IBM PC PACKAGE FOR TOVS PROCESSING AND DISPLAY

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ABSTRACT

An IBM PC package for TOVS data ingestion, preprocessing retrieval and display is available now. This package is based on previous work done by CIMSS and SSEC scientists. Our major effort was concentrated on TIP data ingestion and retrieval display software.

1. INTRODUCTION

As noted in the Report on ITSC-II in Igls, Austria in 1985, there is a need of low cost workstation to process the direct readout TOVS data. The IBM PC computer is well suited to do this job. Programs and subroutines of the ITPP have been down-loaded from the SSEC IBM 4381 to an IBM PC/XT and TOVS retrievals have been made on it. The simultaneous physical retrieval algorithm was sped up on the IBM PC/AT and several display programs were developed.

2. SOFTWARE AND HARDWARE DEVELOPMENT

The low cost workstation is of interest to many international communities. For example, China needs satellite soundings for input into mesoscale numerical models for very short range forecasting. An effort was started March 1986 at the System Development Laboratory, Institute of Atmospheric Physics (IAP), Chinese Academy of Sciences, Beijing, China, to build hardware for direct TIP data ingestion between the satellite receiving system and IBM PC/AT. In the meantime, PC TOVS software from the ITPP including main programs and subroutines were modified to fit the PC environment. The major changes were made on the ingestion program "PRETIP' and related subroutines such as "GETMNF', 'UMMFC', 'SCTIM', and 'HISCNT'. The most important modification substitute 'MVBYT2' for 'MVBYTE' in the PC system, because INTEGER*2 is used quite often in the PC programs. Some corrections were made on 'TOVDRI' to eliminate an error in subroutine 'INGHIR'. From 'PRELOC' down to 'TOVRT2' there were no changes. Figure 1 is the flow chart of TOVS data processing. It takes about 40 minutes to finish ingestion and preprocessing of one orbit and each retrieval requires about 50 seconds.

3. A SAMPLE CASE

Due to the high bit rate, errors still occur in the direct raw TIP data received from the IAP HRPT station. The case presented here is transferred from the data recorded by HP1000 computer's tape driver located at Satellite Meteorological Center in Beijing. It is a NOAA-9 orbit over the area covering northeastern China and Korea on 5 July 1986 from 18:25 GMT to 18:33 GMT. The raw TIP data was loaded on to the IBM 4331 and then transferred to the IBM PC/AT through the emulator at

IAP. For unknown reasons, there are no MSU data on the tape, so all steps regarding MSU data processing are skipped.

After preprocessing, the menu program 'TOVSDEMO' can be followed to calculate the retrievals and to display the results as Fig. 2.

Figures 3 and 4 are examples of the satellite soundings. For comparison, the radiosonde data over same area are also presented in Figures 5 and 6. The time difference between the two data sets is about 18 hours. It should be mentioned here that the TOVS retrievals have not been edited and the radiosonde data are not complete (no data is shown over the USSR and Korea). So it is hard to judge how good the retrievals are. The purpose of our work is to contribute to a workable TOVS PC software package, that can be improved and optimized by international colleagues later.

The program to display TOVS imagery works as follows: 'LCTOVS' creates the 'TOVSMAP.BIN' file from the 'TOVSND.BIN' file, and then 'LLTOVS' displays six TOVS images.

4. CONCLUSION

The low cost workstation is important and valuable for several reasons. First, the hardware equipment (IBM PC/XT or PC/AT) is affordable for most countries and can be integrated with a HRPT or DBS station. Second, the software is easy to learn and operate. Third, thru the PC more meteorologists will be able to use quantative satellite data and gain experience in applications. The remaining problem to be solved is how to speed up the retrievals without sacrificing accuracy for the real-time users.

Hardware and software development for polar-orbiting satellite data processing and dislay will be continued in China, because there are more than 20 weather stations equipped with an HRPT receiving system and satellite soundings would be valuable over Tibet plateau and southeast China Sea.

The TOVS IBM PC package presented here is based on software developments at the Cooperative Institute of Meteorological Satellite Studies, University of Wisconsin-Madison. We very much appreciate the contributions from H. Woolf, R. Dedecker and H. B. Howell.

