algorithm in weather satellite data processing. A special designed quick 50-100-200 micron picture drum writer is used for image output. Enhanced software package including many argorithm for speciallized applications will be available.

3, STAR-3 SYSTEM

With the quickly growing capability of Personal Computer, A low cost weather satellite ground station based on PC-386 is implemented. With a fast 5" disk of 182 to 574 MB capacity, 512 x 512 resolution display, good quality receiver and a user friendly powerful software package, the STAR-3 system is by no means inferior than those products in early 80's. Many chinese regional organizations prefer to have a small ground station by their own. We believe that the significant decrease in cost and wide application fields will make more remote sensing users happy to receive and process weather satellite data by their own for their own specific applications or specific region. Hope in this way the remote sensing application will become more popular especially in those countries with large territory.