#339

GEOS-C

MERGED NASA LASER DATA

75-027A-04C - ESGP. 00052

Earth Science

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 This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system.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

GEOS 3

MERGED NASA LASER DATA ON TAPE

75-027A-04C ESPG-00052

This data set has been restored. There were originally two 7-track, 800 BPI tapes 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 tapes were created on an IBM 360 computer and the restored tapes were created on an IBM 9021 computer. The DR and DS numbers along with the corresponding D numbers are as follows:

DR#	DS#	D#	FILES	TIME SPAN
DR005433	DS005433	D023663	1 - 9	04/19/75 - 12/31/75
		D030505	10 - 21	01/07/76 - 12/29/76

REQ. AGENT	RAND NO.	ACQ. AGENT
CMP	RC5983	JRJ

GEOS-C

MERGED NASA LASER DATA

75-027A-04C

This data set has 1 tape. Its 800 BPI, 7 track, BCD with 9 data files. Each file is one month of Laser Data beginning with April 1975 through December 1975. This data was extracted from the NASA Laser Data tapes (75-027A-04A). TRTCH=ET is required in order to copy or dump (Hex dump) this tape. The format is the same as the NASA Laser Data or SAO Laser Data.

D#	C#	FILES	TIME SPAN
D-23663	C-17739	9	4/19/75 - 12/31/75
D-30505	C-19423	12	1/07/76 - 12/29/76

GEOS-C DATA FORMAT FOR LASER DATA

INTRODUCTION

The GEOS-C satellite will be tracked by many different systems and networks of tracking stations. It is intended that this format will accomodate data taken from all tracking systems and networks as well as altimeter data taken by the satellite. As a consequence of its design characteristics this format not only meets the specifications of the GEOS-C project but also the precise orbit determination requirements of all currently existing satellites. Enclosed is a portion of this format which pertains to laser data.

Since the format is a card image representation, it is ideally suited for transferring data between the different types of computer facilities supporting the GEOS-C project research. The only character images used by the format are:

integer numbers 0 - 9

letters of the alphabet A - Z

blanks, and

minus signs

All decimal points are implied, therefore eliminating the need for that character representation.

attachment 2

Descriptions of columns 1 - 32 for all measurement types

Columns	Subset	Description
1-7	I	Satellite - ID
8-9	I	Measurement Type
		10-14 Right Ascension and Declination
		11 = Laser Optical
		20-29 Range or Range Difference
		20 = Laser
		64-69 X-Y Angles (North-South)
		68 = Laser
		70-79 Azimuth and Elevation Angles
		70 = Laser
10-11		Time System Indicator
	10	0 = Ground Received Time
		1 = Satellite Transponder/Transmitter Time
		2 = Ground Transmitted Time
	11	0 = UT-0
		1 = UT-1
		2 = UT-2
		3 = UT-C
		4 = A.1
		5 = A.3 (A.T. B.I.H.)
		6 = A-S (Smithsonian)
12-16		Station ID
17-32		GMT of Observation
	17-18	year YY
	19-21	Day of Year DDD
	22-26	Time of Day (Seconds from midnight GMT)
	27-32	Fractional Part of Seconds (in microseconds)

Columns 33-80 for laser range measurements (Data Type 20)

Columns	Subset	Description
33-35		Preprocessing Indicators
	33	0 = Data has been corrected for ionospheric refraction effects.
		1 = Data not corrected for ionospheric refraction.
	34	0 = Data has been corrected for tropospheric refraction effects.
		1 = Data not corrected for tropospheric refraction.
		2 = Data has been corrected for tropospheric refraction using the correction formulas for international laser data (see cols. 76-80).
		3 = Data not corrected for tropospheric refraction. Columns 76-80 contain coefficient for use with international laser formulas.
		4 = Data has been corrected for tropospheric refraction effects and meteorological data is present.
		5 = Data not corrected for tropospheric refraction and meteorological data is present.
	35	0 = Data has been corrected for transponder delay effects.
		1 = Data not corrected for transponder delay.
36-54		Observation Data
	36-45	Range or Range Difference (Km)
	46-54	Range or Range Difference XXX.XXXXXX Meters
55-56		Preprocessing Indicators
	55	Preprocessing Report
		0 = Report not indicated
		1 - 9, A - Z values to be assigned
	56	Not used

