SAN MARCO 795
ASSI. FLUX DATA. ASCII
88-026A-02B

SOUV-00026

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 This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system.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

SAN MARCO

ASSI, FLUX DATA, ASCII

88-026A-02B SOUV-00026

This data set consists of 1 magnetic tape. The D tape is a 8mm cartridge, written in TAR format. The C tape is a 4mm cartridage, created on a VAX computer. The D and C number and time span is as follows:

D#	C#	FILES	TIME SPAN
D-108537	C-032739	1	03/25/88 - 12/06/88

INSTITUT FÜR ASTROPHYSIK
UND
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DER
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ff-026A-02B

Dr. Dieter Bilitza
National Space Science Data Center
NASA - Goddard Space Flight Center
Code 633
Greenbelt, MD 20771
USA

Re: ASSI Daten auf 8 mm Tape

Lieber Herr Bilitza,

anbei übersende ich Ihnen die von mir aufbereiteten ASSI Daten auf 8 mm Tape. Dokumentation und Daten sind einem tar - Archiv enthalten, ein Auszug des Inhaltsverzeichnisses liegt bei.

Die von Herrn Wita stammenden Files sind als VOLDESC.PTS bzw. FORMAT.PTS beigelegt. In den von mir ertellten Files VOLDESC.SFD und FORMAT.SFD sind die Labels und Referenzen noch zu ergänzen.

Ich hoffe, die Dokumentation ist ausreichend. Für Rückfragen stehe ich selbstverständlich gerne zur Verfügung.

Mit herzlichen Grüßen,

Klaus Enninghorst

Anlage

88-026A-02B

```
tplook:
=======
Tplook - User: kenningh  Date: Wed Jan 10 16:10:43 1996
User Supplied Label:  /dev/nrmt0h
Reading Exabyte 8500, high density

        71409 record(s) of length 10240
file 0:  #records = 71409  #bytes = 731228160


tape: #files = 1  #records = 71409  #bytes = 731228160  #disk blocks = 1428180


tar -vtf /dev/nrmt0h:
=====================
drwxr-xr-x kenningh/users    0 Jan 10 11:10 1996 doc/
-rw-r--r-- kenningh/users 14409 Jan  8 17:23 1996 doc/format.sfd
-rw-r--r-- kenningh/users 183766 Mar 23 00:00 1994 doc/hresrep.ps
-rw-r--r-- kenningh/users  30818 Dec 19 12:31 1995 doc/format.pts
-rw-r--r-- kenningh/users  17199 Dec 19 12:31 1995 doc/voldesc.pts
-rw-r--r-- kenningh/users  11639 Dec 15 17:00 1995 doc/assi_air.c
-rw-r--r-- kenningh/users  26097 Jan  4 11:43 1996 doc/asciiflx.c
-rw-r--r-- kenningh/users  26594 Jan 20 10:02 1995 doc/sgp4_pos.c
-rw-r--r-- kenningh/users  14987 Dec 15 16:51 1995 doc/assi_sun.c
-rw-r--r-- kenningh/users   3375 Jul 29 11:55 1993 doc/axis_vr.c
-rw-r--r-- kenningh/users   1399 Aug  9 20:38 1993 doc/sunpos.c
-rw-r--r-- kenningh/users   6358 Dec  8 11:51 1995 doc/wth_lst.c
-rw-r--r-- kenningh/users  33941 Dec  8 16:18 1995 doc/shft_lst.c
-rw-r--r-- kenningh/users  14608 Dec 15 16:41 1995 doc/calibrat.c
-rw-r--r-- kenningh/users  74460 Jan  4 18:10 1996 doc/filelist.txt
-rw-r--r-- kenningh/users  22531 Jan 10 11:10 1996 doc/voldesc.sfd
drwxr-xr-x kenningh/users      0 Jan  4 13:29 1996 data/
-rw-r--r-- kenningh/users 260283 Jan  4 11:46 1996 data/a20372.k01
(... insgesamt 1458 data files)
-rw-r--r-- kenningh/users  149619 Jan  4 13:29 1996 data/b23733.k02

/* Eof */
```

88-026A-02B

COPY OF CM806 (8MM) ONTO CM807 (8MM)

FILE	RECORDS READ	RECORDS WRITTEN	RECORD SIZE MAXIMUM	RECORD SIZE MINIMUM	ERRORS
1	71409	71409	10240	10240	0

END OF COPY

BYTES COPIED = 731228160
RECORDS COPIED = 71409
ERRORS = 0

START TIME: 11-APR-1996 09:15:17.00
END TIME: 11-APR-1996 10:37:22.88
ELAPSED TIME: 01:22:05

DSC 795
ff-026A-02B
p.2 (4pp)

1. GENERAL

This is the description of the data of the Airglow-Solar-Spectrometer Instrument (ASSI) aboard San Marco D/l after preprocessing of the telemetry data by PTS, Freiburg, Germany (1988-1991) and after processing of these data by Klaus Enninghorst, Institut fuer Astrophysik und Extraterrestrische Forschung, Universitaet Bonn, Germany (1990-1995).

