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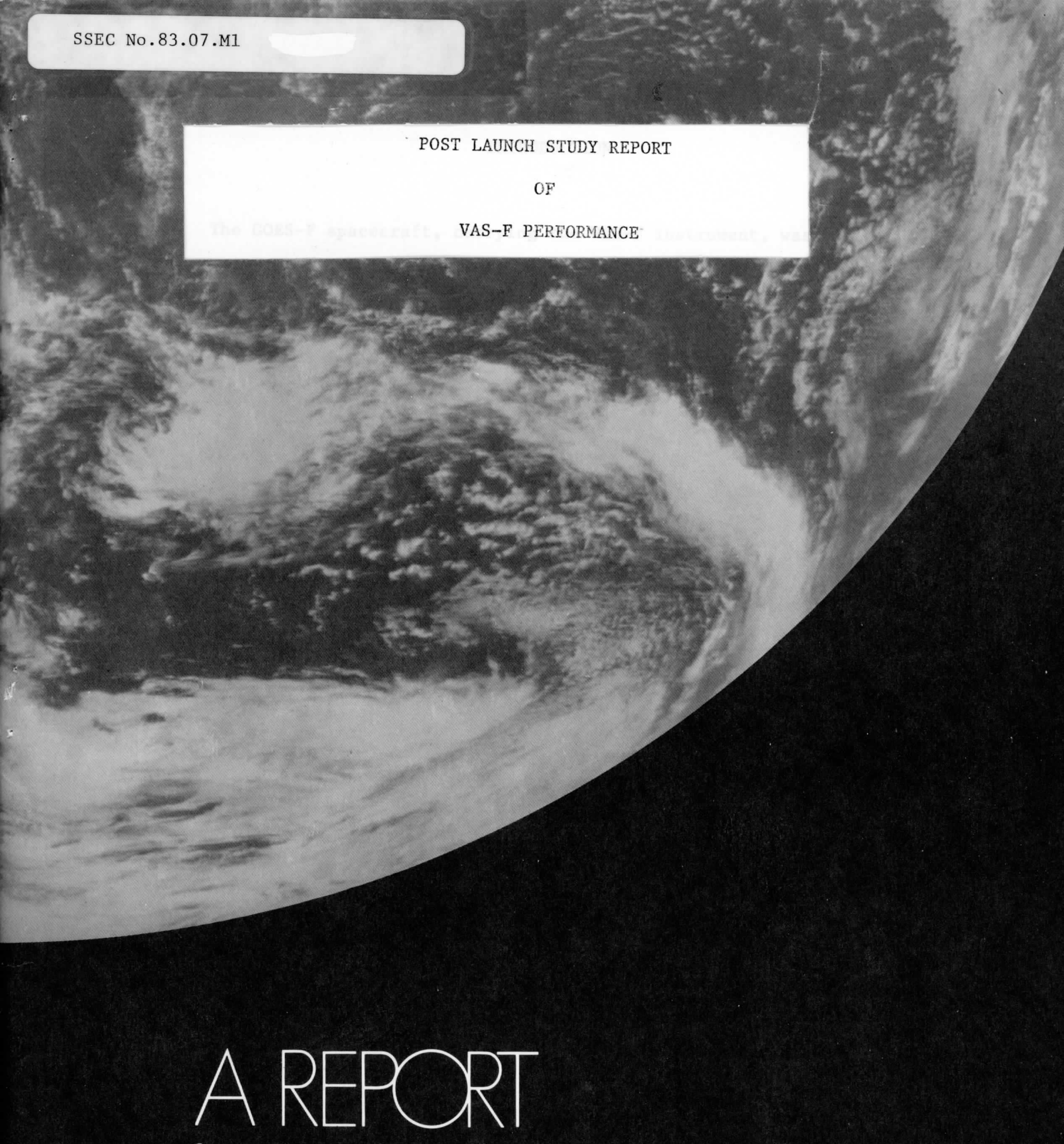
POST LAUNCH STUDY REPORT

