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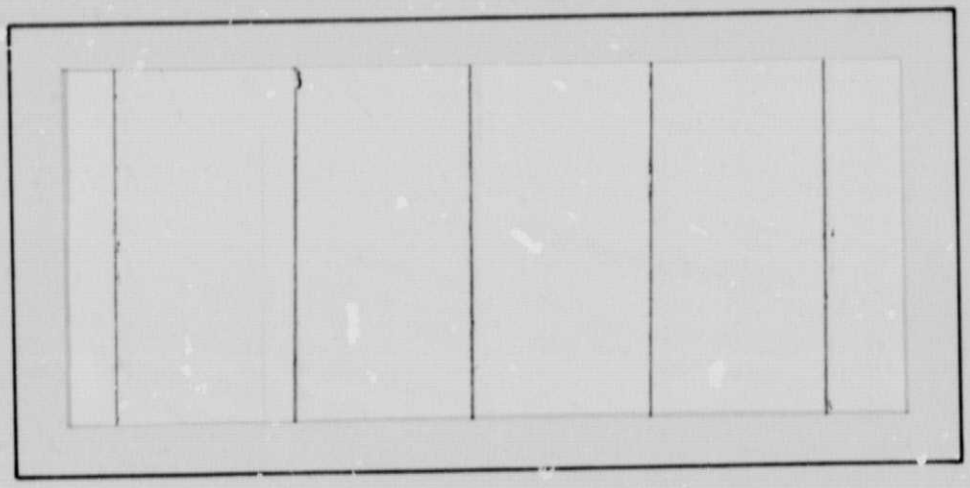

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DETERMINATION OF AEROSOL CONTENT IN THE ATMOSPHERE FROM LANDSAT DATA

Progress Report No. 11

Contract No. NAS5-20899

I.D. Number 22260

Period Covered: July 25, 1977 to
October 28, 1977

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ACCOMPLISHMENTS

In this period, which concludes the data acquisition phase of this program, Volz measurements were made at San Diego and the Salton Sea; Volz data and Landsat data were analyzed for these and other sites.

Volz Measurements

In this period Volz data were obtained for three Landsat 2 overpasses at the Salton Sea and for one overpass at San Diego. These data are given in Table 1.

Table 1. VOLZ DATA FOR LANDSAT OVERPASSES

Date	Aerosol Optical Thickness	Aerosol Content
San Diego		
9-15-77	.205	.96N
Salton Sea		
7-22-77	.217	1.02N
8-27-77	.256	1.02N
4-14-77	.129	.61N

NOAA-EPA Turbidity Network. As discussed in Progress Report No. 9 and 10, there have been problems in maintaining the instruments in the NOAA-EPA turbidity network. Unfortunately three sites selected for this program - Atlantic City, Kadena AB and Guam AB - had instrument problems, and produced no results.

LACIE Sites. The 1977 measurement program at the NASA LACIE sites has reulted in eight useful sets of Volz and Landsat data being received from Dr. Pitts of NASA-Houston. The CCT's for these overpasses have been ordered.

Landsat Data. In this period, digital data have been analyzed for twelve San Diego overpasses, three Salton Sea overpasses, five Miami overpasses, and one Adrigole overpass. These results are shown in Table 2 and in Figs. 1 and 2. Six CCT's are presently on order.

San Diego. It is seen that the San Diego data analyzed in this period show excellent agreement with the previous data. Of particular interest is the overpass of 3-1-77. This was a very windy day, with a large fraction of the ocean covered with whitecaps; it was much more windy than observed for any other overpass at San Diego. The radiances measured just off-shore from the Volz measurement at La Jolla show values higher than expected. Since the sea was rougn, and the target area is in the sun's direction as seen by the MSS, higher values might be expected due to sun glitter. This La Jolla target is about 35 km east of the sub-satellite track, so a similar area about 35 km west of the sub-satellite track looking away from the sun (i.e. 70 km west of La Jolla) was examined. It was found that the radiance values were lower and in good agreement with previous results. Thus it appears that sun glitter was influencing the La Jolla raciances, although it is not absolutely certain that the wind, sea state, and aerosol content were the same 70 km west of La Jolla.

Another overpass of interest in that of 12-1-76, when the lowest aerosol content (0.29N) of this program was measured; the radiances show excellent agreement with the expected values.

TABLE 3. LANDSAT 2 DATA

Date	cos Sun Zenith	Volz	Normalized MSS Radiance MSS4	MSS5	MSS6	MSS7
San Diego						
10-8-76	.66	.56N	2.44	1.19	.69	.54+
10-26-76	.59	1.48N	3.10	1.76	1.07	.61*
12-2-76	.45	.29N	2.02	1.13	.62*	.61+
1-24-77	.44	.57N	2.31	1.14	.65*	.61+
2-11-77	.50	.56N	2.33	1.18	.69*	.60+
3-1-77 (La Jolla)	.57	.68N	2.83	1.66	1.05	.59*
3-1-77 (70 km West of La Jolla)			2.61	1.41	.88	.60*
3-19-77	.66	1.17N	3.02	1.64	.98	.57*
4-24-77	.79	1.04N	2.84	1.42	.86	.52*
7-5-77	.82	.81N	2.43	1.25	.73	.46+
Salton Sea						
5-29-77	.83	.99N	2.59	1.44	.83	.49*
6-16-77	.83	.72N	2.53	1.48	.88	.46*
7-22-77	.80	1.02N	2.77	1.59	.90	.47*
Miami						
4-15-77	.78	1.62N			1.17	.60*
5-20-77	.82	2.37N			1.20	.56*
6-25-77	.81	2.89N			1.35	.81
6-26-77	.81	2.82N			1.47	1.07
8-1-77	.79	1.45N			1.08	.51*
Adrigole						
6-1-77	.79	1.21N	2.82	1.58	1.02	.69*

