DSC#756

NSDF
SL-21E
JOVIAN SATELLITES DIMS ON TAPE

NSDF
SL-21G
SATURNIAN SATELLITES DIMS ON TAPE

SL-21I
URANIAN SATELLITES DIMS ON TAPE

SL-21K
URANIAN SATELLITES MDIMS ON TAPE

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 This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system.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

NSDF

SL-21E PSPG-00708

JOVIAN SATELLITES DIMS ON TAPE

THIS DATASET CONSISTS OF ONE MAGNETIC TAPE. THE TAPE IS 9-TRACK, 6250 BPI, BINARY, WITH 4 FILES OF DATA CONTAINED. THE TAPE WAS CREATED ON AN IBM COMPUTER. SUPPORT DOCUMENTATION,CONTAINED IN THE DATASET CATALOG, SHOULD BE SENT WITH THE TAPE. THE D AND THE C NUMBER IS LISTED BELOW.

D#	C#	FILES
D-107966	C-031721	4

Equations to find latitude and longitude of a given pixel (LINE and SAMPLE)

These equations are for the Sinusoidal Equal Area projection and give the latitude and longitude on degrees of the center of a desired pixel. The enclosed Appendix J "Geometric Definition of a Pixel" contains detailed information pertaining to latitude and longitude of a pixel.

$$\text{Latitude} = (-(\text{PROJ\_TRANSLATION}(1)) - \text{LINE} + .5) \times \text{MAP\_SCALE}$$

$$\text{Longitude} = \frac{(-(\text{PROJ\_TRANSLATION}(2)) - \text{SAMPLE} + .5)}{\text{COSINE (Latitude)}} \times \text{MAP\_SCALE}$$

The following is an explanation of each variable in the equations:

Latitude	The latitude of the center of the LINE pixel.
Longitude	The longitude of the center of the SAMPLE pixel.
LINE and SAMPLE	This is the line and sample location of a specific pixel on the image file. Pixel locations are defined by whole numbers.
	Io, Europa, Ganymede, Callisto
PROJ_TRANSLATION(1)	-1440.
PROJ_TRANSLATION(2)	-2880.
MAP_SCALE	0.0625
	(This information can be found in the text of the enclosed half tone hard copy for each file and the sample data dump.)

SL-21 E

```
 *** PROGRAM: COUNT ***  VERSION: 10-AUG-89 PROCESSING DATE: 18-OCT-90 13:01:45


DEVICE:  MUB0:                  TAPE ID:  FLG0027_01


RECORD COUNT ON FILE NUMBER     1

RECORDS     1 TO    16 HAVE RECORD LENGTHS OF   512 BYTES
RECORDS    17 TO  2897 HAVE RECORD LENGTHS OF  5762 BYTES

FORMATTED IPSYS LABEL INFORMATION

TARGET='IO'                             PROJECTION='SINU'
LATITUDE_RANGE='  -90.00000000000   90.00000000000'
LONGITUDE_RANGE=' -180.00000000000  180.00000000000'
MAP_SCALE='   0.06250000000'            CENTER_LATITUDE='0.'
CENTER_LONGITUDE='    0.00000000000'    MAP_ROTATION='    0.00000000000'
NEW_POLE_LATITUDE='    0.00000000000'   NEW_POLE_LONGITUDE='    0.00000000000'


PROCESSING HISTORY TEXT INFORMATION

@ 22-MAY-85 GEOM
@ 10-MAR-86 NEWMAP  01-16-86  AREA:    1    1 2881 5761 LINC:  1.0 SINC:  1.0
@ 16-OCT-90 TAPEIN  IA=   1   1  2881  5761  8-BIT TYPE:MUB0:PA314       /FILE:  1
@ 17-OCT-90 TAPOUT  IA=   1   1 2881 5761  8-BIT TAPE:MUB0:FLG0027_01  /FILE:  1


DEVICE:  MUB0:                  TAPE ID:  FLG0027_01


RECORD COUNT ON FILE NUMBER     2

RECORDS     1 TO    16 HAVE RECORD LENGTHS OF   512 BYTES
RECORDS    17 TO  2896 HAVE RECORD LENGTHS OF  5760 BYTES

FORMATTED IPSYS LABEL INFORMATION

TARGET='EUROPA'                         PROJECTION='SINU'
LATITUDE_RANGE='-90.0000000000,   90.0000000000'
LONGITUDE_RANGE='-180.0000000000,  180.0000000000'
MAP_SCALE='0.06250000000'               CENTER_LATITUDE='    0.0000000000,'
CENTER_LONGITUDE='0.0000000000'         MAP_ROTATION='0.0000000000'
NEW_POLE_LATITUDE='0.00000000000'       NEW_POLE_LONGITUDE='0.0000000000'
PROJ_TRANSLATION='-1440.00000,   -2880.00000'
POSITIVE_LONGITUDE='WEST'

PROCESSING HISTORY TEXT INFORMATION

@ 24-APR-84 SUBJECT=EUROPA NEW SCAN AFTER JI SIMP 0
@ 24-APR-84 **DB2DB**  INPUT NL:NS 2700 4400 PROCESSED SL:SS:NL:NS    1    1 2700 4400
@
@
@  8-FEB-90 GEOM  (Rows,Columns):    0    0  T-file: TFILE
@ 15-OCT-90 TAPEIN  IA=   1   1  2880  5760  8-BIT TYPE:MUA0:AFLG0027    /FILE:  1
@ 17-OCT-90 TAPOUT  IA=   1   1 2880 5760  8-BIT TAPE:MUB0:FLG0027_01  /FILE:  1
```

