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MONTHLY REPORT

for

SEPTEMBER 1977

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

Work this month emphasized writing software for the microprocessor VAS antenna controller, acquisition and programming of the TIROS-N receiving unit, investigating alternative vendors for the VAS processing system, and development of man interactive processing techniques with Nimbus-6 data on McIDAS.

A recommendation for a revised specification of the temperature algorithm coefficient determination was submitted to NASA during this month.

II. Data Processing System Development

With the insertion of the hour drive into the antenna system, the mechanical installation has been completed. Satellite signal reception is still delayed until the RF feed, that is on order, is delivered and installed. Position sensors for the two axes, hour and declination, have been inserted.

Work on the microprocessor antenna controller has begun. Using the antenna position and signal strength as inputs, the controller will automatically seek out the maximum signal. Software is nearly complete and soon the microprocessor will be tested in situ.

The frame sync documentation is being written. In addition, a pn sequence error detection circuitry has been added. The video cassette tape archive playback of IR and visible VISSR images still exhibits some flakes. Corrective measures are under investigation.

Some of the necessary hardware for TIROS-N signal reception and preprocessing has been ordered; a microprocessor with 16K memory, a dual density tape drive with controller, the proms for monitoring, editing, and assembling, a DEC writer, and an A/D convertor. The data handling software is being written

and tested on inhouse equipment. The antennas are still being tested and tuned with the VTPR signal from the ITOS satellite.

Work is continuing on the VAS System Design. The operating systems for various possible vendors of the VAS processing system midcomputers were investigated. The advantages and disadvantages of interfacing to McIDAS were also considered.

III. Development of VAS Data Processing Techniques

The capability for obtaining soundings from polar orbiter data has been incorporated into the McIDAS facility. Efforts are now focussed on coordinating the Nimbus 6 HIRS and SCAMS temperature analyses with conventional temperature data, man interactively filtering out bad data, and performing a regression to achieve better temperature retrievals.

IV. VAS Instrument Support

After careful scrutiny of the SBRC Calibration and Acceptance Test Specification for VAS D, we have suggested that the section on Temperature Algorithm Coefficient Determination be amended. It should include scanner temperature gradient conditions where the secondary mirror shield and baffle forward heaters are used for better determination of those coefficients and for better simulation of expected space conditions. In addition, it should indicate that the uncertainty of the effective external blackbody temperature determination must be less than $.6^{\circ}\text{C}$.

This uncertainty shall be determined using the calibration coefficients and their respective uncertainties in conjunction with the expected inflight fore optics thermal gradients, so that

$$\Delta_{\nu}(T^*) = \left[\sum_i [\Delta^{\max}(T_s - T_i) \Delta C_i]^2 \right]^{1/2} \leq .6^{\circ}\text{C}$$

where

- T^* = effective blackbody temperature,
- T_s = shutter cavity temperature,
- T_i = temperature of the i^{th} component in the telescope fore optics,
- ΔC_i = uncertainty in the coefficient of the i^{th} telescope component,
- $\Delta^{\max}(T_s - T_i)$ = maximum expected inflight temperature gradient of the i^{th} component of the telescope fore optics with respect to the shutter cavity,
- $\Delta_{\nu}(T^*)$ = uncertainty in the effective blackbody temperature for channel of frequency ν .



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10 October 1977

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 September, 1977.

If you have any questions or desire further information, please contact me at (603) 252-0118.

Sincerely,

Paul Menzel
Program Manager

WPM/rmk

Enclosure

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