Columns	Subset	Description
	57-60	Surface Pressure XXXX Millibars
	61-63	Surface Temperature XXX° KELVIN
	64-66	Relative Humidity at Surface XXX percent
	67-68	Not used
	69-73	Measurement standard deviation XX.XXX Meters
	74-75	Not used
	76-80	Tropospheric refraction correction XX.XXX Meters

Columns 33-80 for Laser X-Y angles and Laser Azimuth and Elevation angles (Types 68,70)

Columns	Subset	Description
33-34		Refraction Indicators
	33	0 = Data has been corrected for ionospheric effects.
		1 = Data nor corrected for ionosphere
	34	0 = Data has been corrected for tropospheric effects.
		1 = Data not corrected for troposphere
35		Not Used.
36-54		Observation Data
	36-38	Azimuth or X-angle (degrees). Sign of X-angle appears in column 36.
	39-40	Azimuth or X-angle (arc minutes)
	41-45	Azimuth or X-angle XX.XXX Arc Seconds
	46	Sign of Y-angle
	47-48	Elevation or Y-angle (degrees)
	49-50	Elevation or Y-angle (minutes)
	51-54	Elevation or Y-angle XX.XX Arc Seconds
55-57		Not Used.
58-61		Standard deviation in X-angle or azimuth XX.XX Arc Minutes
62-65		Standard deviation in elevation or Y-angle XX.XX Arc Minutes
66		Preprocessing Report 0 = Report not indicated 1 - 9, A - Z Values to be assigned.
67-71		Tropospheric refraction correction to X-angle XXX.XX Arc Minutes

TABLE 1

VALUES OF GEOS III RANGE CORRECTION FROM FORMULA*

$\gamma°$	$\Delta R-M$	$d\Delta R/d\theta$	$\gamma°$	$\Delta R-M$	$d\Delta R/d\theta$
0.	-1.3038		31.	-1.3629	.0035
1.	-1.3047	-.0008	32.	-1.3591	.0039
2.	-1.3084	-.0037	33.	-1.3548	.0043
3.	-1.3133	-.0049	34.	-1.3501	.0047
4.	-1.3188	-.0055	35.	-1.3450	.0051
5.	-1.3244	-.0056	36.	-1.3395	.0055
6.	-1.3301	-.0056	37.	-1.3337	.0059
7.	-1.3355	-.0055	38.	-1.3274	.0063
8.	-1.3409	-.0053	39.	-1.3207	.0067
9.	-1.3459	-.0050	40.	-1.3136	.0071
10.	-1.3507	-.0047	41.	-1.3061	.0075
11.	-1.3551	-.0044	42.	-1.2982	.0079
12.	-1.3592	-.0041	43.	-1.2899	.0083
13.	-1.3629	-.0037	44.	-1.2812	.0087
14.	-1.3663	-.0034	45.	-1.2722	.0091
15.	-1.3693	-.0030	46.	-1.2627	.0094
16.	-1.3719	-.0026	47.	-1.2529	.0098
17.	-1.3741	-.0022	48.	-1.2427	.0102
18.	-1.3759	-.0018	49.	-1.2321	.0106
19.	-1.3774	-.0014	50.	-1.2211	.0110
20.	-1.3784	-.0010	51.	-1.2098	.0113
21.	-1.3790	-.0006	52.	-1.1981	.0117
22.	-1.3793	-.0002	53.	-1.1861	.0121
23.	-1.3791	.0002	54.	-1.1737	.0124
24.	-1.3785	.0006	55.	-1.1609	.0128
25.	-1.3775	.0010	56.	-1.1478	.0131
26.	-1.3761	.0014	57.	-1.1343	.0135
27.	-1.3743	.0018	58.	-1.1205	.0138
28.	-1.3721	.0022	59.	-1.1063	.0142
29.	-1.3694	.0026	60.	-1.0918	.0145
30.	-1.3664	.0030	61.	-1.0770	.0148
			62.	-1.0619	.0151
			63.	-1.0464	.0155