*Count <1

+Count 0

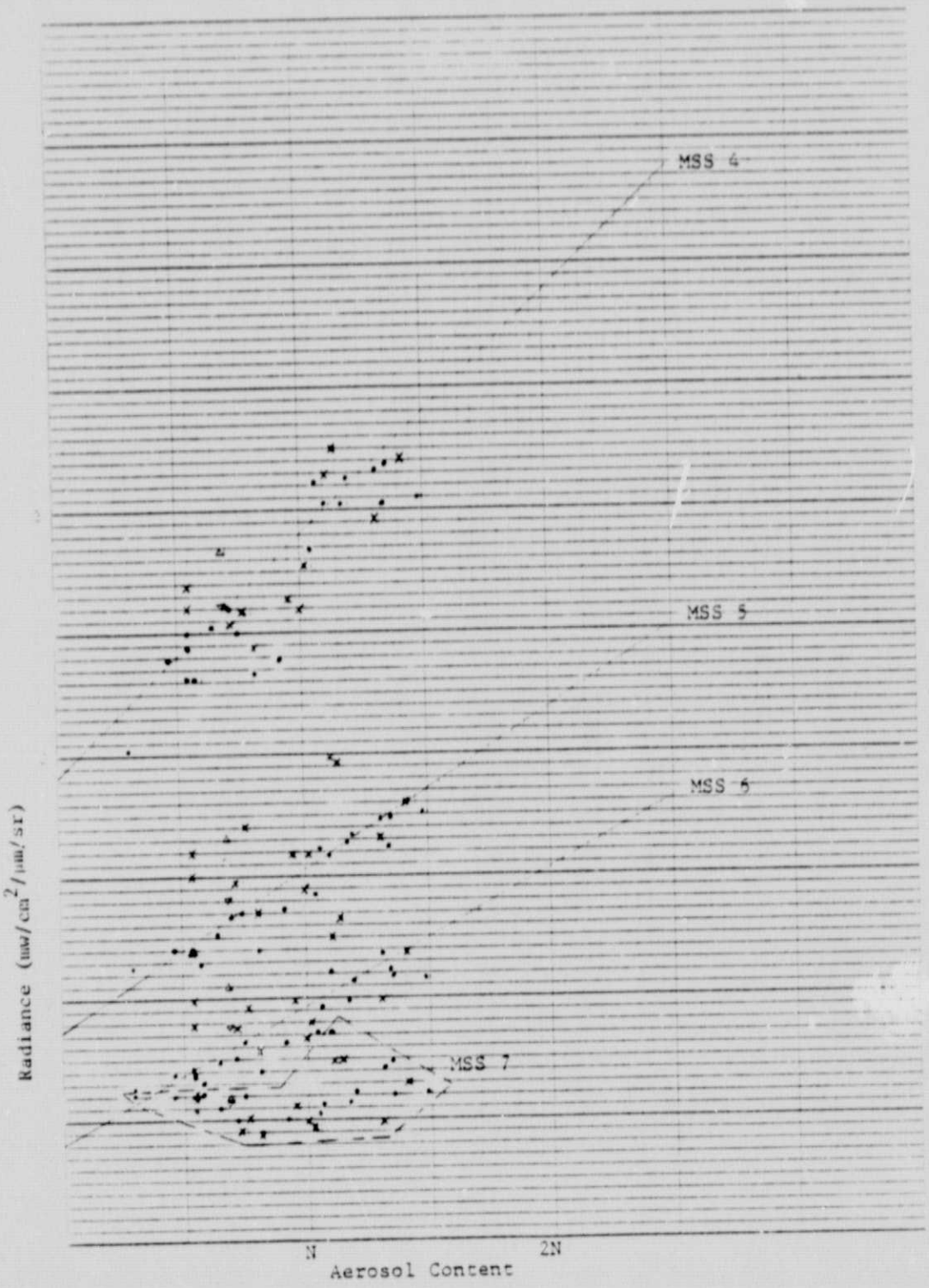

Figure 1. Radiance vs Aerosol Content for Landsat 2, San Diego and Salton Sea (● San Diego; x Salton Sea; △ San Diego toward sun 3-1-77; ▽ San Diego away from sun 3-1-77; - Linear Regression for San Diego).