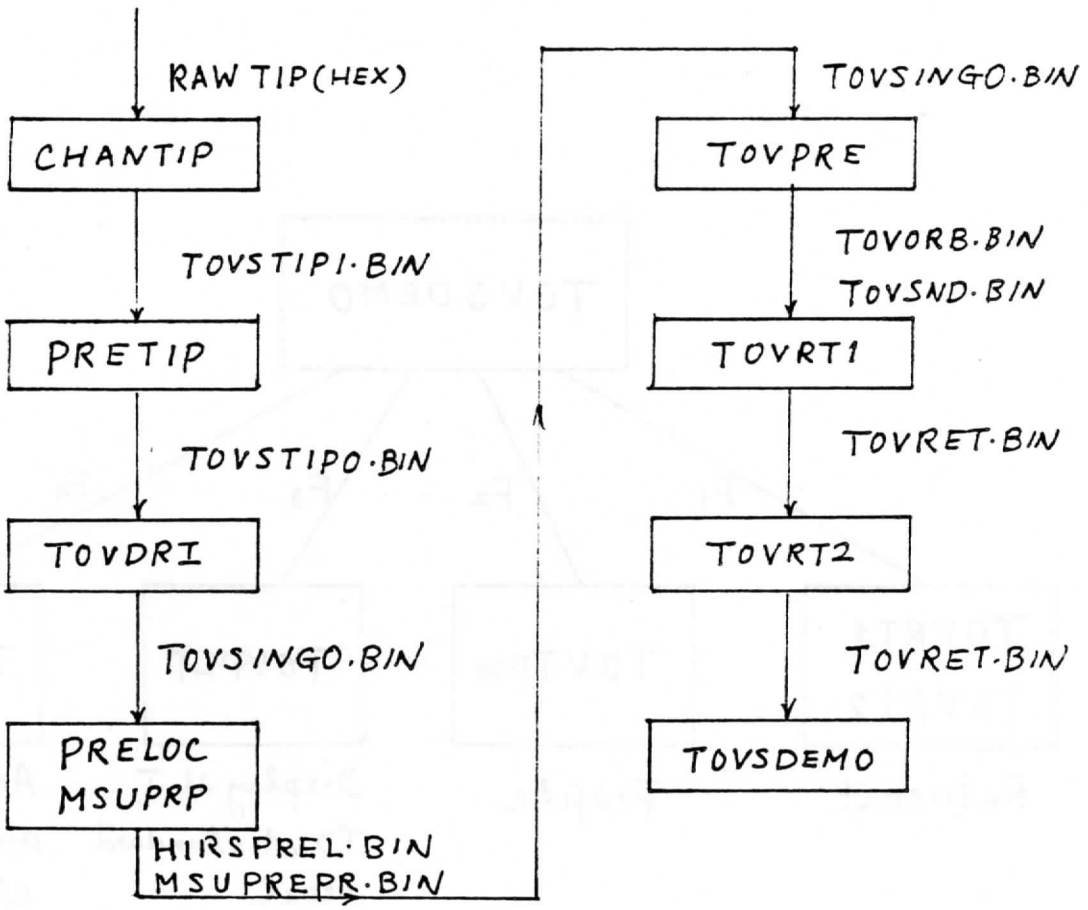

Fig. 1: Procedures of TOVS data processing.