All data files are ASCII files.

1.1 CHANNEL NUMBERING OF THE INSTRUMENTS

ASSI consists of two instruments: ASSI A and ASSI B.

Each instrument has 9 channels. The original numbering given by Dornier, the manufacturer of ASSI, has been adopted (to avoid confusion) with the exception of channel 18. Channel 18 had been numbered 11A by Dornier which is of no use in a computerized environment.

The 9 channel numbers of ASSI A are:
1, 2, 3, 4, 9, 10, 11, 18, 12

The 9 channel numbers of ASSI B are:
5, 6, 7, 8, 13, 14, 15, 16, 17

Since only 10 of the 18 channels yielded reasonable data, the rest of the data is skipped. The channels are thus referred as:

	1,	2,	3,	4,	5
ASSI A:	3,	10,	11,	18,	12
ASSI B:	7,	8,	14,	15,	16

So, channel 18 for example, may be referred to as the 4th channel of ASSI A and channel 14 as the 3rd channel of ASSI B. This is important for the understanding of the data description.

1.2 ANGULAR RESPONSE AND DIRECTION OF VIEW OF ASSI

The horizontal full angle of view is 10.64 [deg], the vertical full angle of view is 8.95 [deg].

More accurate, the angular response of ASSI in horizontal direction is:

angle [deg]:	-6.4	-5.5	-4.9	-4.2	-3.5	-2.2	0.0	2.8	3.6	4.7	5.3	6.4
response [%]:	0.0	45.1	54.2	79.0	94.9	98.3	100.0	99.1	99.4	98.4	53.4	0.0

and the angular response of ASSI in vertical direction is:

angle [deg]:	-5.1	-4.3	-3.4	-2.4	-1.4	0.0	2.5	2.8	3.4	4.5
response [%]:	0.0	36.5	54.6	72.8	90.9	100.0	90.9	72.8	54.6	0.0

ASSI A is looking parallel to the -X-Axis of the S/C.
ASSI B is looking parallel to the +X-Axis of the S/C.
See fig. 1, page 3207, Lit [1] and fig. 3.15, page 3-20, Lit [2].

The orientation of the S/C is determined by two horizon sensors.

A disturbance of the horizon sensor data thus probably yields a wrong direction of view of ASSI.

Imagine that you are looking down from the north pole of the hemisphere to the S/C, then the S/C is spinning clockwise because the S/C has been turned upside down in order to save power during the spin-correction manoevres. (+Z Axis of the S/C pointing down to the south pole of the hemisphere).

Due to the rotation of the S/C the angular response function in horizontal direction of the field of view in motion is a trapezoid, which geometry depends on the spin period of the S/C.
A detailed data analysis (Lit [3]) using the sun as a point source to check the direction of view was performed yielding to the direction of view of ASSI listed in the data. This direction is meant as the center of the trapezoid of the angular response function.

The described analysis yielded small offsets in the direction of view (right ascension), which are listed here:

channel	:	A03,	A10,	A11,	A18,	A12,	B07,	B08,	B14,	B15,	B16
offset [deg]	:	-0.2,	0.2,	-0.1,	0.3,	-1.0,	0.1,	0.2,	-0.7,	-0.1,	0.0

The automatic solar pointing control system of ASSI kept the instrument viewing to the sun once a spin.
If the deviation from the position of the sun perpendicular to the rotation of the instrument exceeds the range (-2.0 .. 1.0), a malfunction of the sun follower is flagged in the data.

2. CALIBRATION

The calibration of ASSI was performed by different scientists. The values presented in the data are the flux given in Rayleigh [R].
The opening angle of ASSI is O = 0.03147 sterad. To obtain the flux in units of [10^6 photons/cm^2/s], the data have to be multiplied by the factor 0.002504 (O/4pi).
If the spectral resolution is N nm, the data have to be devided by N to obtain [R/nm] or [10^6 photons/cm^2/s/nm], respectively.

The spectral resolution (spectral bandpass) of the channels is:

channel	:	A03,	A10,	A11,	A18,	A12,	B07,	B08,	B14,	B15,	B16
N [nm]	:	2.45,	1.22,	1.22,	1.22,	1.22,	2.45,	2.45,	0.82,	0.82,	0.82

The spectrometer function g is: g(lambda) = (1/N)*exp(-(lambda/sigma)^2)
with: lambda = wavelength in nanometer
and: sigma = N/sqrt(pi)

3. WAVELENGTH

The wavelength is given for each data point in Angstroem. During a number of periods a shift in wavelength (grating position) occured which has been corrected and flagged.