OF

VAS-F PERFORMANCE



A REPORT

from the space science and engineering center
the university of wisconsin-madison
madison, wisconsin

POST LAUNCH STUDY REPORT

OF

VAS-F PERFORMANCE

A Report Under NASA Contract

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by

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INTRODUCTION

The GOES-F spacecraft, carrying the VAS-F instrument, was successfully launched 28 April 1983. After some necessary station keeping maneuvers, VAS-F began transmitting engineering checkout and sounding data in late May. This report is based on the analyses of the inflight data and is an update of the Prelaunch Study Report of VAS-F Performance. Many of the analyses performed for VAS-D have been repeated for VAS-F; the theoretical basis for these calculations can be found in the VAS-D prelaunch and postlaunch study reports and will not be repeated here.

I. INFLIGHT VAS-F CALIBRATION

Electronic Calibration

Tables I.1 and I.2 summarize the inflight measurements of the electronic calibration waveform. Data for the band 8 large HgCdTe detector was not available although the similarity of VAS-E and VAS-F results reduces concern about this omission. The average ramp slope was found to be .313 volt/msec (within .4% of the specified value .312 volt/msec and the same as the VAS-E ramp slope) and the average plateau voltage was determined to be 4.45 volts (within 1.2% of the specified value 4.50 volts). The data confirms that the detectors are functioning properly. The observed noise level for band 9 is somewhat higher as was observed previously for VAS-D and -E.

Radiometric Calibration

Comparisons of VAS and HIRS radiances will have to wait until the VAS-F instrument is used on a scheduled basis this coming fall.

Table I.1 VAS-F Electronic Calibration Ramp

filter	detector	ramp slope (volts/msec)	offset (volts)	linear regression coefficient	σ ramp (volts)
8	Upper Large HgCdTe	U	U	U	U
8	Lower Large HgCdTe	U	U	U	U
8	Upper Small HgCdTe	.315	-.770	.9999	.004
8	Lower Small HgCdTe	.315	-.754	.9999	.005
12	Upper Large InSb	.312	-.674	.9993	.041
12	Lower Larger InSb	.310	-.628	.9984	.063
9	Upper Large HgCdTe	.314	-.799	.9993	.044
9	Lower Large HgCdTe	.312	-.789	.9992	.044
9	Upper Small HgCdTe	.315	-.763	.9976	.079
9	Lower Small HgCdTe	.311	-.683	.9971	.087
4	Upper Large HgCdTe	.315	-.809	.9999	.014
4	Lower Large HgCdTe	.313	-.759	.9999	.016
4	Upper Small HgCdTe	.314	-.771	.9997	.026
4	Lower Small HgCdTe	.315	-.731	.9997	.027
11	Upper Large InSb	.314	-.671	.9992	.045
11	Lower Large InSb	.311	-.638	.9986	.060

U indicates that data was unavailable.

Table I.2 VAS-F Electronic Calibration Plateaus

filter	detector	zero (volts) $\bar{z}$	σ_z	offset (volts) $\bar{o}$	σ_o	plateau (volts) $\bar{p}$	σ_p
8	ULH	U	U	U	U	U	U
8	LLH	U	U	U	U	U	U
8	USH	.005	.003	.268	.003	4.458	.013
8	LSH	.001	.002	.267	.003	4.452	.005
12	ULI	.015	.014	.273	.018	4.439	.014
12	LLI	.010	.012	.271	.016	4.435	.016
9	ULH	.014	.021	.258	.036	4.453	.064
9	LLH	.053	.048	.323	.031	4.383	.050
9	USH	.058	.063	.203	.105	4.499	.100
9	LSH	.046	.055	.279	.049	4.446	.083
4	ULH	.001	.001	.255	.015	4.453	.053
4	LLH	.003	.006	.259	.012	4.443	.019
4	USH	.007	.014	.276	.028	4.450	.028
4	LSH	.021	.022	.285	.027	4.473	.025
11	ULI	.001	.002	.265	.015	4.467	.010
11	LLI	.001	.003	.266	.015	4.440	.012

U indicates that data was unavailable.