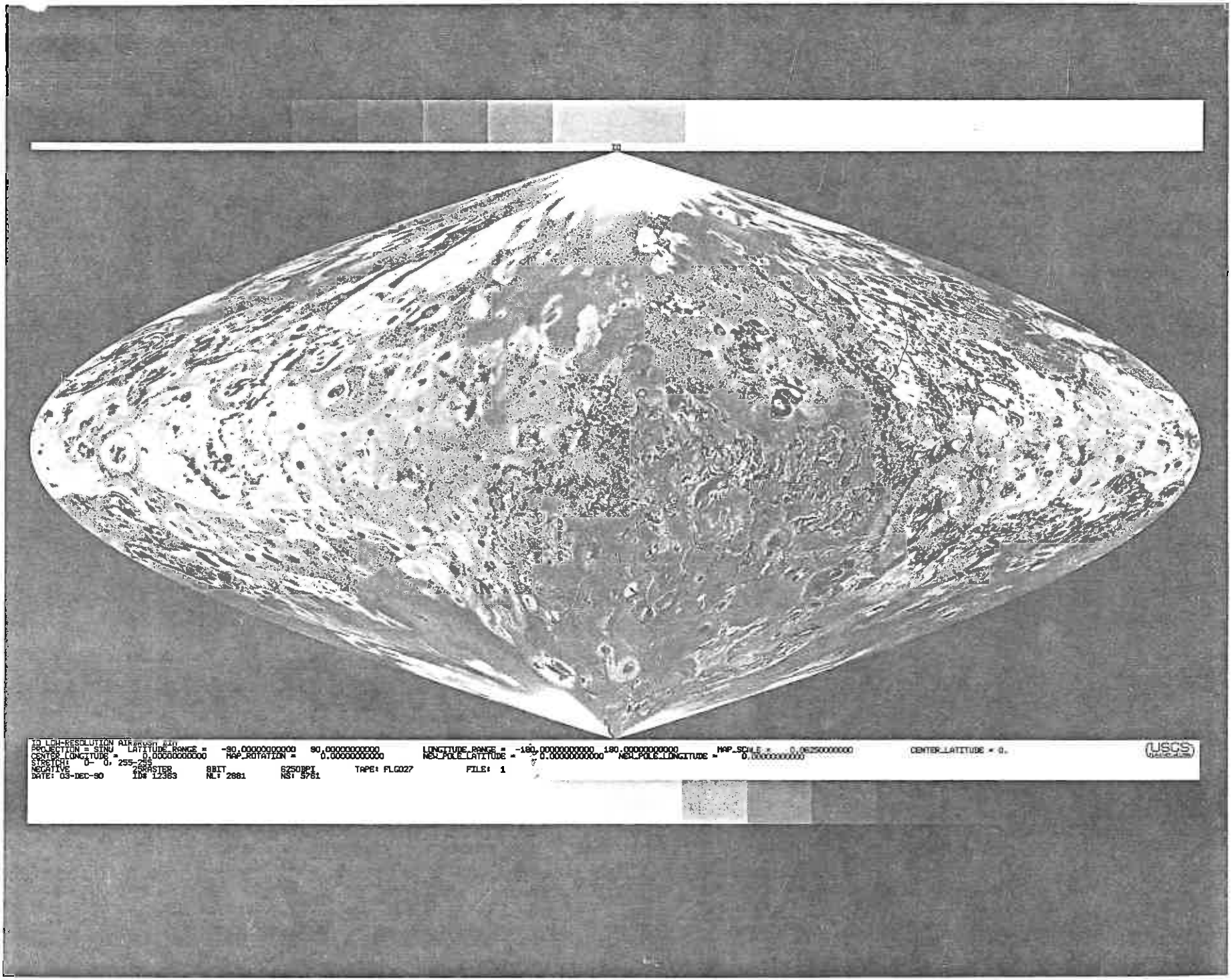
Io

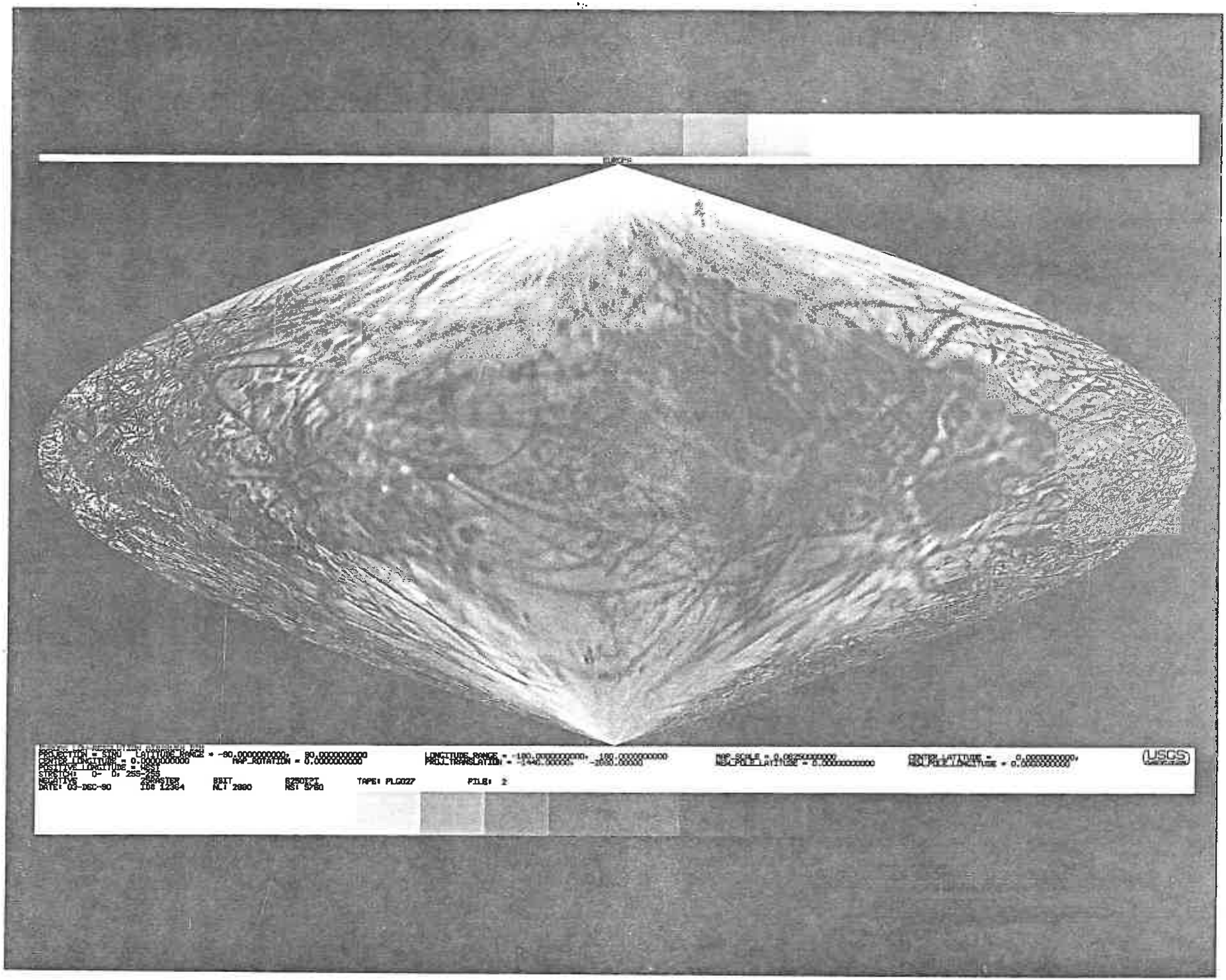
Europa

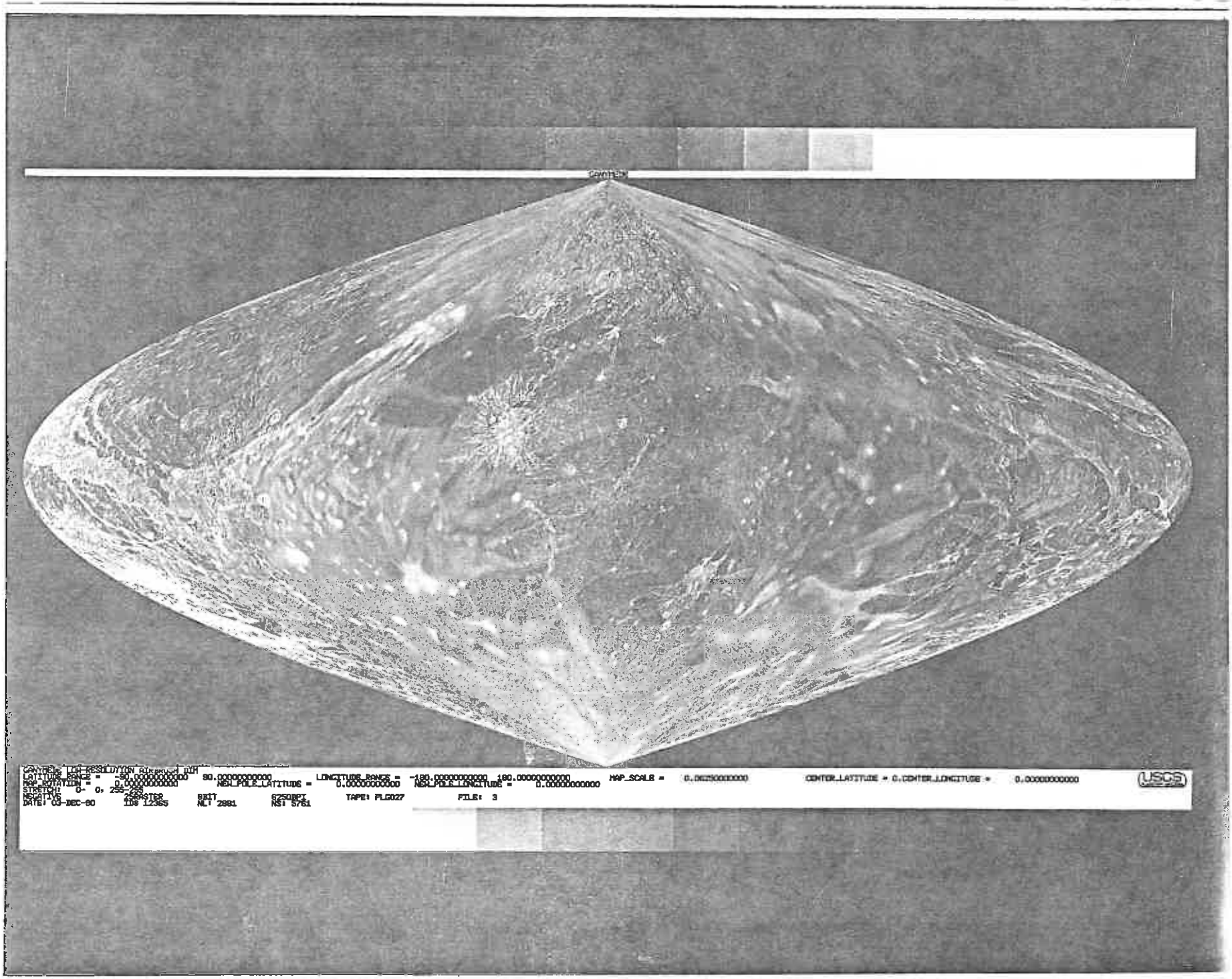
```
DEVICE:  MUB0:                  TAPE ID:  FLG0027_01

RECORD COUNT ON FILE NUMBER     3

RECORDS     1 TO    16 HAVE RECORD LENGTHS OF   512 BYTES
RECORDS    17 TO  2897 HAVE RECORD LENGTHS OF  5762 BYTES

FORMATTED IPSYS LABEL INFORMATION

                                    TARGET='GANYMEDE'
LATITUDE_RANGE='  -90.00000000000   90.00000000000'
LONGITUDE_RANGE=' -180.00000000000  180.00000000000'
MAP_SCALE='   0.06250000000'              CENTER_LATITUDE='0.'
CENTER_LONGITUDE='    0.00000000000'      MAP_ROTATION='    0.00000000000'
NEW_POLE_LATITUDE='    0.00000000000'     NEW_POLE_LONGITUDE='    0.00000000000'


PROCESSING HISTORY TEXT INFORMATION

@ 20-SEP-83 SUBJECT=GANYMEDE RAW DATA (SCANNED VERSION OF NEW AIRBRUSH)
@ 11-MAR-86 NEWMAP  01-16-86  AREA:    1    1 2881 5761 LINC:  1.0 SINC:  1.0
@ 15-OCT-90 TAPEIN  IA=   1   1  2881  5761  8-BIT TYPE:MUA0:AFLG0027    /FILE:  1
@ 17-OCT-90 TAPOUT  IA=   1   1 2881 5761  8-BIT TAPE:MUB0:FLG0027_01  /FILE:  1


DEVICE:  MUB0:                  TAPE ID:  FLG0027_01


RECORD COUNT ON FILE NUMBER     4

RECORDS     1 TO    16 HAVE RECORD LENGTHS OF   512 BYTES
RECORDS    17 TO  2897 HAVE RECORD LENGTHS OF  5762 BYTES

FORMATTED IPSYS LABEL INFORMATION

TARGET='CALLISTO'                       PROJECTION='SINU'
LATITUDE_RANGE='-90.0000000000,   90.0000000000'
LONGITUDE_RANGE='-180.0000000000,  180.0000000000'
MAP_SCALE='0.06250000000'               CENTER_LATITUDE='    0.0000000000,'
CENTER_LONGITUDE='0.0000000000'
PROJ_TRANSLATION='-1440.00000,   -2880.00000'
POSITIVE_LONGITUDE='WEST'

PROCESSING HISTORY TEXT INFORMATION

@ 18-MAY-84 SUBJECT=CALLISTO SIMP ORIG SCAN
@ 21-MAY-84 **DB2DB**  INPUT NL:NS 2700 4400 PROCESSED SL:SS:NL:NS    1    1 2700 4400
@  7-APR-87 GEOM  (Rows,Columns):    0    0  T-file: AIRT.DAT
@ 15-OCT-90 TAPEIN  IA=   1   1  2881  5761  8-BIT TYPE:MUA0:AFLG0027    /FILE:  1
@ 17-OCT-90 TAPOUT  IA=   1   1 2881 5761  8-BIT TAPE:MUB0:FLG0027_01  /FILE:  1
*** END ***  11:12(connect)    2:50.62(cpu) 11613(I/0)   154(faults)
```