4. ASSI DATA FILES

Names: aMPPPP.kOX ASCII file, ASSI A:
bMPPPP.kOX ASCII file, ASSI B:

(M   = Measuring Mode of the instrument)
(PPPP= Pass-No. of the S/C over Kenya)
(X   = No. of succession)

For example, the name of the data-file a30487.k01 means data from ASSI A, mode 3, pass no. 487, no. of succession 1.

4.1 MEASURING MODES

Each spin begins with the Earth/Sky-horizon-sensor signal, because the Earth/Sky-horizon-sensor is triggering the scanposition of ASSI (A and B at the same time).
The number of data records with the same scan position (and therefore wavelength for one channel) depends on the duration of one spin. One spin is about 9.8 .. 13.6 s, shorter at the beginning and longer at the end of the mission. Since there is one measurement every 256 ms, the scan position changes after about 40 data records.

There are four operational modes of ASSI:
Mode 1: All detectors are kept at fixed wavelength positions. 112 different wavelengths (positions) can be chosen.
Mode 2: Spectra are scanned by 8 or 16 steps around a position.
Mode 3: Spectra are scanned from position 0 to 112.
Mode 4: Radioactive sources are exposed to the channeltrons. The mode-4-files have been analysed for calibration purposes but are not stored in the data.

4.2 FORMAT AND STRUCTURE OF THE DATA FILES

- One line of data (158 Bytes) is the equivalent of one measurement; there is one measurement every 256 ms.
- Data which are not usable, are left out. So, if there is a jump in S/C-time greater than 256 ms, then one or more measurements have been left out because of their distortion. Slightly disturbed data are indicated by a flag.
- The channelcounts belonging to the first measurement of a scan position are not reliable because the movement of the scanner (from one position to the next) reduces the integration interval in an unpredictable way. These data are flagged, too.

BYTES	TYPE OF DATA	UNITS	FORMAT
1- 11	Universal Time (Year is always 1988)	[d]	F11.7
12- 16	Altitude S/C	[km]	F5.1
17- 22	Declination S/C	[deg]	F6.3
23- 29	Right Ascension S/C	[deg]	F7.3
30- 33	Solar Local Time S/C	[h]	F4.1
34- 36	Solar Zenith Angle S/C	[deg]	F3.0
37- 41	Declination direction of view ASSI	[deg]	F5.1
42- 46	Right Ascension direction of view ASSI	[deg]	F5.1
47- 49	Earth Nadir Angle ASSI	[deg]	F3.0
50- 55	Spin duration from horizon sensors	[s]	F6.3
56- 58	Scan position		I3
59	Flag#1 indicating errors in direction of view		I1
60	Flag#2 indicating pinhole and IDDS indicator		I1
61	Flag#3 indicating disturbed data		I1
62	Flag#4 indicating spikes or hot spots		I1
63	Flag#5 indicating scan position correction		I1

64- 67	Wavelength	chan. 1 (A03/B07)	[A]		I4
68- 69	Counts (description below)	chan. 1 (A03/B07)			I2
70	Flag#K (description below)	chan. 1 (A03/B07)			I1
71- 82	Flux	chan. 1 (A03/B07)	[R]		E12.6
83- 86	Wavelength	chan. 2 (A10/B08)	[A]		I4
87- 88	Counts (description below)	chan. 2 (A10/B08)			I2
89	Flag#K (description below)	chan. 2 (A10/B08)			I1
90-101	Flux	chan. 2 (A10/B08)	[R]		E12.6
102-105	Wavelength	chan. 3 (A11/B14)	[A]		I4
106-107	Counts (description below)	chan. 3 (A11/B14)			I2
108	Flag#K (description below)	chan. 3 (A11/B14)			I1
109-120	Flux	chan. 3 (A11/B14)	[R]		E12.6
121-124	Wavelength	chan. 4 (A18/B15)	[A]		I4
125-126	Counts (description below)	chan. 4 (A18/B15)			I2
127	Flag#K (description below)	chan. 4 (A18/B15)			I1
128-139	Flux	chan. 4 (A18/B15)	[R]		E12.6
140-143	Wavelength	chan. 5 (A12/B16)	[A]		I4
144-145	Counts (description below)	chan. 5 (A12/B16)			I2
146	Flag#K (description below)	chan. 5 (A12/B16)			I1
147-158	Flux	chan. 5 (A12/B16)	[R]		E12.6