II. INFLIGHT VAS-F DETECTOR NOISE REDUCTION ANALYSIS

The spin budget summary of the findings during the postlaunch checkout on 28 May 1983 are found in Table II.1. The reduced performance of the lower large HgCdTe detectors that was noticed in prelaunch vacuum tests is not as considerable as previously estimated. With a spin budget of 51, the sounding rae at the subsatellite point is roughly 50.2 km/min.

Table II.1 Inflight Spin Budget of VAS-F Large Detectors

Band		Single Sample Noise (erg/etc) inflight	Single Sample Noise (erg/etc) prelaunch	Spin Budget* inflight	Spin Budget* prelaunch
1	U	2.85	3.04	.5 #	1
	L	3.96	4.48	.9	2
2	U	1.72	1.78	8.0	9
	L	2.31	2.60	11.9	15
3	U	1.42	1.51	5.4	6
	L	1.68	2.27	7.3	12
4	U	1.14	1.24	3.7	4
	L	1.44	1.78	5.4	8
5	U	.71	.87	1.4	2
	L	.95	1.47	2.2	4
6	U	.020	.021	4.4	5
	L	.020	.021	4.2	5
7	U	.73	.84	1.4	2
	L	.94	1.27	2.0	4
8	U	.12	.09	.1	1
	L	.10	.17	.1	1
9	U	.64	.71	3.2	4
	L	.81	1.16	4.1	8
10	U	.14	.17	.3	1
	L	.17	.24	.5	1
11	U	.022	.023	5.3	6
	L	.022	.025	5.2	7
12	U	.008	.009	.8	1
	L	.008	.009	.7	1
	U			41	42
	L			51	68

U denotes upper large detector; L denotes lower large detector.

*for sounding in 30 x 30 km area, except 150 x 150 km area for band 1.

round up for integer value of spin budget per spectral band.

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III. INFLIGHT DETERMINATION OF MISREGISTRATION OF VAS-F IMAGES

Preliminary determinations of the misregistration of images of the IR window channels (band 8 using HgCdTe detectors, band 12 using InSb detectors) and the visible channel were made from May, 1983 images. It was found that the IR image is west of the visible image with no discernible north south bias. Table III.1 summarizes these findings.

Table III.1 Misregistration of VAS-F Images

East West

B / A	Visible	HgCdTe(L)	HgCdTe(S)	InSb
Visible	-	-.42	-.59	-.42
HgCdTe(L)	.42	-	-.17	0
HgCdTe(S)	.59	.17	-	.17
InSb	.42	0	-.17	-

Image A is X milliradians west of Image B

North South

B / A	Visible	HgCdTe(L)	HgCdTe(S)	InSb
Visible	-	0	0	0
HgCdTe(L)	0	-	0	0
HgCdTe(S)	0	0	-	0
InSb	0	0	0	-

Image A is X milliradians north of Image B

IV. VAS-F MULTISPECTRAL IMAGES

Figures IV.1 through IV.3 show the full disc multispectral images of the twelve VAS-F spectral bands that were generated during the postlaunch checkout.