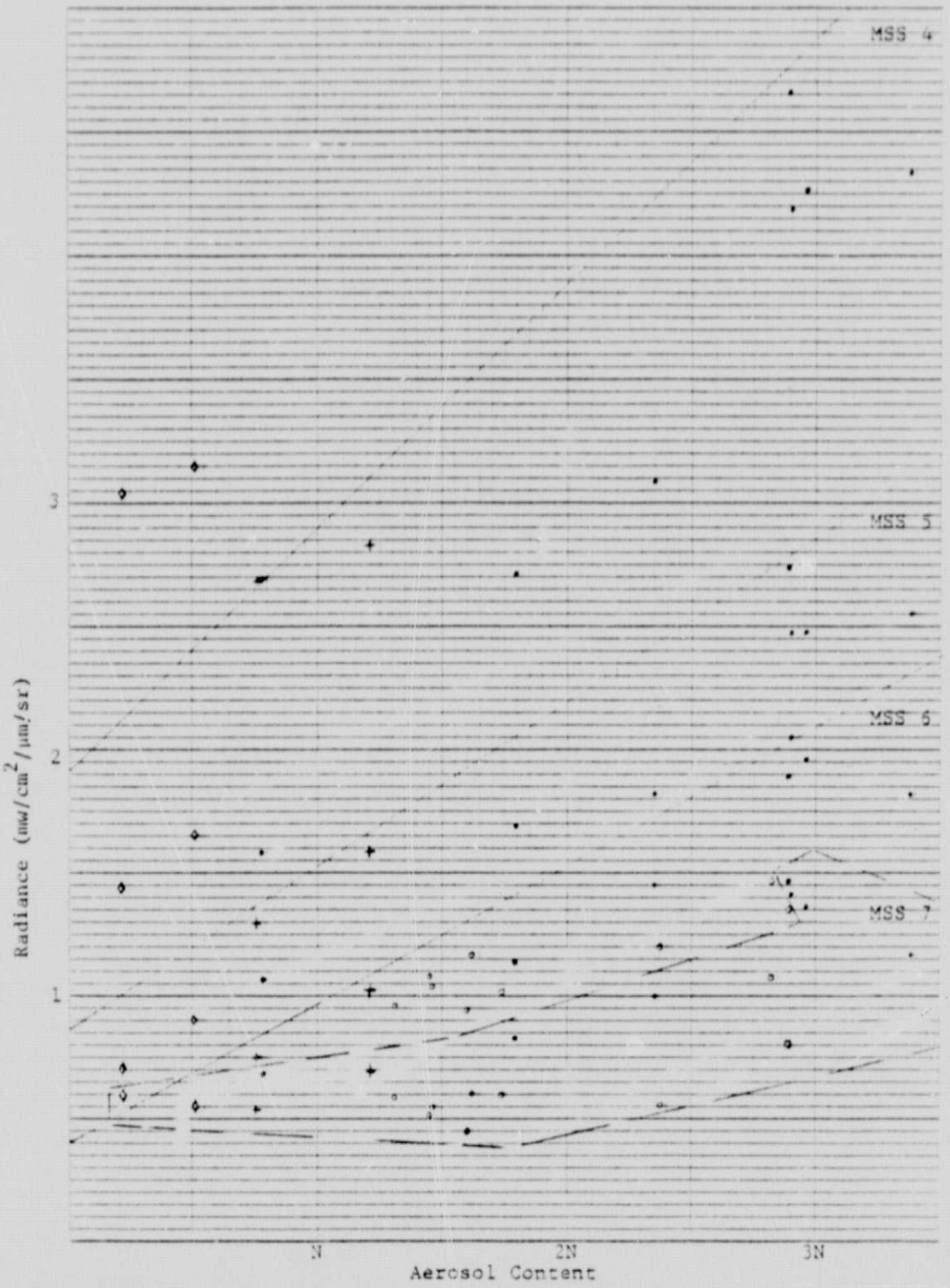

Figure 2. Radiance vs Aerosol Content for Landsat 2, Other Sites (o Miami; • Atlantic City; ◇Barrow; + Adrigole; - Linear Regression for San Diego).

Adrigole. The Adrigole data point obtained in this period shows excellent agreement with the previous results and with the San Diego data.

Salton Sea. These data show fair to good agreement with the expected results, and do not show the high values found on occasion at the Salton Sea (discussed in Progress Report No. 9 and 10).

Miami. With the addition of five data points in this period, and with three of these being for large aerosol contents (>2N), it appears that the radiance-aerosol content relationship is different from that found at San Diego. It was noted by the Miami observer that the two high values (2.98N and 2.82N) were high due to a Sahara dust haze over Miami. Since the Sahara dust has more larger particles than the normal atmospheric aerosol size distribution (i.e., a smaller ν in the Junge distribution) a lower radiance might be expected (see Progress Report No. 1). However, the other data points (when Sahara dust was not reported) also tend to be lower suggesting that the aerosol optical properties in Miami are generally different from those in San Diego. However, it should be noted that the earlier Landsat 1 results for Miami (see Progress Report No. 6) were not significantly different from those for San Diego.

Plans

The final sets of Volz and Landsat data will be analyzed, and the Final Report will be prepared

SIGNIFICANT RESULTS

There are no significant results to report in this period.