$$*\Delta R = [1.411 - 0.0036 (\frac{\nu}{\nu+3})] \cos (\nu - 22.473) \text{ meters}$$

TABLE 2

Range Corrections for GEOS-III

Incidence Angle (Degrees)	Range Correction - Meters		
	Experimental	"Ratio" Program	Formula
0	-1.316	-1.303	-1.304
10	-1.355	-1.350	-1.350
20	-1.367	-1.379	-1.379
30	-1.356	-1.366	-1.366
40	-1.291	-1.314	-1.314
45	-1.273	-1.273	-1.272
50	-1.221	-1.219	-1.219
60	-1.084	-1.085	-1.085

TABLE 3

CROSS SECTION VS INCIDENCE ANGLE - GEOS III

	Cross Section - Meters^2 x 10^6			
Incidence Angle	Min.	Max.	Retro Program	Formula
0	1.86	1.86	4.40	2.0
10	1.86	5.56	7.20	3.1
20	9.27	18.6	14.3	9.4
30	18.6	29.7	23.2	20.2
40	24.1	46.4	30.1	28.7
45	27.8	46.4	30.9	30.0
50	27.8	37.1	27.5	28.7
60	9.27	18.6	17.4	20.2

8.3.5.1.2 Range and Range Difference*

Columns	Subset	Description
1-7		Satellite - ID
8-9		Measurement Type 20-29 Range or Range Difference 20 = Laser 21 = C-Band Radar 22 = C-Band VLBI Range Difference Radars 23 = DSN S-Band Radar 24 = USB Radar 25 = GRARR S-Band Radar 26 = GRARR ATS-F S-Band Radar 27 = GRARR VHF Radar
10-11		Time System Indicator
	10	0 = Ground Received Time 1 = Satellite Transponder/Transmitter Time 2 = Ground Transmitted Time 3 = Satellite Receiver Time
	11	0 = UT-0 1 = UT-1 2 = UT-2 3 = UT-C 4 = A.1 5 = A.3 (A.T. B.I.H.) 6 = A-S (Smithsonian)

*Range Difference - Time Delay VLBI

Columns	Subset	Description
12-16		Station ID
17-32		GMT of Observation
	17-18	Year YY
	19-21	Day of Year DDD
	22-26	Time of Day (Seconds from midnight GMT)
	27-32	Fractional Part of Seconds (in microseconds)
33-35		Preprocessing Indicators
	33	0 = Data has been corrected for ionospheric refraction effects. 1 = Data not corrected for ionospheric refraction.
	34	0 = Data has been corrected for troposheric refraction effects. 1 = Data not corrected for tropospheric refraction. 2 = Data has been corrected for tropospheric refraction using the correction formulas for international laser data (see cols. 76-80). 3 = Data not corrected for tropospheric refraction. Columns 76-80 contain coefficient for use with international laser formulas.
	35	0 = Data has been corrected for transponder delay effects. 1 = Data not corrected for transponder delay.
36-54		Observation Data
	36-45	Range or Range Difference (Km)
	46-54	Range or Range Difference XXX.XXXXXX Meters