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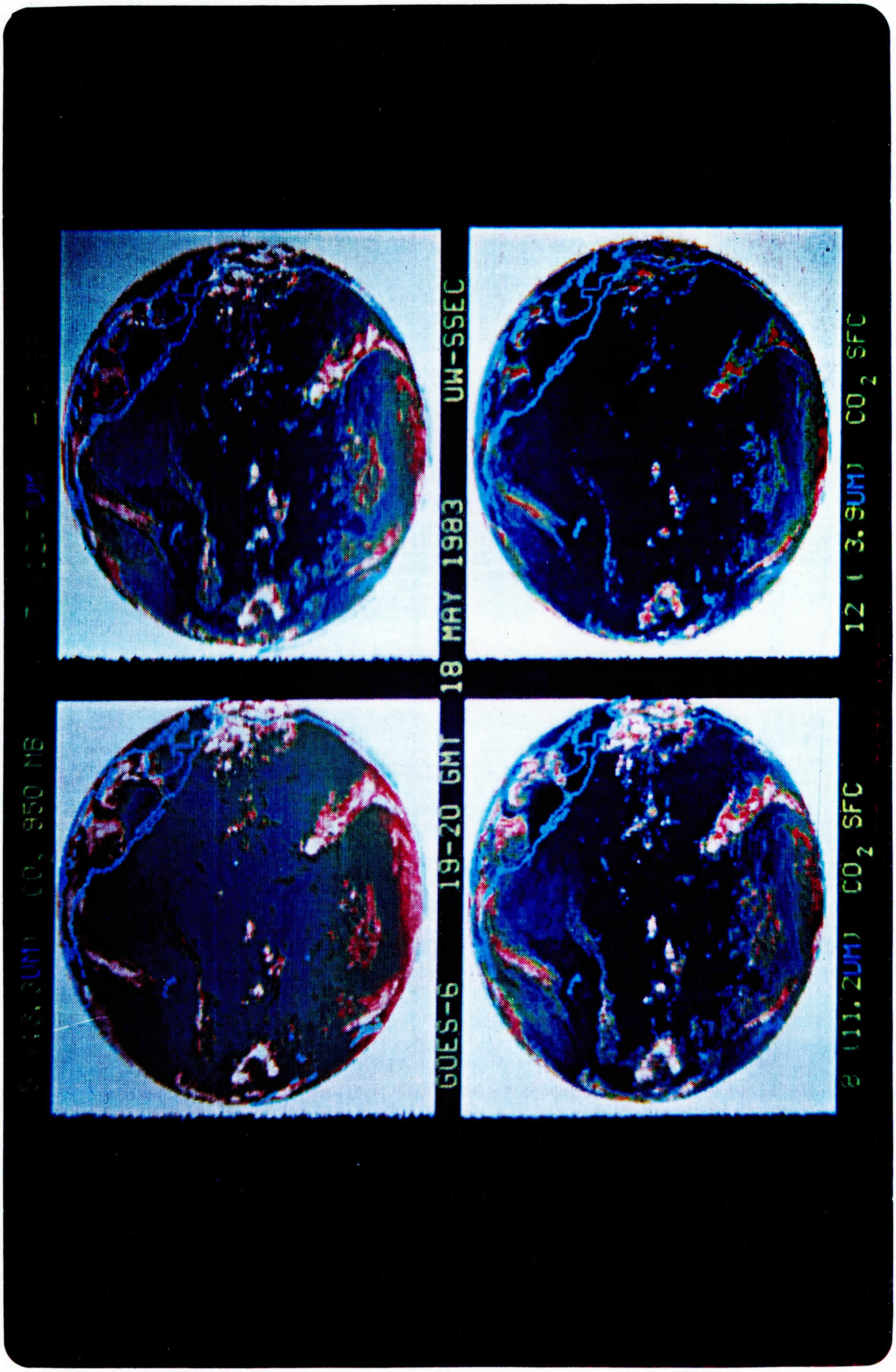
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