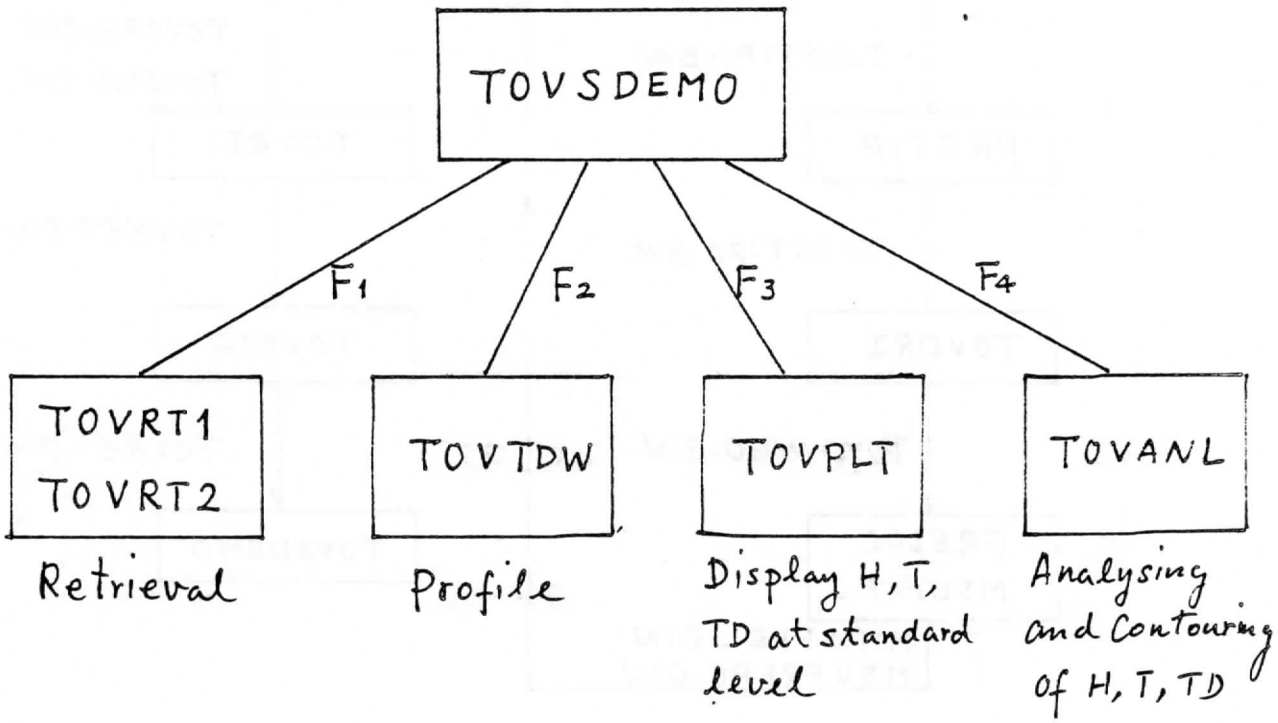

Fig. 2: Display package.

