DATA SET CATALOG #136

OSO-6 Solar X-ray Fluxes

69-068A-04A

1 tape
(D-00111)

Table of Contents

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1. INTRODUCTION:

The documentation for this data set was originally on paper, kept in NSSDC's Data Set Catalogs (DSCs). The paper documentation in the Data Set Catalogs have been made into digital images, and then collected into a single PDF file for each Data Set Catalog. The inventory information in these DSCs is current as of July 1, 2004. This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system. The information existing in the DSCs is now not needed for locating the data files, but we did not remove that inventory information.

The offline tape datasets have now been migrated from the original magnetic tape to Archival Information Packages (AIP's).

A prior restoration may have been done on data sets, if a requestor of this data set has questions; they should send an inquiry to the request office to see if additional information exists.

2. ERRATA/CHANGE LOG:

NOTE: Changes are made in a text box, and will show up that way when displayed on screen with a PDF reader.

When printing, special settings may be required to make the text box appear on the printed output.

Version	Date	Person	Page	Description of Change
01				
02				

3 LINKS TO RELEVANT INFORMATION IN THE ONLINE NSSDC INFORMATION SYSTEM:

http://nssdc.gsfc.nasa.gov/nmc/

[NOTE: This link will take you to the main page of the NSSDC Master Catalog. There you will be able to perform searches to find additional information]

4. CATALOG MATERIALS:

a. Associated Documents To find associated documents you will need to know the document ID number and then click here. http://nssdcftp.gsfc.nasa.gov/miscellaneous/documents/

b. Core Catalog Materials

OSO 6

COUNT RATES, 6 CHANNELS, MAG. TAPE

69-068A-04A

This data set has been restored. There was originally one 7-track, 556 BPI tape written in BCD. There is one restored tape written in ASCII. The DR tape is a 3480 cartridge and the DS tape is 9-track, 6250 BPI. The original tape was created on a 7094 computer and the restored tape was created on an IBM 9021 computer. The DR and DS numbers along with the corresponding D number are as follows:

DR#	DS#	D#	FILES	TIME SPAN
DR004806	DS004806	D000111	1	08/14/69 - 01/20/70

RA 7724

August 17, 1971

To: Data Repository

From: A.D.P. Services

Subject: OSO-6 Solar X-Ray Fluxes 69-068A-04A

This data set 69-068A-04A presently consists of 1 tape D-00111. During processing the tape was dropped and is now physically bad. Please release D-00111, and assign D-00111 to A-81807.

OSO-6 Solar X-ray Fluxes
69-068A-04A

This data set consists of 1, 556, binary, odd, 7-track tape. It contains one file.

D#	C#	#Files	Start-Stop
D-00111	C-05014	1	8/14/69 - 1/20/70*

*There is an error in the printout of the end time. The error was made as the tape was being originally made. 1/20/69 is the time on the printout, but the correct time is 1/20/70.

AUG 9 1971

UNIVERSITY OF CALIFORNIA
LOS ALAMOS SCIENTIFIC LABORATORY
(CONTRACT W-7405-ENG-36)
P. O. Box 1663
Los Alamos, New Mexico 87544

IN REPLY
REFER TO: P-4

August 4, 1971

Mr. Pete Havanec
National Space Science Data Center
Code 601.6
NASA GSFC
Greenbelt, Maryland 20771

Subject: LASL X-ray Experiment OSO-6 reduced data tape and description

Dear Mr. Havanec:

I am sending to you one LASL computer tape reel #16048, 7 track, binary, odd parity, 556 BPI, 1 File, containing all of the reduced data from the LASL x-ray spectrometer Experiment on OSO-6 for storage in the National Space Science Data Center, as per our Experimenters Agreement. Also enclosed is a copy of the experiment and data description I have prepared for Dr. Enrico P. Mercanti code 601.3. This will explain the form of the data on the tape, and interpret the print-out.