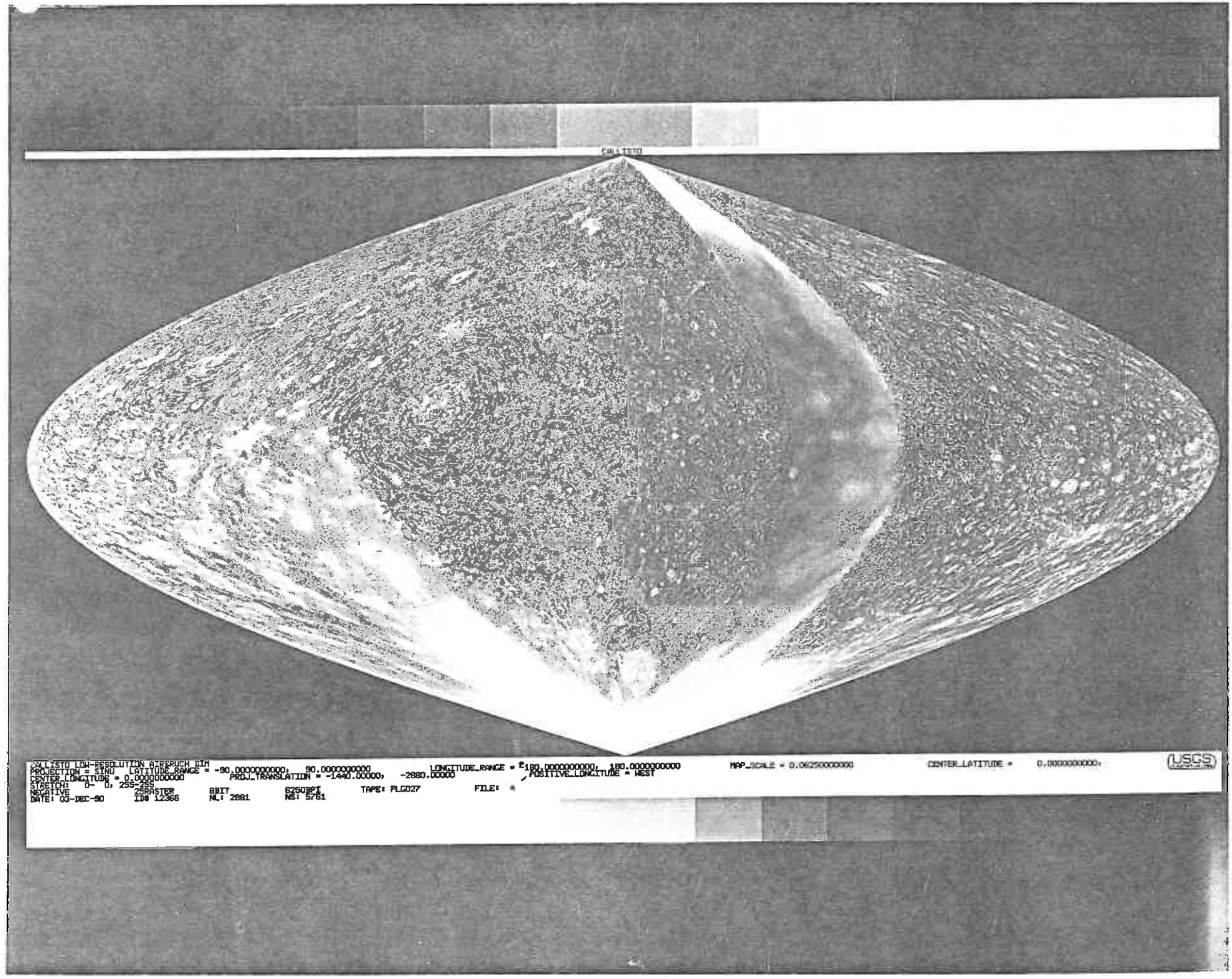
Ganymede

Callisto


IO LOW-RESOLUTION AIRBRUSH MAP
PROJECTION = SINU LATITUDE_RANGE = -90.000000000 90.000000000 LONGITUDE_RANGE = -180.000000000 180.000000000 MAP_SCALE = 0.06250000000 CENTER_LATITUDE = 0.
CENTER_LONGITUDE = 0.000000000 MAP_ROTATION = 0.000000000 NEW_POLE_LATITUDE = 0.000000000 NEW_POLE_LONGITUDE = 0.000000000
STRETCH: 0- 0, 255-255
NEGATIVE 2MASTER 8BIT 6250BPI TAPE: FLG027 FILE: 1
DATE: 03-DEC-90 ID# 12383 NL: 2881 NS: 5761
USGS


PROJECTION = SINU LATITUDE RANGE = -90.000000000, 90.000000000
CENTER LONGITUDE = 0.000000000 MAP_ROTATION = 0.000000000
POSITIVE LONGITUDE = WEST
STRETCH 0- 0; 255-255
NEGATIVE 255
DATE: 03-DEC-90 TIME 12364 ALT 2980 RST 5760
TAPE: PLG027 FILE: 2
LONGITUDE RANGE = -180.000000000, 180.000000000
MAP SCALE = 0.062500000
CENTER LATITUDE = 0.000000000°
USGS


CENTER
GANYMEDE LOW-RESOLUTION MOSAIC WITH
LATITUDE_RANGE = -90.0000000000 90.0000000000 LONGITUDE_RANGE = -180.0000000000 180.0000000000 MAP_SCALE = 0.0625000000 CENTER_LATITUDE = 0.0 CENTER_LONGITUDE = 0.0000000000
MAP_ROTATION = 0.0000000000 NEW_POLE_LATITUDE = 0.0000000000 NEW_POLE_LONGITUDE = 0.0000000000
STRETCH: C- 0, 255-255
NEGATIVE 256PIXEL/IN 8BIT 6250BPI TAPE: FLG027 FILE: 3
DATE: 03-DEC-80 IDS 12365 NLT 2881 NST 5761
USGS


CALLISTO
CALLISTO LOW-RESOLUTION AIRBRUSH MIM
PROJECTION = SINU LATITUDE_RANGE = -90.000000000, 90.000000000 LONGITUDE_RANGE = -180.000000000, 180.000000000 MAP_SCALE = 0.06250000000 CENTER_LATITUDE = 0.000000000,
CENTER_LONGITUDE = 0.000000000 PROJ_TRANSLATION = -1440.00000, -2880.00000 POSITIVE_LONGITUDE = WEST
STRETCH: 0- 0, 255-255
NEGATIVE 2SRASTER 8BIT 625DPI TAPE: PLG027 FILE: 4
DATE: 03-DEC-90 ID# 12366 NL: 2881 NS: 5761
USGS

USGS Tape File Array Format

Magnetic tapes are 9 track with a density of 800, 1600, or 6250 BPI. The track type and density should be clearly labeled on the tape reel face.

A magnetic tape will contain one or more array files separated by end-of-file marks (EOF). The last file on a tape is indicated by two EOF's in succession at the end of the file. Contained within a file are a series of records separated by inter-record gaps.

LABEL FORMAT

The first part of each file may contain label information. Flagstaff presently has two label formats: the "new" format has 512 byte records and the "old" format has 72 byte records.

New format: Labels have the following 16-bit words in the first record.

Word 1	number of lines
Word 2	number of samples
Word 6	format code: 8 = 8-bit integer 16 = 16-bit integer 32 = 32-bit real
Word 9	number of 256 word (512 byte) records used for labels, all of which precede the first data record.

Old format: Labels with 72 byte records contain the number of lines (NL) and the number of bytes per line (NB) in the first record. Decode them by READ ( ), NL, NB with FORMAT (T33,2I4).

DATA FORMAT

Data records are unblocked. For each line in an array there is a corresponding physical tape record separated by inter-record gaps. The number of lines in an array equals the number of data records in a file. For 8-bit data (8 bits per array element) the number of samples in the array will equal the number of bytes in the record. For 16-bit data (16-bit integer word per element) the number of samples in the array will equal the number of bytes in the record divided by two. It should be noted that on some computers, there may be a slight incompatibility in how 16-bit integer records are read in from tape. If the computer you are using has IBM compatible tape units then you will need to swap the two bytes which make up the 16-bit word before using 16-bit integer words. If the image array pixels are 32-bit floating point values, then swap bytes: 1 2 3 4 4 3 2 1.

APPENDIX B

IMAGE LABELS

Image files in the PICS system contain label information located at the beginning of the file. These labels contain pertinent information about the image. These labels describe the size of the image array, in lines and samples; the type of image data, 8-bit unsigned integer, 16-bit integer, or 32-bit floating point files; SPICE information such as viewing geometry and camera conditions, and processing history text. A user can interrogate and modify the image labels with the LABELS program.

PICS labels exist on both disk and magnetic tape files. On disk files, they occupy 512-byte blocks at the start of the file. The home block, the first block in an image file, contains a parameter indicating the number of 512-byte blocks which make up the labels. On magnetic tape, the labels are contained in 512-byte records at the beginning of the file. These records are exact copies of what would be found on a disk file.

Image labels are divided into four sections; there is a home block section, a histogram section, a keyword label section, and a processing history section. The tables shown below give descriptions of the contents and permitted values of each label section.

LABEL SECTIONS

SECTION 1 - The Home block. This section is contained in the first 512-byte block of an image file. It contains information about the image contained in the file, and contains pointers to the other label sections within the file. The format of this block is binary and a detailed description is provided in the description the home block, shown below.

SECTION 2 - The Histogram section, disk blocks 2 to M. These blocks hold the histogram of the image. These blocks may be empty, but 'DISKLO' subroutine will reserve two blocks when labels are initialized. The histogram area consists of 256 bins with each bin a VAX 32-bit long word. The histogram is normalized for 16-bit and 32-bit data. The RMIN and RSCL parameters in the home block section, shown below, specifies the normalization

coefficients.

SECTION 3 - The Keyword label section, disk blocks M+1 to N. The Keyword label area contains information necessary to describe and process an image. Keywords contain information such as mission, spacecraft number, picture number, camera, target, exposure time, spectral information, geometry information, camera state, reseau locations, and other processing information. Keywords take the form: KEYWORD='xxxxxxxxx', where keyword indicates the type of information and xxxxxx contains the value of the keyword. The keywords and associated information are ASCII character strings. Keywords are separated by at least one blank character and the information associated with a keyword is always contained within quotes. A description of permitted keywordS can be found in the keyword label section shown below.

SECTION 4 - The processing history section, disk blocks N+1 to 0. This section is reserved for processinng history text. Each program that creates an output image file copies the label information from the input file to the output files and appends a processing text entry to the history text. Processing history text will consist of an ASCII character string of varying length not to exceed 250 characters. The first 20 characters of the processing history have a specific format as outlined below:

@ dd-mmm-yy program (any ascii string)

character 1	= '@' indicates begining of history text string
character 2	= blank character
characters 3-11	= dd - day of year, mmm - month , yy - year
characters 13-19	= name of program which processes image file
characters 20-n	= short descriptive text of program processing parameters

Description of First Label Block (Home Block)

Word	Description
1	Number of lines in image array
2	Number of samples in image array
3	Number of disk blocks/line
4,5	Exclude value (indicates non-valid or empty value)
6	Bit type or format code 8 = 8-bits/pixel 2 = 32-bits/pixel (integer) 16 = 16-bits/pixel 3 = 64-bits/pixel (complex) 32 = 32-bits/pixel 4 = 64-bits/pixel (real) 6 = 6-bits/pixel 5 = formatted numbers 1 = ascii data
7	File type of disk file: 1 = image array 5 = parallel 2 = mosaic 6 = matrix 3 = map 7 = card images 4 = serial vector 8 = text
8	Block length of disk in 16-bit words (256 for VAX)
9	Total number of label blocks reserved at beginning of disk file.
10	Number of arrays in file
11	Histogram format code (same codes as word 6; normally 32)
12	Pointer to first block of histogram area
13	Number of disk blocks reserved for histogram area
14	Number of words used in histogram area
15	Pointer to first block of keyword labels
16	Number of disk blocks reserved for keyword labels
17	Number of words used in keyword labels
18	Pointer to first block or processing history labels
19	Number of disk blocks reserved for processing history
20	Number of words used in processing history labels
21	Starting line position of frame This parameter is generated by a tape to disk program when a sub-image is transferred to disk from tape
22	Starting sample position of frame This parameter is generated by a tape to disk program when a sub-image is transferred to disk from tape
23	Blocking factor on tape. This field contains the number of line records per physical tape record. The last physical record may be different in length from the other records because there may not be an even multiple of line records in the file
24-30	These words are reserved for future use
31,32	Mean value of data without zero (real number)
33,34	Sigma value without zero (real number)
35,36	Mean value with zero included (real number)
37,38	Sigma value with zero included (real number)
39	Index location of lowest non-zero value in histogram
40	Index location of highest value in histogram
41	Index location of histogram peak

42	Spare word reserved for future use
43,44	RMIN: minimum value of scaled histogram (0 for 8-bit) (real number)
45,46	RSCL: scaling factor of histogram (1.0 for 8-bit) (original value = RMIN + dn*RSCL)
47-255	These words are reserved for future use.