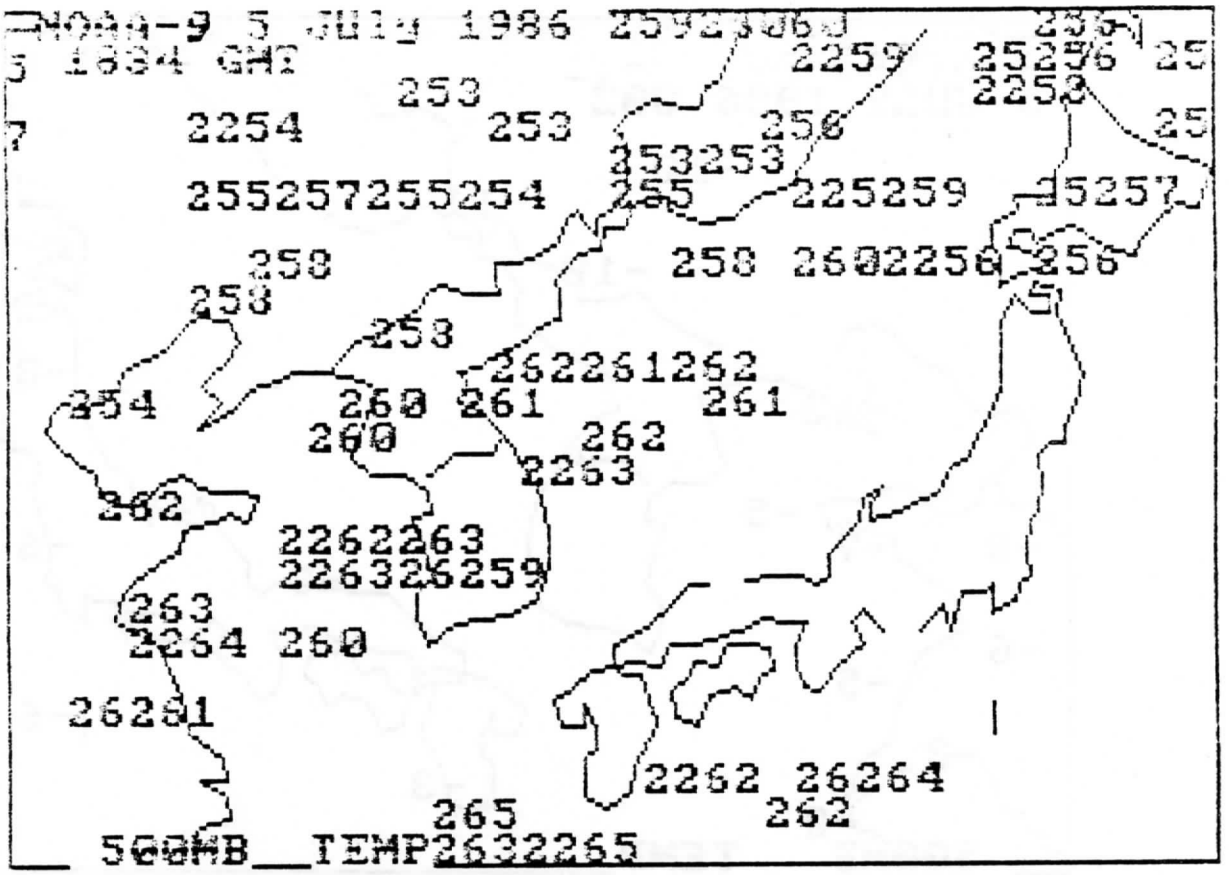

Figure 3

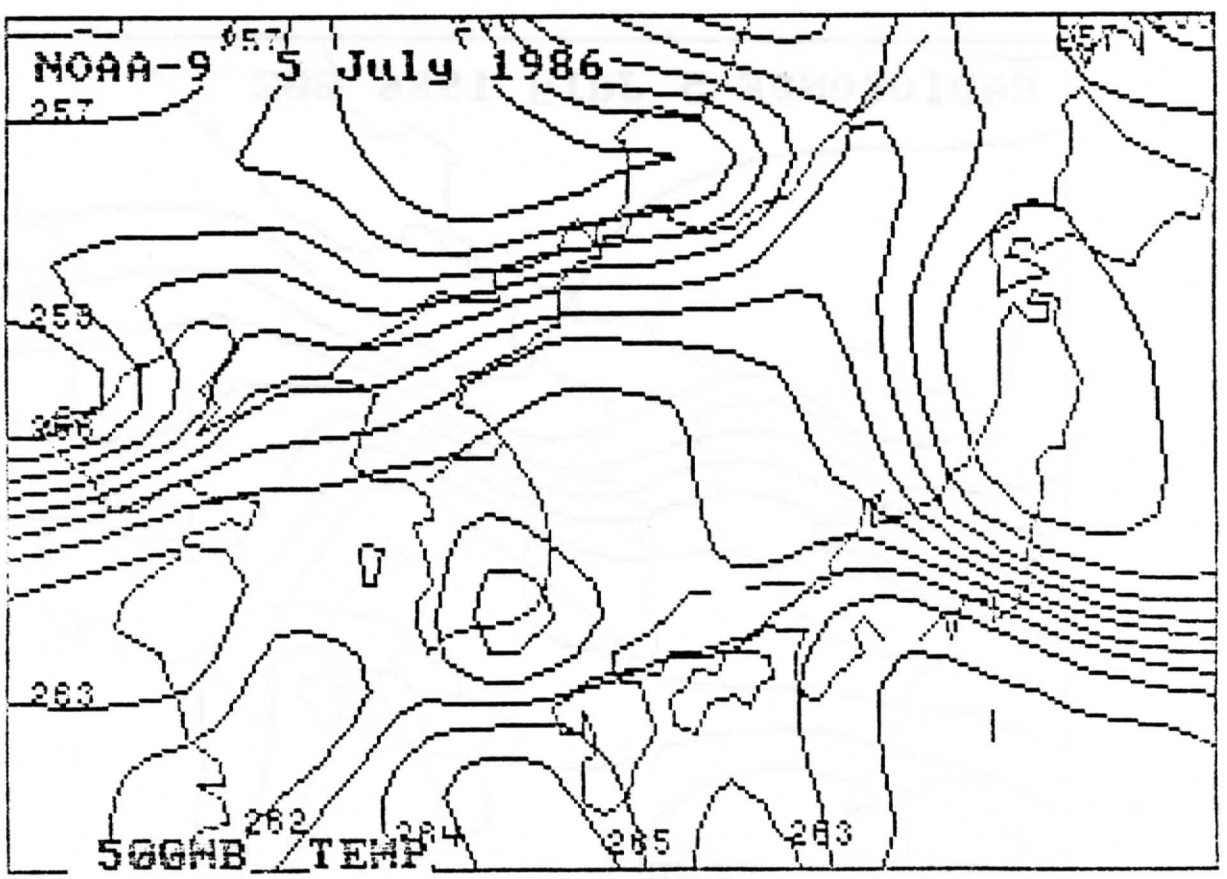

