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SSEC Publication No.77.11.VI.

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Issued: 10 December 1977

MONTHLY REPORT

for

NOVEMBER 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

On November 15, 1977, D. Small of NOAA and R. Dedecker and P. Menzel of SSEC attended the VAS Working Group Meeting at Goddard Space Flight Center. Thermal gradients and acceptance test specifications to be achieved in the next thermal vacuum test were discussed. Also the data transfer from computer to computer between GSFC and SSEC was outlined.

Documentation submitted to NASA during this month consisted of responses to the two action items generated in the Working Group Meeting.

II. VAS Instrument Support

It was pointed out in the November Working Group Meeting that the present approximations for the exact VAS calibration algorithm lead to external blackbody temperature determination errors up to $.8^{\circ}\text{C}$ in the short wavelength bands ($.3^{\circ}\text{C}$ in the long wavelength bands). These approximations include (a) expressing the convolution of the Planck function and the spectral response function as a single Planck function and (b) expanding the Planck function in a Taylor series about the internal blackbody temperature. In response to an action item, UW suggested fitting the exact radiation expression with a single Planck function of the form $B(\alpha_1 + \alpha_2 T, \nu_1)$ where ν_1 is the frequency at which the integral of the spectral response function is at half value, and α_1 and α_2 are least squares fitted over a suitable temperature range. Errors in the external blackbody temperature determination with this approximation peaked at $.03^{\circ}\text{C}$. More details are available in the memorandum submitted to GSFC dated December 5, 1977.

III. Data Processing System Development

To insure a good signal to noise ratio in the solid state RF feed, a

thermoelectric cooling system was designed and then tested at the focus of the VAS antenna. In maximum expected heat of roughly 50°C the front end antenna components remained cooler than 25°C. This is well within the optimum functioning range of even the most critical component.

Work is proceeding on interfaces that will be needed when the VAS Data Base Manager arrives. Using the present McIDAS as a test bed, system control of card readers, line printers, and other peripherals is being optimized.

Efforts are underway to update the system requirements on the Applications Processor. The new requirements will reflect the lessons learned from incorporating polar orbiter sounding software into McIDAS.

Most of the TIROS-N microprocessor data handling software has been written and tested in modular form, and then linked together and tested as a package. This includes software for HIRS and MSU data. An Input/Output design to assure simultaneous reception and processing of data in real time is being developed. Work on interfaces from the microprocessor to the peripherals (receiving system, tape unit, punch and reader) is underway. Testing of the antennas is also continuing.

IV. Development of VAS Data Processing Techniques

The SSEC/NESS work on McIDAS this past month has emphasized accessing and analyzing radiosonde data in the polar orbiting satellite reference frame (Nimbus 6) and including conventional surface data as predictors for polar orbiter data analysis. The software to get moisture retrievals has been written and the investigation of various atmospheric stability criteria is

underway. Cloud height determinations using (a) HIRS CO₂ multichannel information, (b) visible and single IR window channel data, and (c) radar data were compared and found to be in reasonably good agreement. More cloud height technique development using CO₂ multichannel data is planned.



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10 December 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 November, 1977.

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

Sincerely,

Paul Menzel
Program Manager

WPM/rmk

Enclosure

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