Columns	Subset	Description
55-56		Preprocessing Indicators
	55	Preprocessing Report 0 = Report not indicated 1 - 9, A - Z values to be assigned.
	56	Transponder type for pulse radars 1 - coherent 2 - non-coherent or Transponder Channel for GRARR 1 = Channel A or 1st sidetone 2 = Channel B or 2nd sidetone 3 = Channel C or 3rd sidetone
57-61		Reference station number for range differencing or transmitting station number for station-to-satellite-to satellite-to-station data.
62-68		Relay satellite-ID for satellite-to-satellite data.
69-73		Measurement standard deviation XX.XXX Meters
74		Range ambiguity indicator For DSC S-Band ? 1 - MARK 1A (824809582.0 m) 2 - TAU (151285510.38518 m) For USB 1 - 824809582.0 m For GRARR S-Band 1 - 18737031.3 m 2 - 4684257.8 m 3 - 936851.6 m
75		Not used
76-80		Tropospheric refraction correction XX.XXX Meters or, Coefficient of Tropospheric Refraction for international lasers (see Col. 34) XX.XXX Meters

8.5.1.3 Range Rate, and Range Rate Differences*

Columns	Subset	Description
1-7		Satellite - ID
8-9		Measurement Type _
		30-37 Range Rate or Range Rate Difference
		30 = Combined DSN/USB Radars
		31 = C-Band Radar
		32 = C-Band VLBI Range Rate Difference Radars
		33 = DSN S-Band Radar
		34 = USB Radar
		35 = GRARR S-Band Radar
		36 = GRARR ATS-F C-Band Radar
		37 = GRARR VHF Radar
10-11		Time System Indicator
	10	0 = Ground Received Time
		1 = Satellite Transponder/Transmitter Time
		2 = Ground Transmitted Time
		3 = Satellite Receiver Time
	11	0 = UT-0
		1 = UT-1
		2 = UT-2
		3 = UT-C
		4 = A.1
		5 = A.3 (A.T. B.I.H.)
		6 = A-S (Smithsonian)

*Range Rate Differences - Fringe Rate VLBI

Columns	Subset	Description
12-16		Station ID
17-32		GMT of Observation
	17-18	Year YY
	19-21	Day of Year DDD
	22-26	Time of Day (Seconds from midnight GMT)
	27-32	Fractional Part of Seconds (in microseconds)
33-35		Preprocessing Indicators
	33	0 = Data has been corrected for ionospheric refraction effects. 1 = Data not corrected for ionospheric refraction.
	34	0 = Data has been corrected for tropospheric refraction effects. 1 = Data not corrected for tropospheric refraction.
	35	Receiver Mount Type 1 = X-Y (East-West) 2 = X-Y (North-South) 3 = Azimuth-Elevation 4 = Hour angle-declination
36-42		Counting interval for average range rate data (Types 30, 33, 34). XXXXX.XX Seconds or, Tropospheric refraction correction for other range rate data types. XXXXX.XX cm/Second
43-55		Observation Data
	43-49	Range rate or range rate difference XXXX.XXX Km/Second
	50-55	Range rate or range rate difference XXX.XXX Millimeters/Second

Columns	Subset	Description
56		Preprocessing Report 0 = Report not indicated. 1 - 9, A - Z Values to be assigned.
57-61		Reference station number for range differencing, or transmitting station number for station-to-satellite-to-satellite-to-station data or average range rate data.
62-68		Relay satellite - ID for satellite-to-satellite data.
69-73		Measurement Standard deviation XXX.XX millimeters/second
74		Transmitter or reference station Mount type 1 = X-Y (East-West) 2 = X-Y (North-South) 3 = Azimuth-Elevation 4 = Hour angle-declination
75-77		Receiver antenna axis displacement XX.X Meters
78-80		Transmitter or reference station Antenna axis displacement XX.X Meters