Keyword Label Section

Variable	Description and Range
CAL_TARGET_CODE	Planet system code: (J = Jupiter, S = Saturn, U = Uranus, N = Neptune)
CAMERA	Voyager: WA = Camera A, Wide angle NA = Camera B, Narrow angle Viking: 4 = Spacecraft 1, camera B 6 = Spacecraft 2, camera B 7 = Spacecraft 1, camera A 8 = Spacecraft 2, camera A Mariner: A = Camera A, Wide angle B = Camera B, Narrow angle
CAMERA_ANGLES	Declination, right ascension and twist angle of camera in earth mean equatorial 1950 coordinate system (EME1950) in degrees
CAMERA_STATE_1	Voyager: Scan Rate of camera (permitted values: 1, 3, 7) Viking: Light flood condition of camera (0 = flood off, 1 = light flood on)
CAMERA_STATE_2	Voyager: (shutter mode indicator) (0 = Normal shutter mocd) (1 = Wide angle BSIMAN or BOTSIM shutter mode) Viking: Camera gain state (1 = high gain, 0 = low gain)
CAMERA_STATE_3	Voyager: Gain state condition of camera (always contains the number 1) Viking: DC offset condition (1 = offset on, 0 = offset off)
CENTER_LATITUDE	Center latitude of projection when used (-90,90 Degrees)
CENTER_LONGITUDE	Center longitude of projection when used (-360,360 Degrees)
DATUM	Base elevation of topographic image (kilometers)
DISTANCE	Distance from the planet in km/pix (used only for the point perspective projection POIN)
ECCENTRICITY	Eccentricity of planet, also known as

ellipticity.

EXPOSURE_TIME	Exposure time of camera, (Voyager units are in seconds Viking units are in milli-seconds)
FRAME_ID	Image identifier (FDS for Voyager, FSC for Viking, Etc.)
GMT	Time of exposure in greenwich mean time (year:day:hour:min:sec) in the following format: YYYY:DDD:HH:MM:SS
JULIAN_DATE	Time of exposure in decimal julian days (ephemeris time)
LATITUDE_RANGE	Latitude range used to create image (-90,90 degrees) for non-rectangular projections, the corner latitude, longitude will not necessarily be within the lat,lon range given because the smallest rectangle that will contain the lat,lon boundaries will include some area outside that range.
LEVEL	A specific group of programs have been run on a particular image or mosaic.
LONGITUDE_RANGE	Longitude range used to create image (-360,360 degrees)
MAP_ROTATION	Clockwise rotation of north (0,360 degrees)
MAP_SCALE	Scale in kilometers/pixel or degrees/pixel depending on projection.
MATCH_POINTn	Up to 9 sets of conjugate (matching) points between two LEVEL 1 images used by JIGSAW to update the camera angles. The points are stored in the following order: line, sample of image 1, FSC of the overlapping image, and line and sample of the matching point on the overlapping image.
MISSION	Mission name (MARINER, VIKING, VOYAGER, LANDSAT, NOAA, GALILEO)
NEW_POLE_LATITUDE	New pole latitude if the spherical coordinate system has been rotated. This is the projection pole. (-90,90 degrees)
NEW_POLE_LONGITUDE	New pole longitude if the spherical coordinate system has been rotated. This is the projection pole. (-180,180 degrees)
NO_CAMERA_STATE	Number of camera states to be listed in the keyword label area.

PATH — Path number used in LANDSAT, Thematic mapper and other earth orbiting spacecraft

PHOTO_RAD_POINTn — Up to 8 points that designate bland areas in the image that can be used for correcting brightness errors after radiometry and photometry corrections have been made. The order is lat,lon,line,samp where line,samp is the position in the raw image.

PICTURE_NO — PICNO for VIKING and VOYAGER

PLANET_ANGLES — Declination, right ascension and rotation spin angle of planet in EME1950 in degrees

POSITIVE_LONGITUDE — The direction of positive longitude (WEST or EAST)

PROJECTION — Four letter code for a map projection

CODE	PROJECTION
ALBE	Albers conical equal-area
LAMA	Lambert azimuthal equal-area
LAMB	Lambert conformal
MERC	Mercator
ORTH	Orthographic
POIN	Point perspective
POLA	Polar stereographic
POLY	Polyconic
SIMP	Simple cylindrical
SINU	Sinusoidal
TRAN	Transverse mercator

PROJ_TRANSLATION — Offset of the top left corner of line 1, sample 1 relative to the origin of the map projection

RADIUS — Radius of target in kilometers (3 values - major equatorial axis, minor equatorial axis and the polar axis)

RAW_TIE_POINTn — Up to 9 ground control points used to update camera angles. The order is lat,lon,line,samp, radius where line,samp is the position in the raw image and radius is the local radius in km if known.

RESEAUS — Line,sample,type,weight(1.0 or 0.0) quadruplets of reseau locations (2F7.1,I1,F4.1)

ROW — Row number of LANDSAT, Thematic mapper and other earth orbiting spacecraft

SPACECRAFT_NO	Number of spacecraft
SPACECRAFT_VECTOR	Cartesian Vector from the planet to the spacecraft in kilometers in EME1950
STANDARD_PARALLELS	First and second standard parallels of projection when used (0,90 degrees)
SUN_VECTOR	Cartesian Vector from the planet to the sun in kilometers in EME1950
SYSTEM	Coordinate system of the state of the spacecraft and target which is either Earth Mean Equatorial 1950 or 2000. The coordinate systems are defined in Mert Davies' report of the IAU working group on cartographic coordinates and rotational elements of the planets and satellites: 1982. The 2000 system constants are included in the 1985 update report. 1950 = EME1950 (default) 2000 = J2000
TARGET	Name of planet or satellite that is the target of the image.
VERTICAL_SCALE	Scale of density values (KM/PIXEL)
WAVE_LENGTH	Camera filter position or wave length of image frame. (VOYAGER: 0 = clear, 1 = violet, 2 = blue, 3 = orange, 5 = green, 7 = UV) (VIKING: 1 = blue, 2 = -blue, 3 = violet, 4 = clear, 5 = green, 6 = red)

APPENDIX J

GEOMETRIC DEFINITION OF A PIXEL IN PICS

The purpose here is to describe the spatial or geometric definition of a pixel used in the PICS digital products and software provided by the USGS in Flagstaff. A broad range of factors enters into this question. For example, is a pixel to be conceived of as a point or as an area. The point definition would be most convenient, for instance, when dealing with coordinate grid overlays. This results in an odd number of pixels across a map that has an even number of spatial increments. For changing scales (for instance by even powers of 2) this definition becomes a problem. In this case it makes more sense to treat a pixel as a finite area. Then an even number of pixels covers an even number of spatial increments and decreasing/increasing scales by a power of 2 becomes trivial. However, grids now fall between pixels, at least in a mathematical sense. Their treatment in the generation of hardcopy therefore becomes an issue.

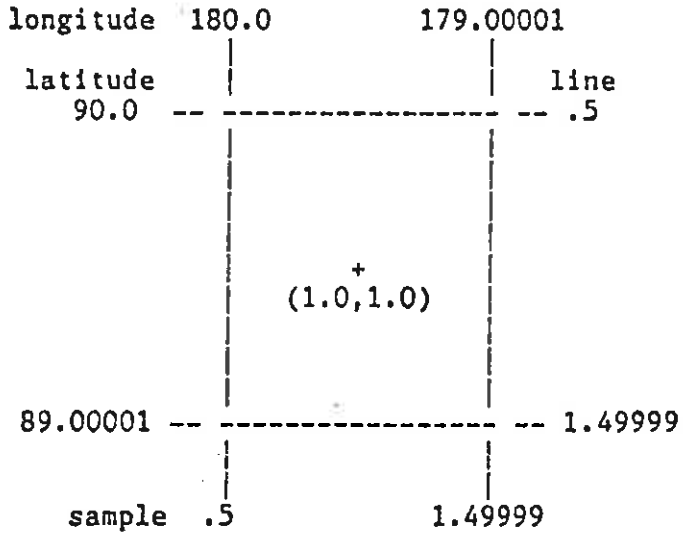
It was decided that the area concept of a pixel was the better choice; we would have to live with the assymmetries introduced in things like cartographic grids. There are various solutions: (1) use two pixels for the width of a grid line, (2) stagger grid pixels back-and-forth across the mathematical position, (3) use a convention whereby grid lines are systemmatically drawn offset from their mathematical position.

The next issue is the conversion between integer coordinates and real coordinates of the pixel mesh. We adopt the convention that pixels are numbered (or named if you like) beginning in the upper left corner with line 1, sample 1 (pixel 1,1); lines increase downward; samples increase to the right. (Even this is not a universal standard; some astronomical systems begin, perhaps more logically, in the lower left corner.) There are three reasonable possibilities for aligning a real, or floating point, coordinate system with the pixel mesh: the coordinate 1.0, 1.0 could be the upper left, the center, or the lower right of pixel 1,1. The convention historically used for geometric calibration files (reseau positions) and also used in the Multimission Image Processing Laboratory at the Jet Propulsion Laboratory, is that the center of the pixel is defined as its location in real coordinates. In other words, the real coordinates of the center of pixel 1,1 are 1.0, 1.0. The top left corner of the pixel is .5, .5 and the bottom right corner is 1.49999..., 1.499999. The

bottom and right edge of a pixel is the mathematically open boundary. This is the standard adopted in the PICS software and its digital products.

Cartographic conventions must also be defined. Many of our digital products are in some map projection with an associated latitude and longitude range. The projection representation of a pixel is mathematically open at the increasing (right and lower) boundaries, and mathematically closed at its left and upper boundaries. An exception occurs at the physical limits of a projection; the lower boundary of the lowest pixel is closed to include the limit of the projection (e. g. the south pole). In the case of a rectangular projection such as a Mercator or a Simple Cylindrical, the left edge of pixel 1,1 is labeled with the left end of the longitude range and the right edge of the right most pixel is labeled with the right end of the longitude range. For example, if an image is in a Simple Cylindrical projection with a longitude range of -180.0 to +180.0, a latitude range of -90.0 to +90.0 and a scale of one degree/pixel, the image will have 180 lines and 360 samples. The latitude and longitude of the top left corner of pixel 1,1 is 90.0, 180.0. (if the planet has positive longitude to the west). The latitude and longitude of the bottom right corner of pixel 180,360 is -90.0, -180.0.

Coordinates of Pixel 1,1



Finally, we must select a convention for drawing grid lines for various cartographic coordinates on planetary images and maps. The convention used in PICS is that a grid line is drawn in the pixels that contain its floating point value until the open boundary is reached and then an exception is made so that the outer range of latitude and longitude will always appear on the image. This means, in the example given above, a 10 degree grid would start on pixel 1 and be drawn on every tenth pixel (11,21,31,...) until the open boundary is reached. Then the line would be drawn on the pixel previous to the open boundary (line 180 instead of line 181, or sample

360 instead of 361).

