PROGRESS REPORT

through

December 1980

VISSR Atmospheric Sounder (VAS) Development and Performance Evaluation

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Prepared by

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for

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I. General

On December 19, Dave Erickson, Paul Menzel and Fred Mosher attended the VAS working group meeting in Greenbelt, Maryland. Post-launch assessment of VAS instrument performance, SDB performance, and improvements to routine operations were discussed.

II. Data Processing System Development

Efforts are still being made to diagnose the symptoms of the problems reoccurring in the VAS data. The loss of synchronization between the satellite and the SDB is of major importance since this causes the documentation and the data to be incompatible and hence unuseable. Because of this we have not received any usable data since the middle of December. Efforts have been made to look at the documentation during the exact time of the loss of synchronization. This information has been transfered to Westinghouse with the hopes that they can fix the problem at the SDB.

A spacecraft maneuver was performed on December 31, which decreased the spin rate of the satellite. This caused two problems at Wisconsin. The full resolution archive scanner would not lock-up on the slower spin rate of the satellite. However, the design of the archive was modified so that it is now possible to compensate for different spin rates. The other problem occurred in the navigation orbit and attitude (O and A) blocks supplied to the SDB. The SDB could not use our O and A information because it is very sensitive to the exact spin rate of the satellite. A counter which measures the exact spin rate was installed at Wisconsin to provide this information in our O and A blocks.

The earth is now centered correctly in images generated using O and A blocks from Wisconsin in the SDB. The problems mentioned in the last progress

report were discussed at the VAS working group meeting and personnel at SOCC were able to resolve them.

III. VAS Instrument Support

Continued investigation of the post-launch VAS-D spin budget confirmed that the spin budget for the lower large detectors is thirty percent higher than the prelaunch estimate. Analysis of December 4, 1980, dwell sounding data has the spin budget at 90 spins (instead of the 69 predicted pre-launch). It has been discovered that the spin budget can be expected to vary with the seasons because the detector responsivity is a function of the nominal scanner temperature which in turn is a function of the time of the year. We can expect the winter spin budget to be 20% higher than the summer spin budget because the detector responsivity is roughly 10% less in the winter. Prelaunch estimates were based on summer nominal scan temperatures, therefore, two thirds of the 30% increase in the spin budget can be explained in this way.

Initial attempts were made to determine the misregistration of images from different detectors. From December 1980, measurements with the IR window channels and the visible channel, it was generally found that the IR image is east of the visible image. The following table summarizes our findings.

Table of Misregistration of Images

A \ B	Visible	HgCdTe(large)	HgCdTe(small)	InSb
visible	-	800	600	800
HgCdTe (large)	-800	-	-200	000
HgCdTe (small)	-600	200	-	200
InSb	-800	000	-200	-

Image A is XXX microradians west of Image B

IV. Technique Development

Sounding development concentrated on the cloud problem. The method of retaining the initial estimate of the temperature profile below the cloud has lead to somewhat noisy geopotential fields because of inaccuracies in the initial guess. In most cases a 24 hour forecast is being used. Presumably this problem will be relieved when a more continuous updating/assimilation can be accomplished. Temperature profiles above the cloud are retrieved with good accuracy except in the case of cirrus, which is extremely difficult to detect. The best indicators of cirrus are the horizontal consistency of the long wave window and the upper level moisutre channel. When cirrus is suspected, no retrieval is made.

A partial cloud (N-star) algorithm was tried by splitting the sample (nominally 25 fov) into two parts; thus simulating adjacent fov with different cloud amounts. Results have been very unsatisfactory to date.

It appears to be very difficult to achieve an accurate temperature sounding where there is a sudden change in the surface contribution (i.e., moving off the east coast). This seems to manifest a "memory" in the signal which varies from channel to channel. The net effect is analogous to misregistration to the extent that a temperature retrieval is impossible without special channel selection.

The CO_2 absorption technique for determining cloud height is being adapted to VAS for use with 4-channel MSI. This will have application in the DS mode since the temperature retrieval algorithm has an option for specifying cloud pressure.