8.3.5.1.7 Azimuth/Elevation and X-Y Angles

Columns	Subset	Description
1-7		Satellite - ID
8-9		Measurement Type
		60-63 X-Y Angles (East-West)
		60 = USB Radar
		64-69 X-Y Angles (North-South)
		64 = USB Radar
		65 = GRARR S-Band Radar
		66 = GRARR ATS-F C-Band Radar
		67 = GRARR VHF Radar
		70-79 Azimuth and Elevation Angles
		70 = Laser
		71 = C-Band Radar
		73 = DSN S-Band Radar
10-11		Time System Indicator
	10	0 = Ground Received Time
		1 = Satellite Transponder/Transmitter Time
		2 = Ground Transmitted Time
		3 = Satellite Receiver Time
	11	0 = UT-0
		1 = UT-1
		2 = UT-2
		3 = UT-C
		4 = A.1
		5 = A.3 (A.T. B.I.H.)
		6 = A-S (Smithsonian)

Columns	Subset	Description
12-16		Station ID
17-32		GMT of Observation
	17-18	Year
		YY
	19-21	Day of Year
		DDD
	22-26	Time of Day (seconds from midnight GMT)
	27-32	Fractional Part of Seconds (in microseconds)
33-34		Refraction Indicators
	33	0 = Data has been corrected for ionospheric effects. 1 = Data not corrected for ionosphere
	34	0 = Data has been corrected for tropospheric effects. 1 = Data not corrected for troposphere
35		Not Used.
36-54		Observation Data
	36-38	Azimuth or X angle (degrees). Sign of X angle appears in column 36.
	39-40	Azimuth or X angle (arc minutes)
	41-45	Azimuth or X angle XX.XXXX Arc Seconds
	46	Sign of Y angle
	47-48	Elevation or Y angle (degrees)
	49-50	Elevation or Y angle (minutes)
	51-54	Elevation or Y angle XX.XX Arc Seconds

Columns	Subset	Description
55-57		Not Used.
58-61		Standard deviation in X angle or azimuth XX.XX Arc Minutes
62-65		Standard deviation in elevation or Y angle XX.XX Arc Minutes
66		Preprocessing Report 0 = Report not indicated 1 - 9, A - Z Values to be assigned.
67-71		Tropospheric refraction correction to X angle XXX.XX Arc Minutes
72-76		Tropospheric refraction correction to Y angle or elevation XXX.XX Arc Minutes
77-80		Not Used.

(NFILES,MODE,DENSITY,TAPE DESCRIPTION)
5 BCD 800 NASA LASER DATA MERGED TAPE
****

FILE NO. 1
66 RECORDS 0 READ ERRORS April '75 Sept '75 253 rec approx. 250' of tape
53.7 FEET OF TAPE

FILE NO. 2
129 RECORDS 0 READ ERRORS May '75 October '75 112 rec. approx. 100' of tape — 1294' total
104.6 FEET OF TAPE

NOVEMBER '75 103 rec. approx 100' of tape

FILE NO. 3
185 RECORDS 0 READ ERRORS June '75
150.5 FEET OF TAPE

DECEMBER '75 87 rec. approx 75' of tape

FILE NO. 4
386 RECORDS 0 READ ERRORS July '75
313.9 FEET OF TAPE

Approx total tape length 1469'