Figure 4

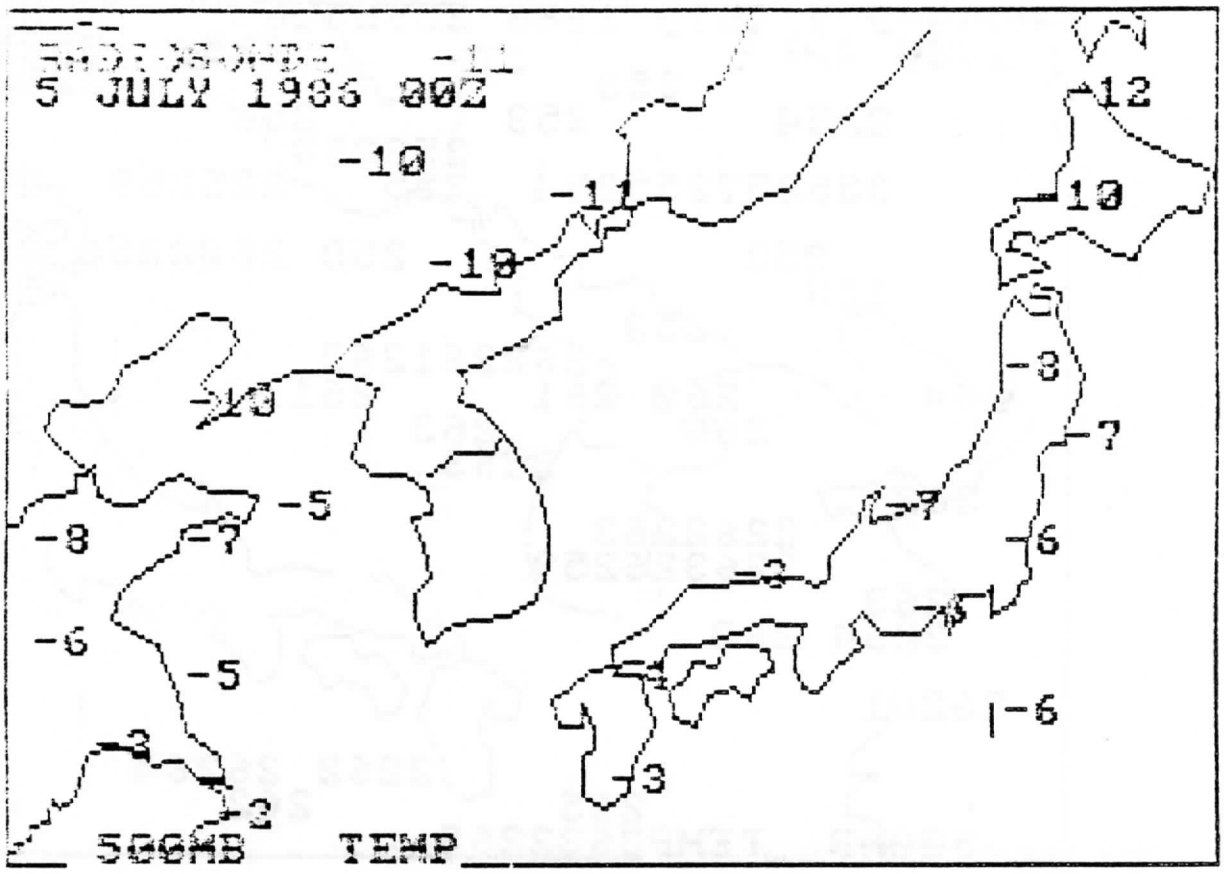

Figure 5