To summarize, the PICS conventions are:

1. Pixels are treated as areas, not as points.

2. The integer coordinates begin with 1,1 (read "line 1, sample 1") for the upper-left-most pixel; lines increase downward; samples increase to the right.

3. Integer and floating point image coordinates are the same at the center of a pixel.

4. Grids will be drawn in the pixels that contain the floating point location of the grid lines except for open boundaries, which will be drawn to the left or above the open boundary.

NSDF

SL-21G PSPG-00710

SATURNIAN SATELLITE DIMS ON TAPE

THIS DATASET CONSISTS OF ONE MAGNETIC TAPE. THE TAPE IS 9-TRACK, 6250 BPI, BINARY WITH 6 FILES OF DATA. THE TAPE WAS CREATED ON AN IBM COMPUTER. SUPPORT DOCUMENTATION, CONTAINED IN THE DATASET CATALOG, SHOULD BE SENT WITH THE TAPE. THE D AND C NUMBER IS LISTED BELOW.

D#	C#	FILES
D-107995	C-031724	6

Equations to find latitude and longitude of a given pixel (LINE and SAMPLE)

These equations are for the Sinusoidal Equal Area projection and give the latitude and longitude on degrees of the center of a desired pixel. The enclosed Appendix J "Geometric Definition of a Pixel" contains detailed information pertaining to latitude and longitude of a pixel.

$$\text{Latitude} = (-(\text{PROJ\_TRANSLATION}(1)) - \text{LINE} + .5) \times \text{MAP\_SCALE}$$

$$\text{Longitude} = \frac{(-(\text{PROJ\_TRANSLATION}(2)) - \text{SAMPLE} + .5)}{\text{COSINE (Latitude)}} \times \text{MAP\_SCALE}$$

The following is an explanation of each variable in the equations:

Latitude	The latitude of the center of the LINE pixel.
Longitude	The longitude of the center of the SAMPLE pixel.
LINE and SAMPLE	This is the line and sample location of a specific pixel on the image file. Pixel locations are defined by whole numbers.
	Mimas, Enceladus, Tethys, Dione, Iapetus, Rhea
PROJ_TRANSLATION(1)	-1440.
PROJ_TRANSLATION(2)	-2880.
MAP_SCALE	0.0625
	(This information can be found in the text of the enclosed half tone hard copy for each file and the sample data dump.)

```
*** PROGRAM: COUNT ***  VERSION: 10-AUG-89 PROCESSING DATE: 10-DEC-90 08:39:59


DEVICE:  MUB0:                  TAPE ID:  FLG0028_01


RECORD COUNT ON FILE NUMBER      1

RECORDS      1 TO     43 HAVE RECORD LENGTHS OF    512 BYTES
RECORDS     44 TO   2923 HAVE RECORD LENGTHS OF   5760 BYTES

FORMATTED IPSYS LABEL INFORMATION

TARGET='MIMAS'                          PROJECTION='SINU'
RADIUS='    212.50    197.00    184.00'
LATITUDE_RANGE='  -90.0000000000,   90.0000000000'
LONGITUDE_RANGE=' -180.0000000000,  180.0000000000'
MAP_SCALE='   0.06250000000'            CENTER_LONGITUDE='    0.0000000000,'
MAP_ROTATION='    0.0000000000,'        NEW_POLE_LATITUDE='    0.0000000000,'
NEW_POLE_LONGITUDE='    0.0000000000,'
PROJ_TRANSLATION='   -1440.00000,   -2880.00000'
POSITIVE_LONGITUDE='WEST'

PROCESSING HISTORY TEXT INFORMATION

@ 19-OCT-89 MOSAIC inited Picture_No:  to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@ 19-OCT-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   123525760 TOP=Y
@ 19-OCT-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5443221 TOP=N
@ 19-OCT-89 NEWMAP  24-APR-89 AREA:    1    1 2880 5760 LINC:  1.0 SINC:  1.0
@ 19-OCT-89 FLT8B   1-APR-89  TYPE=LPFZ  LINE=   3  SAMP=   3  LOW=  1  HIGH=255  NORM=  0.0  TOL=    8
@  6-DEC-90 TAPEIN  IA=   1   1  2880  5760  8-BIT TYPE:MUA0:PA219       /FILE:  2
@  6-DEC-90 TAPOUT  IA=   1   1 2880 5760  8-BIT TAPE:MUA0:VK181       /FILE:  1


DEVICE:  MUB0:                  TAPE ID:  FLG0028_01


RECORD COUNT ON FILE NUMBER      2

RECORDS      1 TO     43 HAVE RECORD LENGTHS OF    512 BYTES
RECORDS     44 TO   2923 HAVE RECORD LENGTHS OF   5760 BYTES

FORMATTED IPSYS LABEL INFORMATION

                                        TARGET='ENCELADUS'
PROJECTION='SINU'                       RADIUS='    251.00    251.00    251.00'
LATITUDE_RANGE='  -90.0000000000,   90.0000000000'
LONGITUDE_RANGE=' -180.0000000000,  180.0000000000'
MAP_SCALE='   0.06250000000'            CENTER_LONGITUDE='    0.0000000000,'
MAP_ROTATION='    0.0000000000,'        NEW_POLE_LATITUDE='    0.0000000000,'
NEW_POLE_LONGITUDE='    0.0000000000,'
PROJ_TRANSLATION='   -1439.99841,   -2880.00000'
POSITIVE_LONGITUDE='WEST'

PROCESSING HISTORY TEXT INFORMATION

@ 10-JUN-89 GEOM  (Rows,Columns):    0    0  T-file: EN_MERC
@ 11-JUN-89 MAPMOS inited Picture_No:  to(nl,ns)23575772 Input(sl,ss,nl,ns)   1   118125772
```

```
@ 11-JUN-89 MAPMOS updated Picture_No: to(nl,ns)23575772 Input(sl,ss,nl,ns)   1   1 5453227
@ 13-JUN-89 MAPMOS updated Picture_No: to(nl,ns)23575772 Input(sl,ss,nl,ns)   1   118125772
@ 13-JUN-89 MAPMOS updated Picture_No: to(nl,ns)23575772 Input(sl,ss,nl,ns)   1   118125772
@ 13-JUN-89 MAPMOS updated Picture_No: to(nl,ns)23575772 Input(sl,ss,nl,ns)   1   118125772
@ 24-SEP-90 GEOM  (Rows,Columns):    0    0  T-file: ENCEL
@ 24-SEP-90 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   128805760 TOP=N
@ 24-SEP-90 NEWMAP  17-JAN-90 AREA:    1    1 2880 5760 LINC:  1.0 SINC:  1.0
@  6-DEC-90 TAPEIN  IA=   1   1  2880  5760  8-BIT TYPE:MUA0:PA996       /FILE:  3
@  6-DEC-90 TAPOUT  IA=   1   1 2880 5760  8-BIT TAPE:MUA0:VK181       /FILE:  2


DEVICE:  MUB0:                  TAPE ID:  FLG0028_01


RECORD COUNT ON FILE NUMBER     3

RECORDS     1 TO    43 HAVE RECORD LENGTHS OF   512 BYTES
RECORDS    44 TO  2923 HAVE RECORD LENGTHS OF  5760 BYTES

FORMATTED IPSYS LABEL INFORMATION

                                    TARGET='TETHYS'
PROJECTION='SINU'                   RADIUS='    524.00    524.00    524.00'
LATITUDE_RANGE='  -90.0000000000,   90.0000000000'
LONGITUDE_RANGE=' -180.0000000000,  180.0000000000'
MAP_SCALE='   0.06250000000'        CENTER_LONGITUDE='    0.0000000000,'
MAP_ROTATION='    0.0000000000,'    NEW_POLE_LATITUDE='    0.0000000000,'
NEW_POLE_LONGITUDE='    0.0000000000,'
PROJ_TRANSLATION='   -1440.00000,   -2880.00000'
POSITIVE_LONGITUDE='WEST'

PROCESSING HISTORY TEXT INFORMATION

@ 12-JUN-89 MOSAIC inited Picture_No:  to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   118245760 TOP=Y
@ 12-JUN-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@ 12-JUN-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@ 13-JUN-89 NEWMAP  25-FEB-88 AREA:    1    1 2880 5760 LINC:  1.0 SINC:  1.0
@ 13-JUN-89 DSK2DSK 16-NOV-88 AREA:    1    1 2880 5760 LINC:  1.0 SINC:  1.0
@ 13-JUN-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   118245760 TOP=Y
@ 13-JUN-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@ 13-JUN-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@ 14-JUN-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@ 14-JUN-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@ 14-JUN-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@ 14-JUN-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@  6-DEC-90 TAPEIN  IA=   1   1  2880  5760  8-BIT TYPE:MUA0:PA650       /FILE:  1
@  6-DEC-90 TAPOUT  IA=   1   1 2880 5760  8-BIT TAPE:MUA0:VK181       /FILE:  3


DEVICE:  MUB0:                  TAPE ID:  FLG0028_01


RECORD COUNT ON FILE NUMBER     4

RECORDS     1 TO    43 HAVE RECORD LENGTHS OF   512 BYTES
RECORDS    44 TO  2923 HAVE RECORD LENGTHS OF  5760 BYTES

FORMATTED IPSYS LABEL INFORMATION
```