The meaning of the flags and of counts is as follows:

```
  Flag#1: &1 (bit no. 1, LSB) --> horizon sensor data were disturbed
  ------- &2 (bit no. 2)      --> horizon sensor data were corrected
          &4 (bit no. 3)      --> spin axis position set to nominal value

  Flag#2: &1 --> S/C flying in the sun
  ------- &2 --> pinhole ON
          &4 --> sun follower does not match the sun properly

  Flag#3: &1 --> minor frame counter malfunction (time not reliable)
  ------- &2 --> sun-sensor time is disturbed
          &4 --> first measurement of a scan position

  Flag#4: K=1..5: counts of the Kth channel show a spike or 'hot spot'
  ------- K=9:    several channelcounts show spikes
                  spikes are always set to zero

  Flag#5: &1 --> scan position disturbed and corrected by PTS
  ------- &2 --> scan position corrected (+1) by author
          &4 --> scan position malfunction assumed by author

  Counts are included for an accuracy assessment of the data:
          99 -->           > 1000000
          98 -->  100000 ..  999999
          97 -->   10000 ..   99999
          96 -->    1000 ..    9999
          95 -->     100 ..     999
          94 -->      94  .      99
       <= 93 -->  true counts during a duty cycle (250 milliseconds)

  Flag#K: &1 --> calibration interpolated or of low quality
  ------- &2 --> no calibration available and flux set to 1E-06
```

For Example, the 43rd line of data-file a30487.k01 is:

```
119.4219545590.4-2.521284.96704.6111014.4028.007709.87902013400(continued)
31479513.282454E+09(continued)
```

```
25133119.006467E+07(continued)
16430010.000000E+00(continued)
12440000.000000E+00(continued)
08320000.000000E+00

representing the following measurement:
Universal Time of the Measurement:     119.4219545 days
                  (Date: 1988-04-28, Time: 10:07:36.87)
Altitude of S/C:                          590.4 km
Declination of S/C:                      -2.521 degrees
Right Ascension of S/C:                 284.967 degrees
Solar Local Time of S/C:                    4.6 h
Solar Zenith Angle of S/C:                  111 degrees
Direction of view of ASSI, Declination:    14.4 degrees
Direction of view of ASSI, Right Ascension:  28.0 degrees
Direction of view of ASSI, Earth Nadir Angle:   77 degrees
Spin duration from horizon sensors:        9.879 seconds
Scan position                               20
Flag#1: 1 (horizon sensor data were disturbed)
Flag#2: 3 (S/C flying in the sun and pinhole is ON)
Flag#3: 4 (first measurement of a scan position)
Flag#4: 0
Flag#5: 0
Wavelength channel 1 (A03): 314.7 nm
Counts     channel 1 (A03): 95 (true count rate between 100 .. 999)
Flag#K     channel 1 (A03): 1  (calibration interpolated or of low quality)
Flux       channel 1 (A03): 3.282454E+09 Rayleigh
Wavelength channel 2 (A10): 251.3 nm
Counts     channel 2 (A10): 31 (true count rate 31)
Flag#K     channel 2 (A10): 1  (calibration interpolated or of low quality)
Flux       channel 2 (A10): 9.006467E+07 Rayleigh
Wavelength channel 3 (A11): 164.3 nm
Counts     channel 3 (A11): 0
Flag#K     channel 3 (A11): 1  (calibration interpolated or of low quality)
Flux       channel 3 (A11): 0 Rayleigh
Wavelength channel 4 (A18): 124.4 nm
Counts     channel 4 (A18): 0
Flag#K     channel 4 (A18): 0
Flux       channel 4 (A18): 0 Rayleigh
Wavelength channel 5 (A12):  83.2 nm
Counts     channel 5 (A12): 0
Flag#K     channel 5 (A12): 0
Flux       channel 5 (A12): 0 Rayleigh

/* EOF */
```

==========
San Marco/ASSI metadata file review: FORMAT.SFD
==========

CCSD3FF0000500000001CCSD3CS00004MRK**001
ADIDNAME=NSSD####;
CCSD$$MARKERMRK**001CCSD3KS00002MRK**002

TECHNICAL_CONTACT: <the name and address for a technical contact for the formats>

SUBM_DATE: YYYY-MM-DD

REL_DATE: YYYY-MM-DD

REVISABLE_STATUS: <YES/NO ?>

DATA_DESCRIPTION
LOG_VOL_CLOSING_DATE:

ASSI_DATA: Solar and terrestrial atmospheric radiations between 20 and 650 nm measured aboard the Italian-US satellite SAN MARCO D/l from March 25th, 1988 through December 6th, 1988.

CONTENTS

ABBREVIATIONS

ASSI	Airglow-Solar-Spectrometer-Instrument
Lit	Literature
S/C	Spacecraft

Literature
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[1] Payload Definition Document for SAN MARCO D/L Satellite
CRA Rome, October 1987.

[2] ASSI Experimentbeschreibung
Dornier System, September 1983.

[3] Angular Response Function and Look Direction of ASSI
(Internal Paper for the ASSI Community),
K. Enninghorst and M. Roemer,
Institut fuer Astrophysik und Extraterrestrische Forschung,
Universitaet Bonn, March 1994.

sf-026A-02B

Document file is on the tape