Sincerely yours,

Harold V. Argo

Harold V. Argo

HVA/fl

Enc. a/s

Section 5a. Experiment Title

The Los Alamos Scientific Laboratory X-ray Spectrometer

Section 5b. Investigators

Principal Investigator:
Dr. H. V. Argo, Los Alamos Scientific Laboratory, Los Alamos, N. M. 505-667-5305

Co-investigators:
Mr. James A. Bergey, Los Alamos Scientific Laboratory, Los Alamos, N. M. 505-667-4884
Dr. W. Doyle Evans, Los Alamos Scientific Laboratory, Los Alamos, N. M. 505-667-5315

Section 5c. Objective

The experiment monitored with low time resolution (i.e., one orbital period) the flux in 5 selected coronal emission lines between 16 A and 40 A, plus one continuuminterval at 18.1 A.

Section 5d. Instrumentation

The instrument consisted of six fixed wavelength curved crystal spectrometers, using Johan type geometry, mounted in one of the wheel sections of the spacecraft. A sun sensor gated the electronics on during the period the entrance slits were sweeping by the sun. The photons were analyzed spectrally by the crystals, and those satisfying the Bragg condition were focussed on the photocathodes of the Bendix M-310 electron multipliers and counted individually. The observed count rate in each of the spectrometers can be converted into flux in units of photons cm^{-2} sec^{-1} by using the efficiency factors listed in Table 1. The efficiency E_n is defined by

$$\text{observed count rate} = E_n \times \text{flux}$$

and has been obtained from measurements of the geometric factor, the crystal Bragg reflection efficiency at the given wavelength, and the photo efficiency of the Bend M-310 multipliers at the same wavelength with two different counter voltages, high and low.

Once each revolution of the wheel the counters were gated on for a sweep of 4.10° centered on the sun, and the photon pulses from each of the six spectrometers were collected in separate 6-bit scalers. The six scalers were then read out sequentially through the telemetry and reset to zero during the remainder of the wheel revolution. After six wheel revolutions the logics shifted the electronics mode from "sun" to "shade", whereupon the spectrometers were gated on while looking in a direction 60° away from the sun and collected background counts for a 23.3° sweep during each of the next two revolutions.

Table 1

λ(A)	Emmission Line	E_T (high)	E_T (Low)
40.27	C V	$2.2(10)^{-8}$	$2.0(10)^{-8}$
33.74	C VI Lα	$1.4(10)^{-7}$	$1.2(10)^{-7}$
21.60	O VII	$1.0(10)^{-6}$	$.75(10)^{-6}$
18.97	O VIII Lα	$7.0(10)^{-7}$	$6.2(10)^{-7}$
18.20	Continuum	$5.1(10)^{-7}$	$4.7(10)^{-7}$
16.01	O VIII Lβ	$6.8(10)^{-7}$	$5.8(10)^{-7}$

This ended the LASL masterframe of 8 OSO main frames and the sequence would then repeat. Because the wheel spin rate was not synchronous with the telemetry read-out, it was possible that transfer from a scaler could occur during a read in gate. The number then encoded would not be a valid count and was flagged by a bit in the data word and rejected in the computer analysis.

No inflight calibrations were performed.

A more detailed description of the instrument, electronics, and data format can be found in the Ball Brothers OSO-G Experiment Payload Description, TN69-04 (16 June 1969), pages 2-58 to 2-64.

Section 5e. Operational Use

At a wheel spin rate of 30 r.p.m. solar data was collected for about 0.023 seconds out of each wheel revolution period of 2 seconds, giving a duty factor of $\sim$ 1/1000. In practice the summed data for a typical orbit represented from 20 to 25 seconds of observing time. Analysis of the data and comparison with that from similar instruments flown on sounding rockets leads us to believe that the two stations at 18.97 A and 18.20 A suffered broken ultra-violet screens, probably at launch, and the 21.60 A station had excessive transmission of longer wavelength contaminant. The remaining stations: 40.27 A, 33.74 A, and 16.01 A had counting rates at turn-on 14 August 1969 ranging from 10 counts/second to 33 counts/second.

All 6 channels experienced a serious and continuing decay in gain, or sensitivity, beginning at turn-on. In first approximation the decay was exponential with time and does not appear to be correlated in any simple way with the initial count rate. A very rough fit of the data for the first 60 days of operation gives the decay constants for each channel listed in Table 2, where τ is defined by

Table 2

Channel	Decay Time: τ
40.27 A	72 days
33.74 A	14 days
21.60 A	14.4 days
18.97 A	9.4 days
18.20 A	20.4 days
16.01 A	43 days

$I(t) = I(o) \exp - t/\tau$, with $I(o)$ the count rate at time $t=o$, and time expressed in days. Because of the Bendix M-310 gain degredation, the data after 60 days is probably of little use.