Tethys

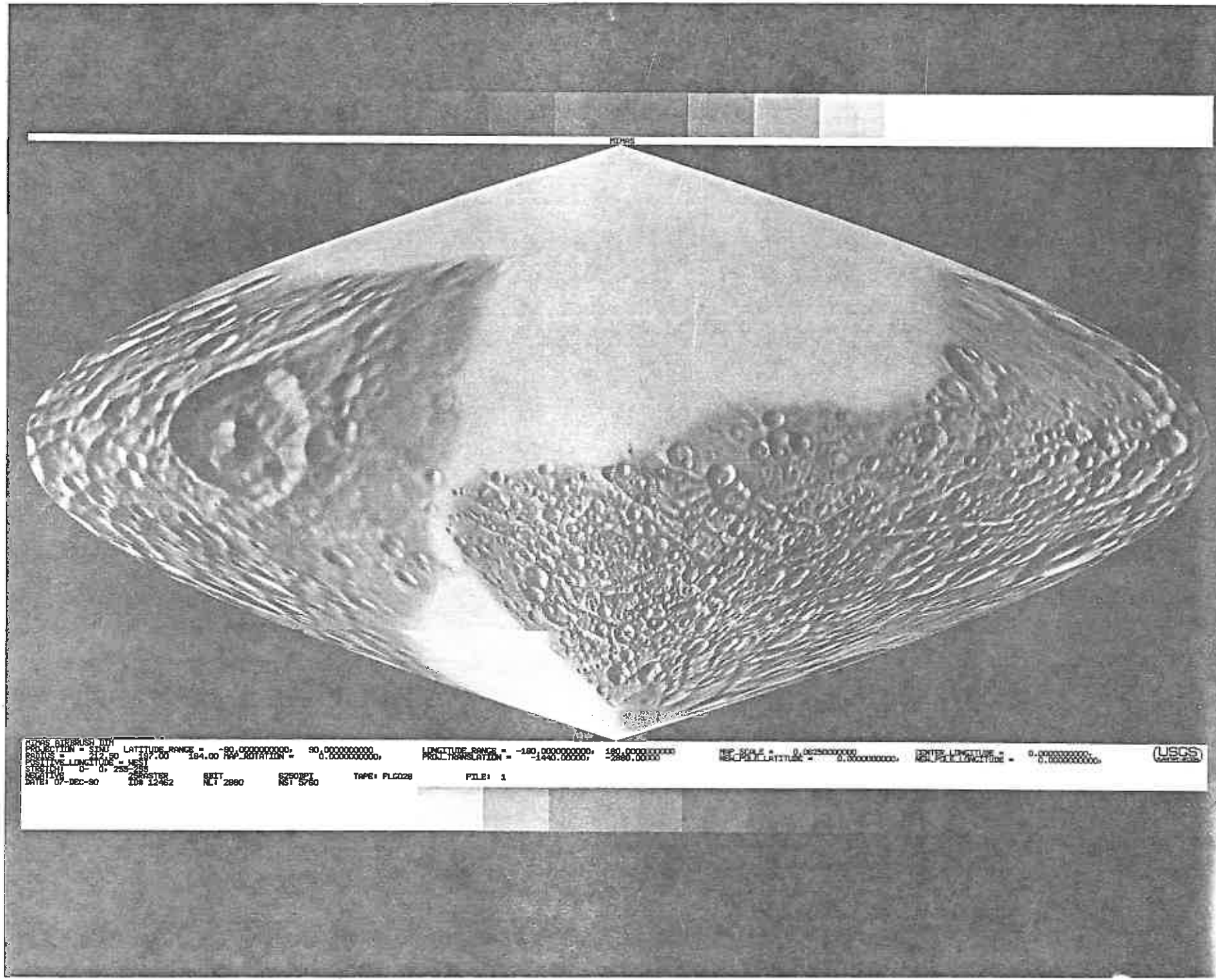
```
                                    TARGET='DIONE'
PROJECTION='SINU'                   RADIUS='    559.00    559.00    559.00'
LATITUDE_RANGE='  -90.0000000000,   90.0000000000'
LONGITUDE_RANGE=' -180.0000000000,  180.0000000000'
MAP_SCALE='   0.06250000000'            CENTER_LATITUDE='-5.00000000000'
CENTER_LONGITUDE='    0.0000000000,'    MAP_ROTATION='    0.0000000000,'
NEW_POLE_LATITUDE='    0.0000000000,'   NEW_POLE_LONGITUDE='    0.0000000000,'
PROJ_TRANSLATION='   -1440.00000,   -2880.00000'
POSITIVE_LONGITUDE='WEST'

PROCESSING HISTORY TEXT INFORMATION

@  8-AUG-89 MOSAIC inited Picture_No:  to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@  8-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@  8-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   118245760 TOP=Y
@  9-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   118245760 TOP=Y
@  9-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@  9-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   118245760 TOP=Y
@  9-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)  26   1 5353304 TOP=Y
@  9-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5353304 TOP=Y
@  9-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@ 10-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)  26   1 5353304 TOP=Y
@ 10-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)  26   1 5353304 TOP=Y
@ 10-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5403304 TOP=Y
@ 10-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@ 10-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@ 10-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   118245760 TOP=Y
@ 10-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@ 10-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   1 5603304 TOP=Y
@ 10-AUG-89 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   118245760 TOP=Y
@  6-DEC-90 TAPEIN  IA=   1   1  2880  5760  8-BIT TYPE:MUA0:PA1003      /FILE:  4
@  6-DEC-90 TAPOUT  IA=   1   1 2880 5760  8-BIT TAPE:MUA0:VK181       /FILE:  4


DEVICE:  MUB0:                  TAPE ID:  FLG0028_01


RECORD COUNT ON FILE NUMBER     5

RECORDS     1 TO    43 HAVE RECORD LENGTHS OF   512 BYTES
RECORDS    44 TO  2923 HAVE RECORD LENGTHS OF  5760 BYTES

FORMATTED IPSYS LABEL INFORMATION

                                    TARGET='IAPETUS'
PROJECTION='SINU'                   RADIUS='    718.00    718.00    718.00'
LATITUDE_RANGE='  -90.0000000000,   90.0000000000'
LONGITUDE_RANGE=' -180.0000000000,  180.0000000000'
MAP_SCALE='   0.06250000000'            CENTER_LONGITUDE='    0.0000000000,'
MAP_ROTATION='    0.0000000000,'        NEW_POLE_LATITUDE='    0.0000000000,'
NEW_POLE_LONGITUDE='    0.0000000000,'
PROJ_TRANSLATION='   -1439.99841,   -2880.00000'
POSITIVE_LONGITUDE='WEST'

PROCESSING HISTORY TEXT INFORMATION

@ 25-SEP-90 MOSAIC inited Picture_No:  to(nl,ns)28865772 Input(sl,ss,nl,ns)   1   128865772 TOP=Y
@ 25-SEP-90 GEOM  (Rows,Columns):    0     0  T-file: IAP
```