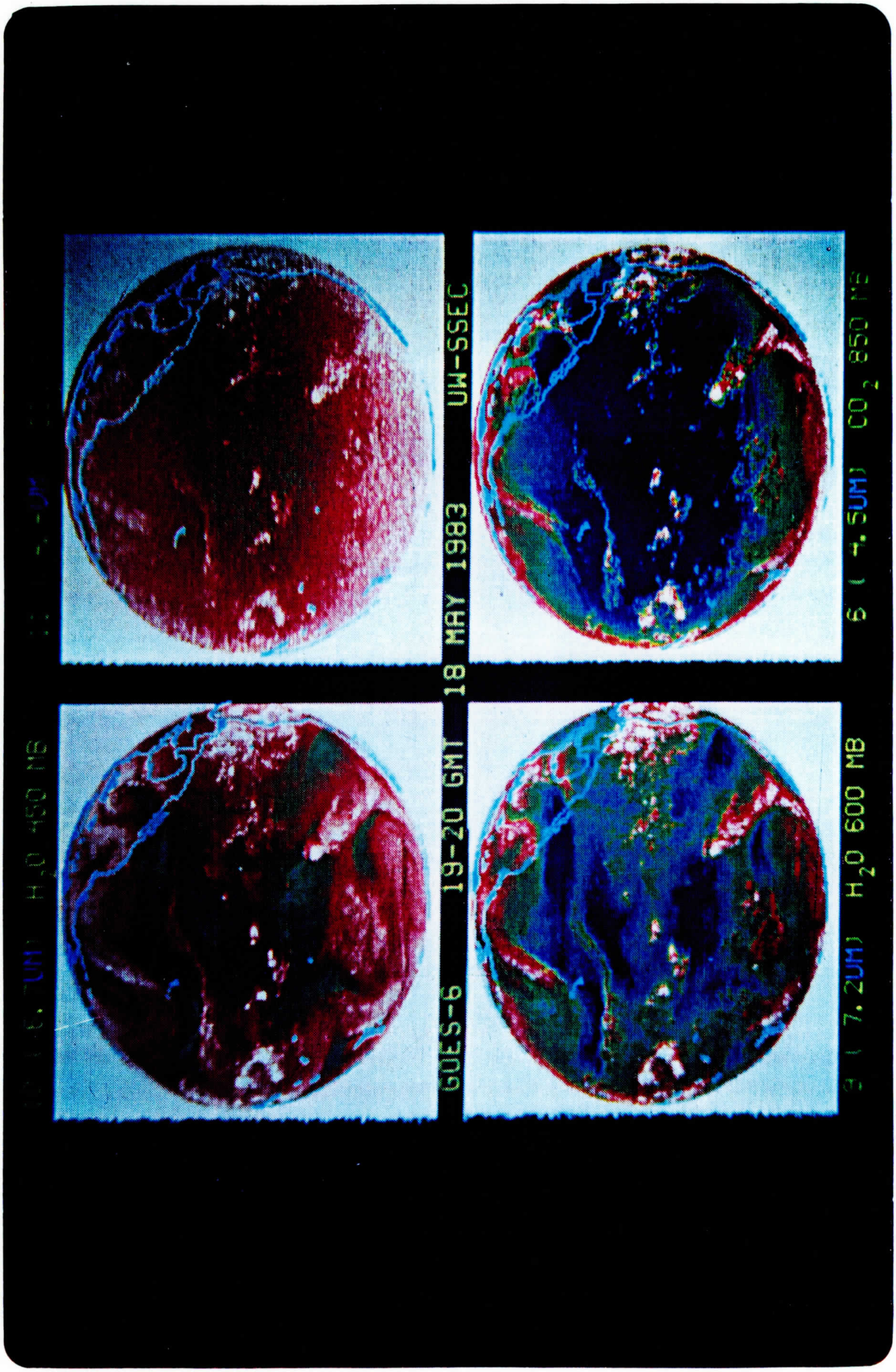
12 (3.9UM) CO2 SFC
CO2 950 MB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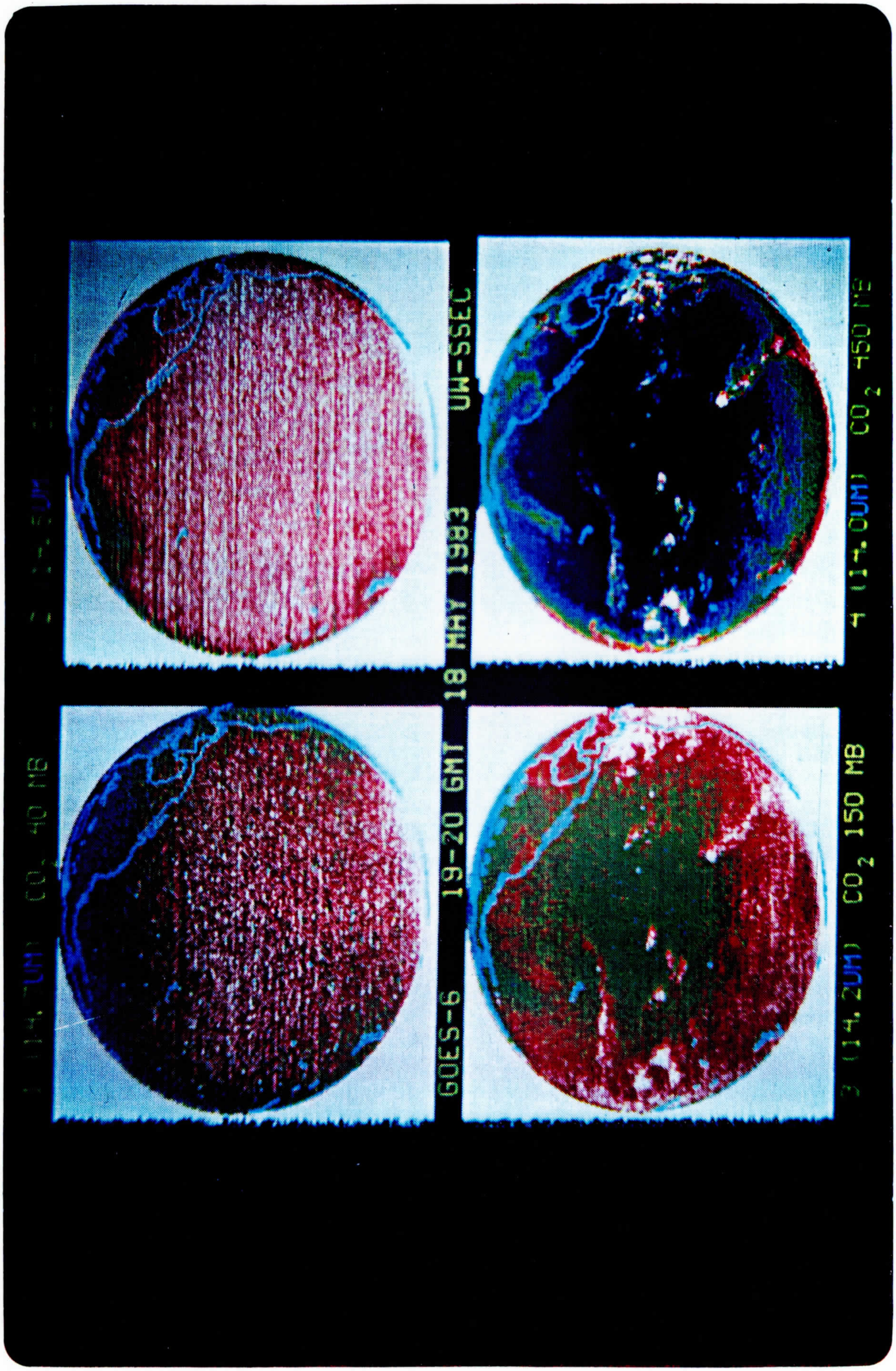
(7.2UM) H2O 600 MB
6 (4.5UM) CO2 850 MB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3 (14.2UM) CO2 150 MB
4 (14.0UM) CO2 450 MB