FILE NO. 5
449 RECORDS 0 READ ERRORS Aug. '75
364.7 FEET OF TAPE

*** NO. OF FILES CHECKED = 5 NO. OF FEET OF TAPE = 987.5
TOTAL NO. OF PHYSICAL RECORDS = 1215
TOTAL NO. OF READ ERRORS = 0

```
75027012013 70687510977474  5239040       116835589212300101429906 8       000 350475027017013 70687510  REC     1, LENGTH  7200
977474  5239110 10 846904 43 75406   0   0        0        0  75027012013 70687510977484  5099040
 112354810306200101429906 8      000 333775027017013 70687510977484  5099110  8 831194 45532438   0
 0        0        0  75027012013 70687510977496  4914040       107366609580600101429906 8      000 3157
75027017013 70687510977496  4914110  51220918 49233888   0   0        0        0  75027012013 70687510
977502  4837040       105049527336600101429906 8      000 307475027017013 70687510977502  4837110  327
22896 51132914   0   0        0        0  75027012013 70687510977507  4776040       103216734957800101 4
299068      000 301075027017013 70687510977507  4776110  14928066 52463976   0   0        0        0
75027012013 70687510977513  4720040       101142474130600101429906 8      000 293875027017013 70687510
977513  4720110359371857 4 5440 776   0   0        0        0  75027012013 70687510977521  4633040
  986 319714640010142999068      000 285275027017013 70687510977521  4633110356105214 8 5713  69   0
 0        0        0  75027012013 70687510977530  4557040       960793946944001014299068      000 2766
75027017013 70687510977530  4557110351261675 8 60 5 861   0   0        0        0  75027012013 70687510
977534  4515040       950779221296001014299068      000 273375027017013 70687510977534  4515110348 59
 8145 61201047   0   0        0        0  75027012013 70687510977535  4506040       948395673350001014
299068      000 272575027017013 70687510977535  4506110348195443 4 61383658   0   0        0        0
75027012013 70687510977536  4497040       946 61353385001014299068      000 271775027017013 70687510
977536  4497110347394623 0 61564422   0   0        0        0  75027012013 70687510977537  4488040
  943775860591001014299068      000 270975027017013 70687510977537  4488110346583035 2 6215  55   0
 0        0        0  75027012013 70687510977538  4480040       941539713698001014299068      000 2702
75027017013 70687510977538  448011034616 2402 62333962   0   0        0        0  75027012013 70687510
977543  4452040       931115095164001014299068      000 266775027017013 70687510977543  445211034227
34102 64 13635   0   0        0        0  75027012013 70687510977544  4450040       929183519017001014
299068      000 266175027017013 70687510977544  4450110341384910 2 64183786   0   0        0        0
75027012013 70687510977545  4443040       927303868255001014299068      000 265575027017013 70687510
977545  444311034048  176 64352146   0   0        0        0  75027012013 70687510977547  4432040
  923701325937001014299068      000 264375027017013 70687510977547  4432110339 346758 65 83262   0
 0        0        0  75027012013 70687510977553  4387040       914171898825001014299068      000 2611
75027017013 70687510977553  4387110333184675 8 66401304   0   0        0        0  75027012013 70687510
977760  6639040       158564165676000101429906 8      000 535775027017013 70687510977760  663911022347
41938 26292122   0   0        0        0  75027012013 70687510977773  6883040       166334810729300101 4
299068      000 577875027017013 70687510977773  6883110222594802 5 24242217   0   0        0        0
75027012013 70637511025862  6993040       129694066301000101228704 0      000 400475027017013 70637511
025862  6993110113534973 9 36331139   0   0        0        0  75027012013 70637511025863  6976040
 1292102810387001012287040      000 398475027017013 70637511025863  6976110113422210 7 3646 559   0
 0        0        0  75027012013 70637511025864  6959040       128728674849000101228704 0      000 3964
75027017013 70637511025864  6959110113304766 5 36585641   0   0        0        0  75027012013 70637511
025865  6943040       128249269098100101228704 0      000 394575027017013 70637511025865  694311011318
54309 37115932   0   0        0        0  75027012013 70637511025868  6893040       126824587128000101 2
287040      000 388775027017013 70637511025868  6893110112424045 7 37511606   0   0        0        0
75027012013 70637511025875  6783040       123582818207500101228704 0      000 375775027017013 70637511
025875  6783110111123859 8 3925 329   0   0        0        0  75027012013 70637511025882  6682040
 1204638867618001012287040      000 363575027017013 70637511025882  6682110109331105 8 41 13990   0
 0        0        0  75027012013 70637511025886  6627040       118740620926300101228704 0      000 3569
75027017013 70637511025886  6627110108313483 2 41574591   0   0        0        0  75027012013 70637511
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File 1

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