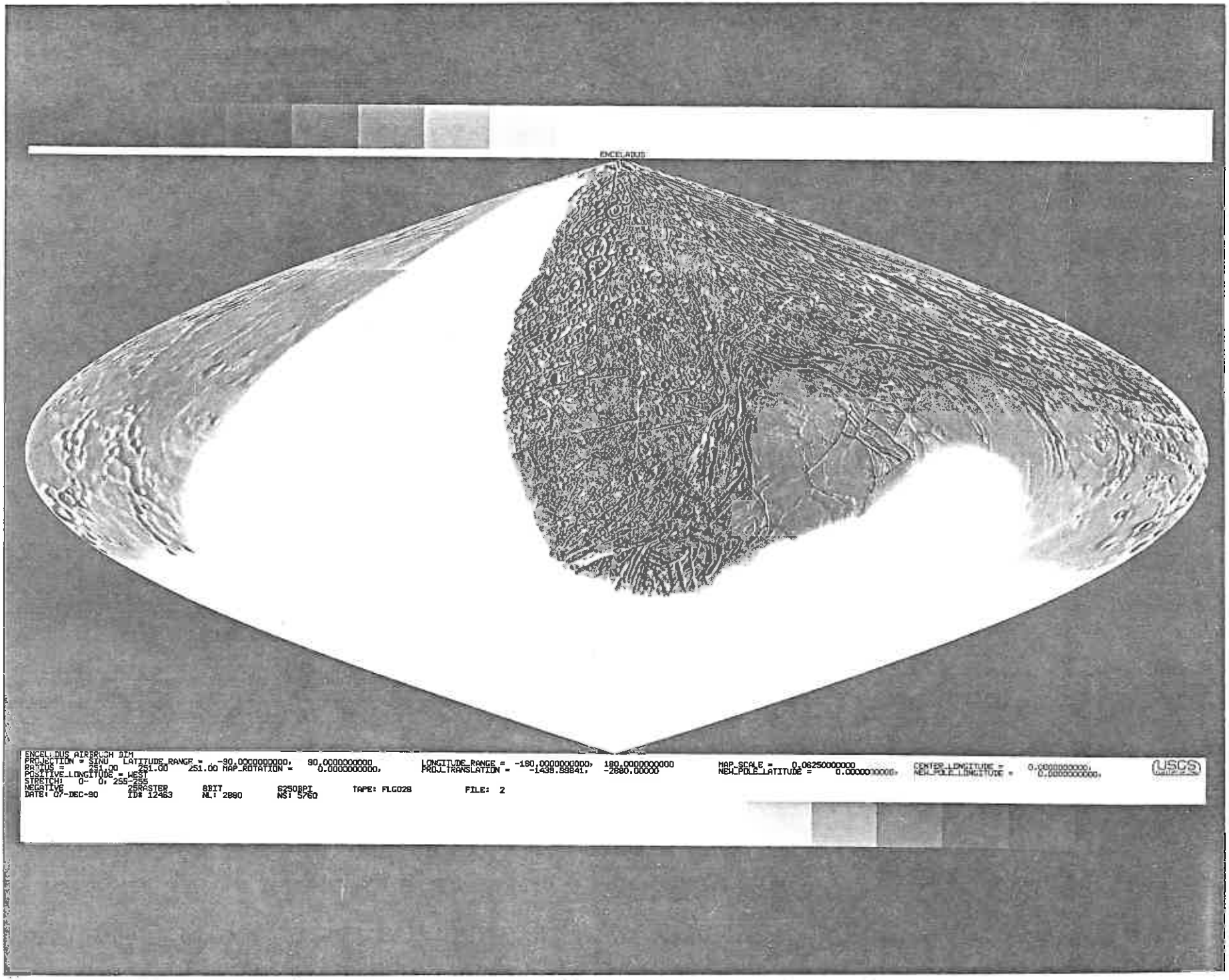
Dione

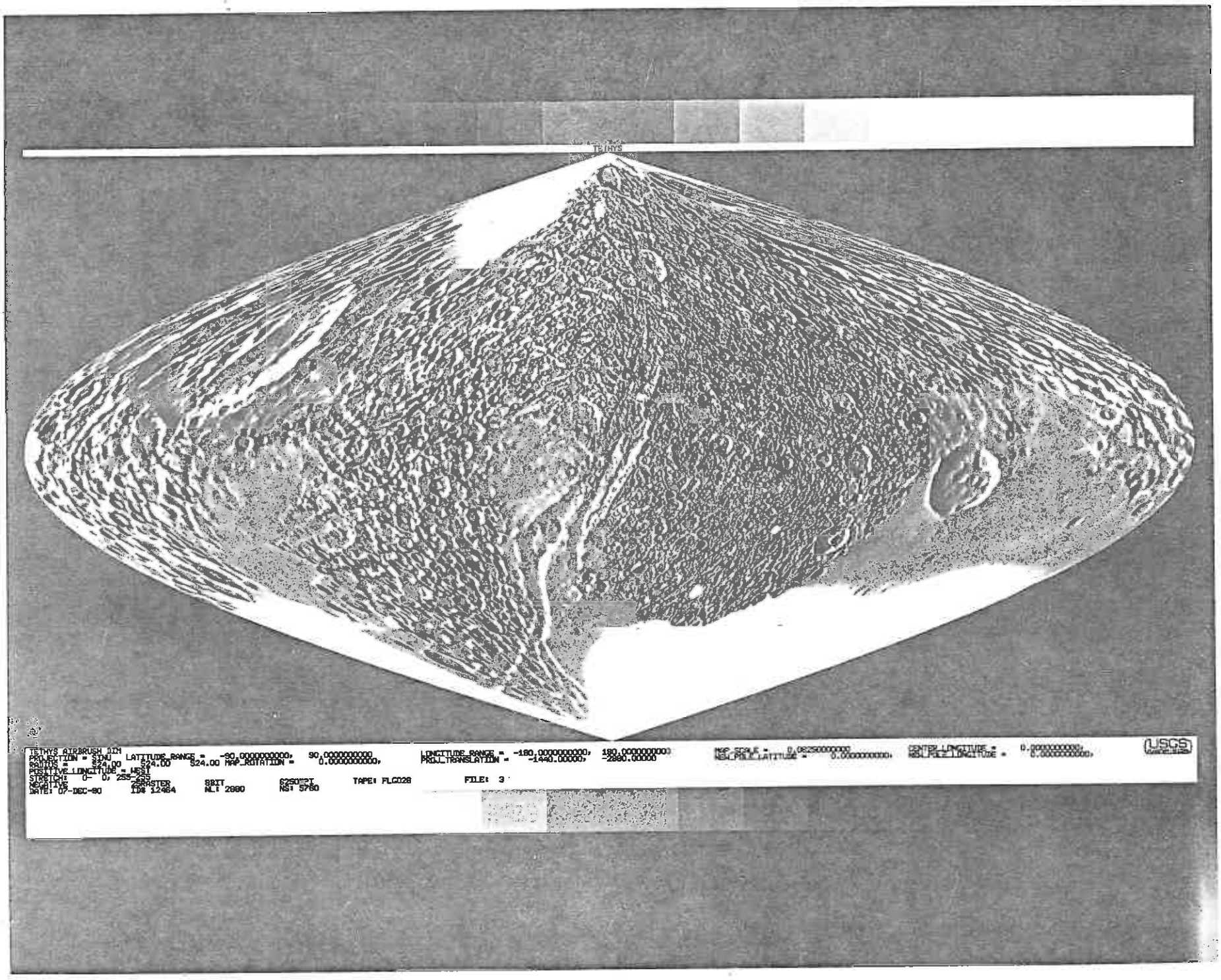
Iapetus

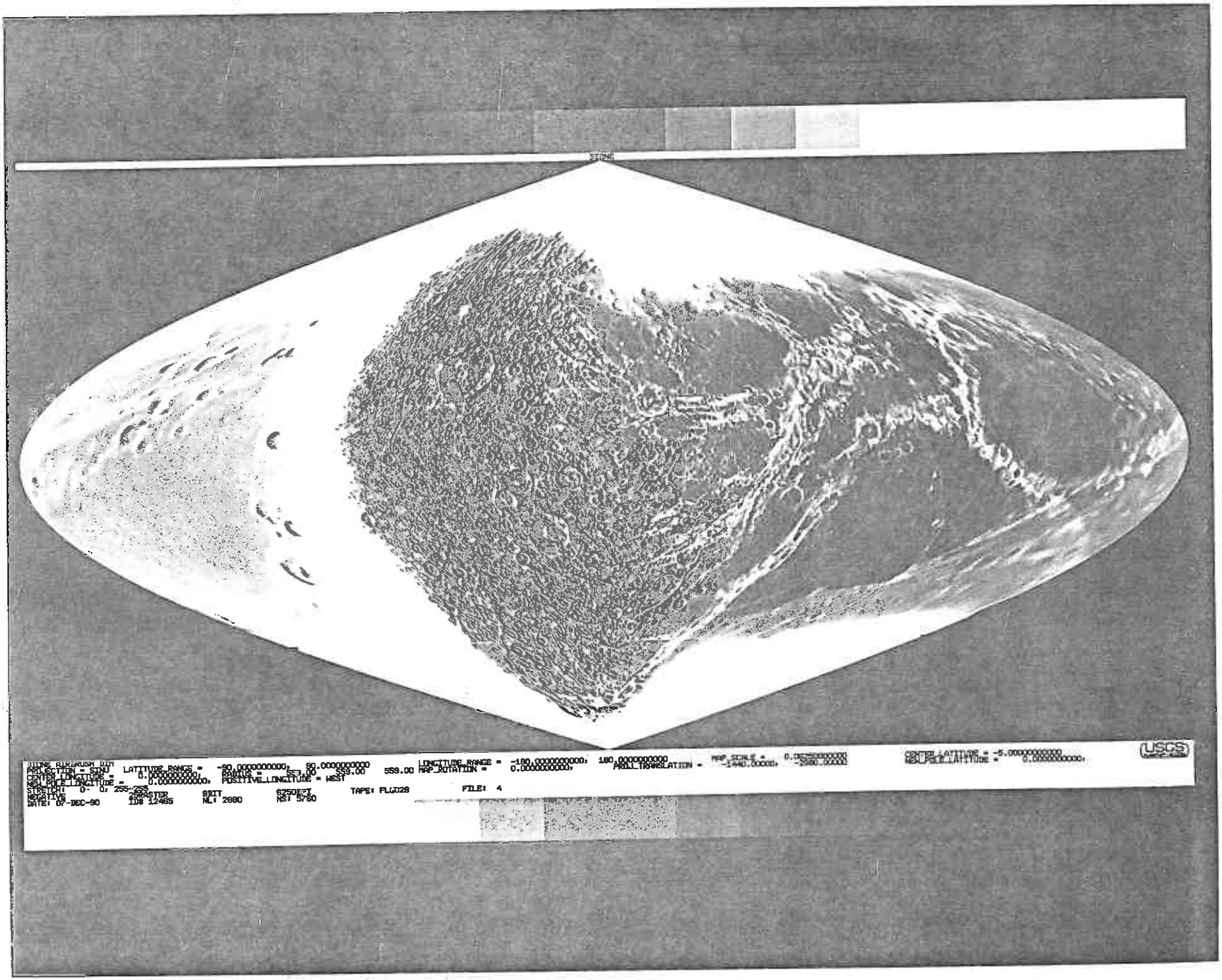
```
@ 25-SEP-90 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   12880   20 TOP=Y
@ 25-SEP-90 NEWMAP  17-JAN-90 AREA:     1     1 2880 5760 LINC:  1.0 SINC:  1.0
@  6-DEC-90 TAPEIN  IA=    1    1  2880  5760  8-BIT TYPE:MUA0:PA996        /FILE:  4
@  6-DEC-90 TAPOUT  IA=    1    1 2880 5760  8-BIT TAPE:MUA0:VK181        /FILE:  5


DEVICE:  MUB0:                  TAPE ID:  FLG0028_01


RECORD COUNT ON FILE NUMBER      6

RECORDS      1 TO     43 HAVE RECORD LENGTHS OF   512 BYTES
RECORDS     44 TO   2924 HAVE RECORD LENGTHS OF  5762 BYTES

FORMATTED IPSYS LABEL INFORMATION

                                      TARGET='RHEA'
                                        PROJECTION='SINU'
LATITUDE_RANGE='  -90.0000000000,    90.0000000000'
LONGITUDE_RANGE=' -180.0000000000,  180.0000000000'
MAP_SCALE='    0.06250000000'             CENTER_LONGITUDE='     0.0000000000,'
MAP_ROTATION='     0.0000000000,'         NEW_POLE_LATITUDE='     0.0000000000,'
NEW_POLE_LONGITUDE='     0.0000000000,'
PROJ_TRANSLATION='    -1440.00000,    -2880.00000'


PROCESSING HISTORY TEXT INFORMATION

@ 29-OCT-86
@ 30-OCT-86  *** FLT16B *** 10-JAN-86 AREA: 1, 1,  2881, 5761 LINC:1 SINC:1
@ 30-OCT-86   TYPE=HPF  LINE= 251 SAMP= 251 LOW=     1 HIGH= 32767 NORM= 16384.0
@ 30-OCT-86
@ 30-OCT-86
@ 30-OCT-86 B16MAD  14-JAN-86 AREA:     1     1 2881 5761 LINC:  1.0 SINC:  1.0
@ 30-OCT-86 B16MAD  MUL1,MUL2,ADD:      1.00000      1.00000-16383.00000
@  6-DEC-90 TAPEIN  IA=    1    1  2881  5761 16-BIT TYPE:MUA0:A883        /FILE: 47
@  6-DEC-90 BT2BT   15-MAR-87 AREA:     1     1 2881 5761 LINC:  1.0 SINC:  1.0
@  6-DEC-90 BT2BT  Obit: 8  Ibit:16 (mul,add):        0.02550        0.00000
@  6-DEC-90 TAPOUT  IA=    1    1 2881 5761  8-BIT TAPE:MUA0:VK181        /FILE:  6
*** END ***  31:51(connect)    1:13.33(cpu) 17575(I/0)   188(faults)
```