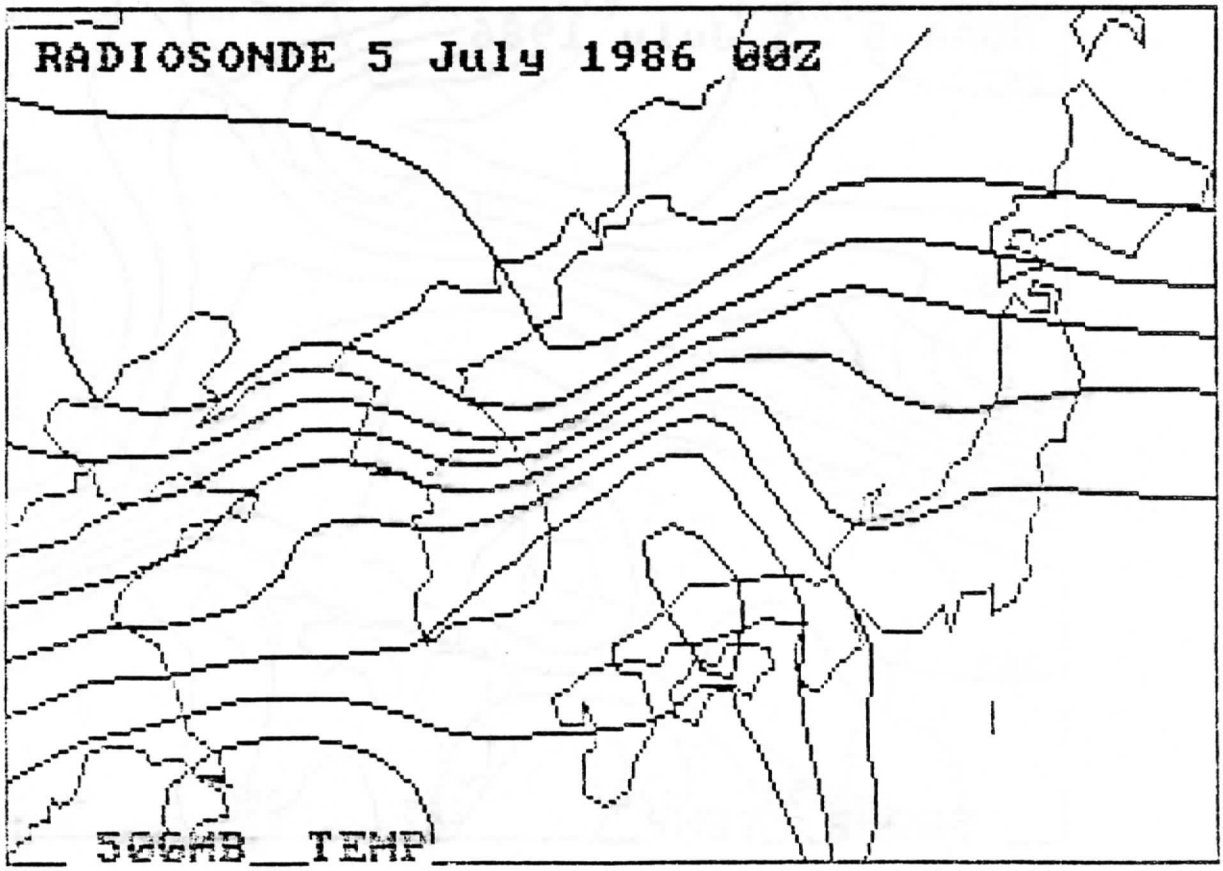

Figure 6

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