Section 5f. Measured Data

1. The measured quantities are simply the number of photons counted by each of the six spectrometer channels during the period they were gated "on" in each wheel revolution. The photon counts were accumulated in 6 bit scalers, so in principle each channel could respond to a maximum rate of 64 counts per

revolution, or 64 counts/0.023 seconds ≈ 2800 counts/second. At turn-on with typical count rates falling between 10 and 30 c/s, and the summed observing time for a typical orbit being from 20 to 25 seconds, the counting statistics for the data collected in one orbit were ≈ 5 to 10%. These fluxes represent the emission from the whole solar disc and corona out to several solar radii.

2. Data taken during the periods the satellite was passing through the South Atlantic Magnetic Anomally have high backgrounds which are not readily removed. Typically, 7 or 8 consecutive orbits of the 16 per day pass through the anomally. They can be identified by the increased count rates in the "shade" mode of operation. The low counting rates prevent a rapid identification of the anomally, but the summation of an orbits data when compared with the sums for other orbits willclearly identify those orbits passing through the anomally. In principle, if the ephemeris data for OSO-G is ever made available to the experimenters with the Anamally periods clearly marked, one will be able to retrieve the solar data for those portions of the orbit not in the Anomally.

   As discussed in section 5e above, the steady degradation of gain with time for all 6 channels makes an absolute flux determination very questionable.

3. The low time resolution of this experiment will limit its usefulness to phenomena that cause variations in flux intensities over periods of a few hours or days. The larger flares do show up in the data. Relative flux intensities in the channels covering 40.27 A, 33.74 A, and 16.01 A can be extracted from the data if the South Atlantic Anomally periods are dropped from the data, and corrections are made for the time dependent change in gain in all channels.

4. Time coverage: data tapes exist for the time period from instrument turn on 14 August 1969 to 20 January 1970. The data are probably not useful after the first 60 days because of the severe gain degradation.

5. Data Tapes: There are 62 reels of NASA data tapes, identified as OSO-G, experimenter X84, covering the time period from 14 August 1969 to 20 January 1970. These are 7 track, binary, 800 BPI.

Section 5g. Reduced Data

1. Description: The reduced data consists simply of the sum of counts, the average count rate per second, and the standard deviation for that rate for each spectral channel for each orbit. These are listed for both "sun" data and "shade" data.

2. The first half minute of data after sun acquisition and the last half minute at sunset have been removed arbitrarily from the summations to eliminate atmospheric transmission errors. The calibration factors given in Table 1 and Table 2 can be used to convert the reduced data to absolute fluxes.

3. The assumptions and errors have been discussed in sections 5 d, e, and f.

4. Within the limitations of the data, these measurements can be used to study slowly varying solar phenomena that influence the emission in the selected emission lines.

5. Time coverage: All OSO-G data tapes provided by NASA GSFC up to 20 January 1970 have been reduced in the manner described in 5g-1 above.

6. These reduced summaries have not been published.

7. Amount and form of data storage: The reduced data is contained on a single reel of computer tape, 7 track, binary, odd parity, 556 BPI, 1 file. The tape format is as follows:

Record 1	(data record)
.	.
.	.
.	.
N	(data record)
EØF	
EØF	

Record Format: A7, 2I9, 6 F9.2: label, date, time (sec), 40.27 A channel, 18.20 A channel, 21.60 A channel, 18.97 A channel, 16.01 A channel, 33.74 A channel.

Section 5h. Current Status

The instrument was turned off in January 1970 because of the severe degradation in gain of the Bend M-310 photon multipliers.

FILE 0001 REC 0001 CH 0138							
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0097 202020202020	202020202020	202020202020	222020202020	202020202020	202020202020	202020201212	
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0049 117306012020	202001057304	062020202020	017330052020	202020027312	112020202020	202020202020	202020202020
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FILE 0001 REC 0016 CH 0138
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FILE 0001 REC 0017 CH 0138

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