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MONTHLY REPORT

for

JANUARY 1978

VISSR Atmospheric Sounder (VAS)  
Development and Performance Evaluation

Contract No.: NAS5-21965

Prepared by

Space Science and Engineering Center  
University of Wisconsin  
Madison, WI

for

National Aeronautics and Space Administration  
Goddard Space Flight Center  
Greenbelt, MD

## I. General

On January 9, 1978, the VAS Working Group Meeting was held in Madison, Wisconsin. The recent developments in the science programs of UW, NESS, and GSFC were discussed. In addition, NOAA's proposed VAS Evaluation Program and Operations scenerios in the VAS era were presented. On the following day the Design Review of SSEC's VAS Ground Data Processing System was held. Hardware configurations were presented for data reception, archive, data base management, applications processing, and man interaction via user terminals.

On January 12, 1978, D. Small of NOAA and P. Menzel of SSEC went to Suitland, Maryland, to confer with D. Winners, head of the SFSS network. He and his associates were briefed on the VAS instrument, the VAS program at Wisconsin, and the NOAA VAS Evaluation Program. Participation in the evaluation by SFSS personnel was encouraged.

On January 24, 1978, D. Small and W. Smith of NOAA and P. Menzel of SSEC went to Santa Barbara, California, to discuss with F. Malinowski the status of the VAS Instrument and the information required by UW/NESS for effective system performance analyses after the next thermal vacuum test. The need for some raw data from the Calibration and Acceptance Test was emphasized.

Documentation submitted to NASA during the month consisted of UW/SSEC VAS System Design Review.

## II. Data Processing System Development

The preamplifier and downconverter of the RF feed have been installed at the antenna focus. Real time satellite reception has been achieved and the resulting VISSR images are very good.

Work on the TIROS-N receiving unit has focussed on procuring an antenna system and interfacing the microprocessor to it. Software for the microprocessor is being written to handle Input/Output by way of direct memory access, to establish interrupt priorities, and to achieve antenna control through the servos. In addition, code is being written that will convert the TIP digital counts to radiance values. Results of the prototype antenna testing have indicated that an antenna constructed of four booms with 16 element crossed yagis per boom can achieve the required signal to noise gain to assure successful TIROS-N TIP reception. In addition, it has been found that two antennas, an east antenna and a west antenna, will be necessary to provide complete coverage (the penthouse restricts visibility to 180° of 360° azimuth). These antennas have been ordered.

SSEC has initiated the paperwork to order another Harris /6 midicomputer which will be the VAS Applications Processor. As indicated in the System Design Review, we have sized the major applications processing tasks of (a) analysis of sounding data from VAS and polar orbiters, (b) analysis of fast time sequence data from VAS and VISSR, and (c) four dimensional data assimilation and we feel that the Harris /6 with an associated 80 Mbyte disk can perform those tasks in real time. The advantages of this machine are that implementation will be simple (only three interfaces are needed and all are already designed), that the processor will be powerful (the possible floating point throughput will be about ten times that of McIDAS), that the system will have redundancy (the applications processor can serve as backup to the data base manager since both are the same midicomputer), and that the system is expandable (with separable tasks, another applications processor expands the system capability without any complications).

### III. VAS Instrument Support

In our meetings with SBRC we discovered that no provisions have been made to record any of the raw data from the upcoming Calibration and Acceptance Test. Successful inflight instrument performance is going to rely heavily upon a thorough prelaunch evaluation of available test data. Raw data is needed to allow analyses of noise reduction techniques developed for VAS and testing of UW ground processing system.

Together with F. Malinowski we determined that raw data could be recorded by a special test program at each of the five scanner temperature plateaus for the last external calibrator blackbody temperature. This special program would record every second (or third) line of a sounding sequence that has been expanded by a factor of two (or three). Recording this data would represent approximately an additional 30 min. of vacuum test time at each plateau, would require the writing of some additional software, and would not require any additional hardware. UW urges that raw data be recorded in this fashion at the next thermal vacuum test.

### IV. Development of VAS Data Processing Techniques

The SSEC/NESS work on McIDAS this past month has emphasized documentation of existing programs to educate the less familiar user about those programs and software updates to facilitate his use of them. The beginnings of a menu type user documentation have been incorporated.

The cloud height determinations based on the CO<sub>2</sub> absorption method were improved with the incorporation of the explicit integration of the radiative transfer equations (this was made possible by last months progress toward evaluating the atmospheric transmission function on McIDAS with considerable

speed and accuracy). A statistical analysis of the various available cloud height determinations is planned.

Work on improving skin temperature determinations with VISSR data is beginning, and techniques for establishing low level moisture content using HIRS 3.7, 11.2, and 8.4  $\mu\text{m}$  channel information are under discussion.



**SPACE SCIENCE AND ENGINEERING CENTER**

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10 February 1978

Mr. J. B. Connor  
Contracting Officer, Code 289  
NASA--Goddard Space Flight Center  
Greenbelt, MD 20771

Dear Mr. Connor:

In accordance with Article III of Contract NAS5-21965, I am submitting the required Progress Report for the month of January 1978.

If you have any questions or desire further information, please contact me at (608) 262-0118.

Sincerely,

*Paul Menzel*

Paul Menzel  
Program Manager

WPM/rmk

Enclosure

cc: H. Montgomery, Code 942 (10 copies)