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Paul Menzel

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VISSR Atmospheric Sounder (VAS) Development and Performance Evaluation

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Prepared by

Space Science and Engineering Center
The University of Wisconsin
Madison, WI

for

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

I. General

On May 28-30, J. T. Young traveled to the NSSFC in Kansas City for follow-up training sessions on the VAS McIDAS terminal.

II. Data Processing System Development

During the week of May 19-23, SSEC participated in the VAS link test with Wallops Island and GSFC. The satellite link and the phone modem link were both tested. The satellite link test using simulated mode AA VAS data showed that the mode AA frame sync worked correctly, as did the digital archive. The antenna receiving system at SSEC had a minor problem with the PSK demod which was fixed during the test. The preprocessor has some hardware problems. The preprocessor rejected too many scan lines because the checksum test was failed. There were also some problems with shifted bit patterns, which were traced to an error in the manufacturer's microprocessor system code and corrected. The problem with the excessive scan line rejection has not yet been solved. New data from the June link-up test will be needed to help solve the problem. The dwell sound averaging in the preprocessor was not tested because Wallops was having difficulty putting in the correct line documentation. The VAS ingest software in the data base manager has been partially checked out. The raw data ingest portion was checked out with the limited amount of data the preprocessor would pass on, but the line documentation of the link test data was not sufficient to test the filing and data management portions of the ingest package.

III. VAS Instrument Support

Further analysis of the VAS E vacuum test data produced a spin

budget for the two channels. The following table summarizes the results for 30x30 km^2 area observations (except 150x150 km^2 area for band 1).

Band	Ch 1	Ch 2
	Large Upper Detectors	Large Lower Detectors
1	1	1
2	6	7
3	4	4
4	3	3
5	2	3
6	10	7
7	2	2
8	1	1
9	4	4
10	1	1
11	11	8
12	1	1
	47	43

The most striking difference with respect to the VAS D spin budget is the reduced number of spins required for band 2 through 5 and band 9; this is the result of better HgCdTe detector performance.

The VAS D spin budget has been revised to account for 12% reflectance losses in the calibrator optics; the following table summarized the VAS D spin budget for 30x30 km^2 area observations with the large detectors (except 150x150 km^2 area for band 1) and 15x15 km^2 area observations with the small detectors.

Band	Ch 1 Large Upper Detectors	Ch 2 Large Lower Detectors	Ch 1 Small Upper Detectors	Ch 2 Small Lower Detectors
1	3	2		
2	23	19		
3	11	7	102	72
4	10	7	91	63
5	5	4	43	37
6	7	7		
7	4	3	36	26
8	1	1	1	1
9	14	9	147	116
10	2	2	19	16
11	6	7		
12	1	1		
	87	70		

The large offset observed in the VAS D calibration test data has not been explained satisfactorily. The mean difference between the algorithm determined effective external blackbody radiance and the radiometrically determined radiance for the 28 different test gradients ranges from .5 to 1.5 ergs/etc for the various bands in the HgCdTe detector. Detector nonlinearity adjustments did not help appreciably. However, if it was assumed that the internal blackbody temperature was underestimated by .5°C, then the offset was reduced to within .25 ergs/etc for all bands; no justification for such an underestimation has been found.

The Synchronizer Data Buffer parameters for calibration were revised to agree with the VAS Data Book. Scaled parameters for operational use will soon be forthcoming.

IV. VAS Data Processing Techniques

A new retrieval algorithm was made "operational" this month embodying the changes developed for improving moisture distribution. These changes are three-fold: 1) The surface term of the radiative transfer equation is removed from the HIRS measurements. The surface term is estimated from surface data, a microwave temperature retrieval and the theoretical transmittance function; 2) A cloudy model is incorporated to allow IR channels to be used in "mostly" cloudy as well as "partly" cloudy situations; 3) The moisture retrievals are iterated such that the 8.4 μm atmospheric component is radiatively satisfied by the solution. The new retrieval method makes an impressive improvement in the moisture sounding, while improvements in temperature sounding are relatively insignificant.