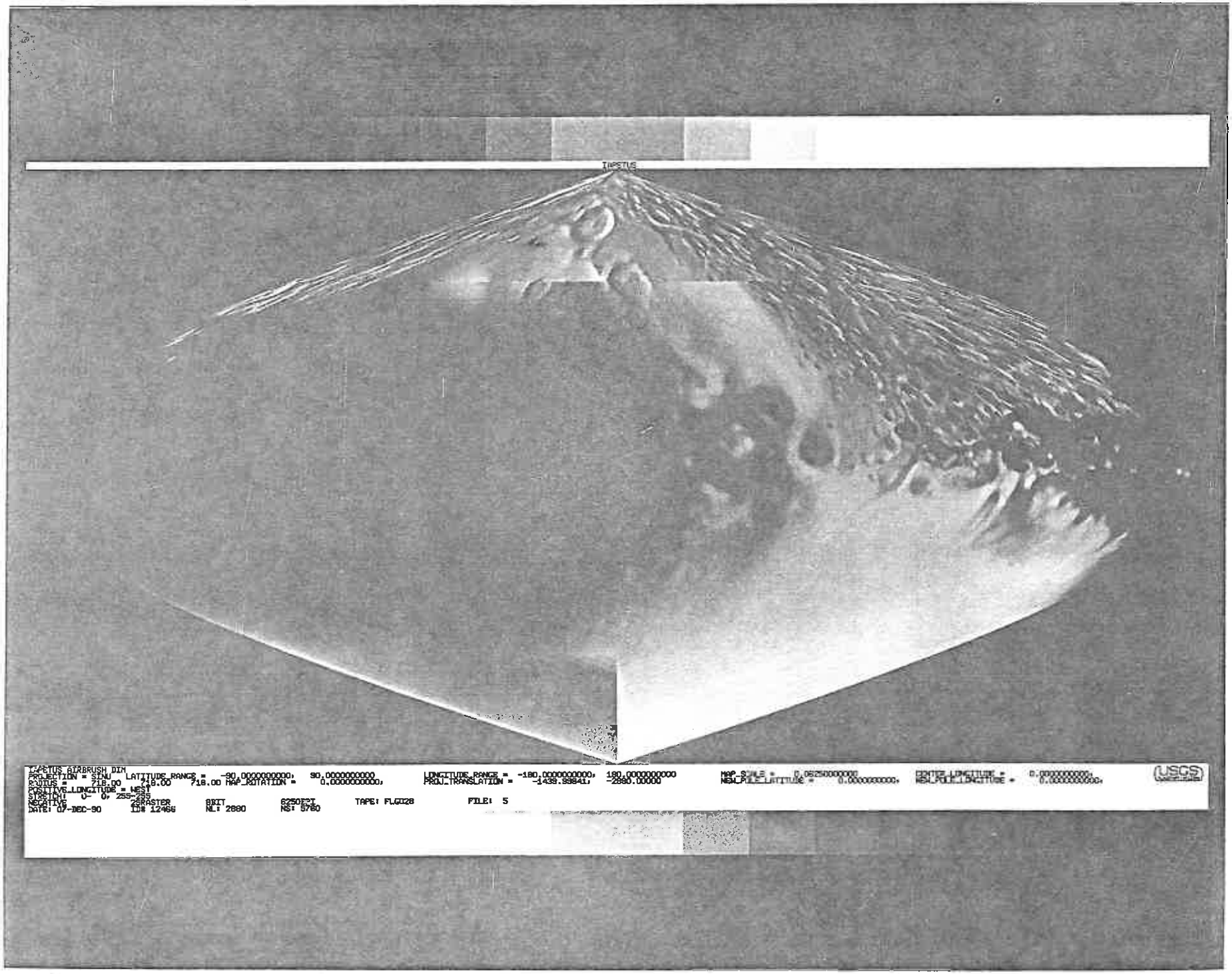
Rhea

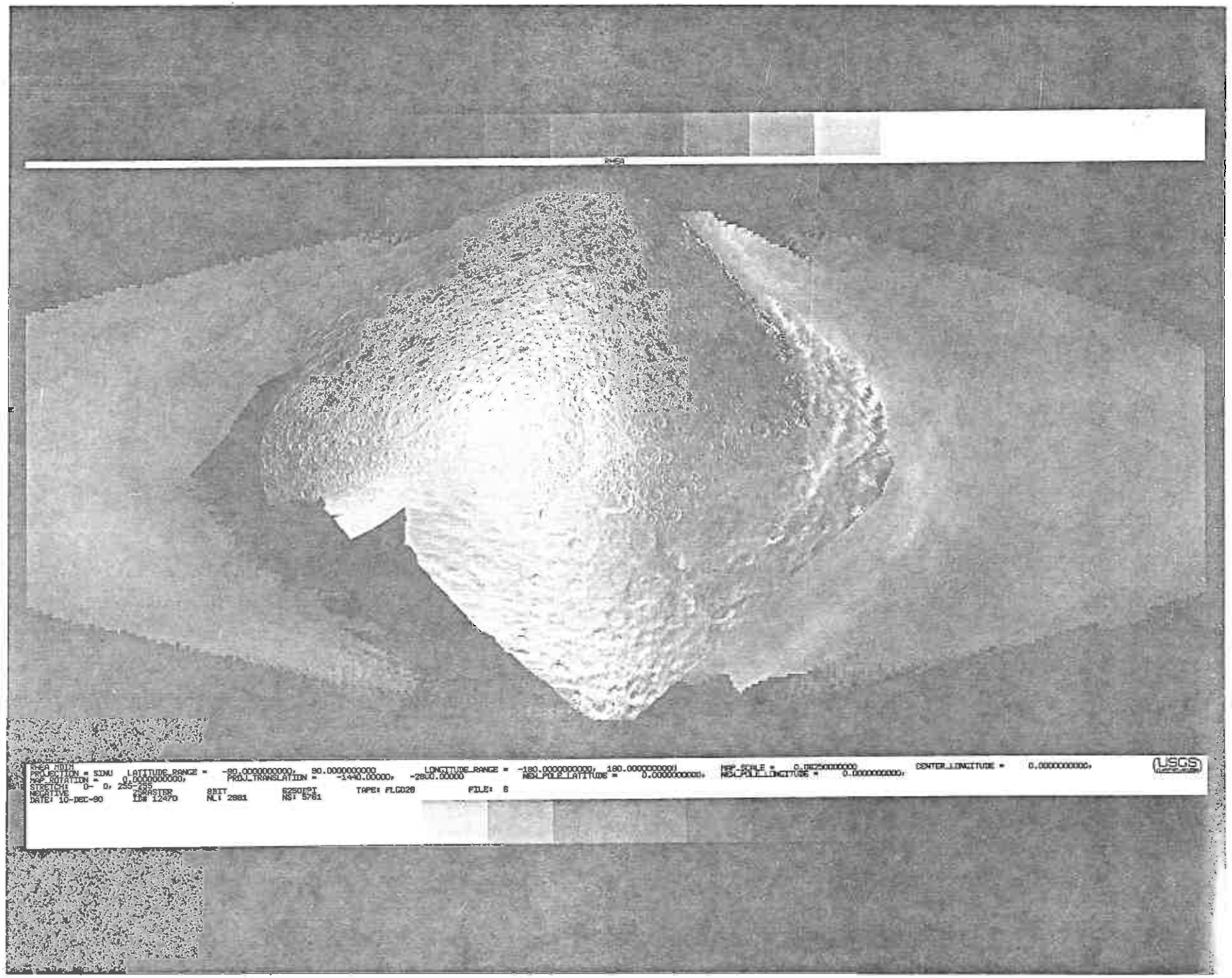

MOMS AIRBRUSH DTM
PROJECTION = SINU LATITUDE_RANGE = -90.0000000000, 90.0000000000
RADIUS = 3397.00 197.00 194.00 MAP_ROTATION = 0.0000000000,
POSITIVE_LONGITUDE = WEST
SCALING: 0- 0; 255-255
NEGATIVE
DATE: 07-DEC-90 ID# 12462
RASTER
NLI 2880
BRIT
NST 5760
6250BPI
TAPE: PLG028
FILE: 1
LONGITUDE_RANGE = -180.0000000000, 180.0000000000
PROJ_TRANSLATION = -1440.00000, -2880.00000
MAP SCALE = 0.0625000000
MSC_PROJ_LATITUDE = 0.0000000000,
CENTER LONGITUDE = 0.0000000000,
MSC_PROJ_LONGITUDE = 0.0000000000,
USGS


ENCELADUS
ENCELADUS AIRBRUSH DIM
PROJECTION = SINU LATITUDE_RANGE = -90.0000000000, 90.0000000000 LONGITUDE_RANGE = -180.0000000000, 180.0000000000 MAP_SCALE = 0.06250000000
RADIUS = 251.00 251.00 251.00 MAP_ROTATION = 0.0000000000, PROJ_TRANSLATION = -1439.99841, -2880.00000 NEW_POLE_LATITUDE = 0.0000000000, CENTER_LONGITUDE = 0.0000000000,
POSITIVE_LONGITUDE = WEST NEW_POLE_LONGITUDE = 0.0000000000,
STRETCH: 0- 0, 255-255
NEGATIVE 2SRASTER 8BIT 6250BPI TAPE: FLG028 FILE: 2
DATE: 07-DEC-90 ID# 12463 NL: 2880 NS: 5760
USGS


TETHYS
TETHYS AIRBRUSH DIM
PROJECTION = STNI LATITUDE_RANGE = -90.0000000000, 90.0000000000 LONGITUDE_RANGE = -180.0000000000, 180.0000000000
RADIUS = 824.00 824.00 824.00 MAP_ROTATION = 0.0000000000, PROJ_TRANSLATION = -1440.00000, -2880.00000
POSITIVE_LONGITUDE = WEST
STRETCH 0- 0, 255-255
NEGATIVE ZOOMSTER BRIT 6250"PI TAPE: FLG028 FILE: 3
DATE: 07-DEC-90 ID# 12464 NLI 2880 NSI 5760
MAP SCALE = 0.0625000000 CENTER_LONGITUDE = 0.0000000000,
PROJ_PLE_LATITUDE = 0.0000000000, PROJ_PLE_LONGITUDE = 0.0000000000,
USGS


MOON
PROJECTION = SINU
CENTER_LONGITUDE = 0.000000000,
MSN_POLE_LONGITUDE = 0.000000000,
LATITUDE_RANGE = -90.000000000, 90.000000000
POINTS = 559.00 559.00
POSITIVE_LONGITUDE = WEST
559.00
LONGITUDE_RANGE = -180.000000000, 180.000000000
MAP_ROTATION = 0.000000000,
PROJ_TRANSLATION = -1440.00000, 0.000000000 2880.00000
CENTER_LATITUDE = -5.000000000
MSN_POLE_LATITUDE = 0.000000000,
STRETCH: 0- 0; 255-255
NEGATIVE
DATE: 07-DEC-90
6250BPI
TAPE: FLJ028
FILE: 4
NL: 2880
NS: 5760


TAPETUS
TAPETUS AIRBRUSH DIM
PROJECTION = SINU LATITUDE_RANGE = -90.0000000000, 90.0000000000 LONGITUDE_RANGE = -180.0000000000, 180.0000000000 MAP_SCALE = 0.0625000000 CENTER_LONGITUDE = 0.0000000000,
RADIUS = 718.00 718.00 MAP_ROTATION = 0.0000000000, PROJ_TRANSLATION = -1439.93841, -2880.00000 NEAR_FILE_LATITUDE = 0.0000000000, NEAR_FILE_LONGITUDE = 0.0000000000,
POSITIVE_LONGITUDE = WEST
STRETCH 0- 0, 255-255
NEGATIVE ZRASTER BYTE 6250BPI TAPE: FLG028 FILE: 5
DATE: 07-DEC-90 IDS 12466 NL: 2880 NS: 5760
USGS


MAP_SCALE = 0.0625000000
CENTER_LONGITUDE = 0.0000000000
PROJECTION = SINU LATITUDE_RANGE = -90.0000000000, 90.0000000000 LONGITUDE_RANGE = -180.0000000000, 180.0000000000
MAP_ROTATION = 0.0000000000, PROJ_TRANSLATION = -1440.00000, -2800.00000 NEG_POLE_LATITUDE = 0.0000000000, NEG_POLE_LONGITUDE = 0.0000000000,
STRETCH: 0- 0, 255-255
NEGATIVE GRASTER 8BIT 6250BPI TAPE: FLG028 FILE: 6
DATE: 10-DEC-90 ID# 12470 NL: 2881 NS: 5761

USGS Tape File Array Format

Magnetic tapes are 9 track with a density of 800, 1600, or 6250 BPI. The track type and density should be clearly labeled on the tape reel face.

A magnetic tape will contain one or more array files separated by end-of-file marks (EOF). The last file on a tape is indicated by two EOF's in succession at the end of the file. Contained within a file are a series of records separated by inter-record gaps.

LABEL FORMAT

The first part of each file may contain label information. Flagstaff presently has two label formats: the "new" format has 512 byte records and the "old" format has 72 byte records.

New format: Labels have the following 16-bit words in the first record.

Word 1	number of lines
Word 2	number of samples
Word 6	format code: 8 = 8-bit integer 16 = 16-bit integer 32 = 32-bit real
Word 9	number of 256 word (512 byte) records used for labels, all of which precede the first data record.

Old format: Labels with 72 byte records contain the number of lines (NL) and the number of bytes per line (NB) in the first record. Decode them by READ ( ), NL, NB with FORMAT (T33,2I4).

DATA FORMAT

Data records are unblocked. For each line in an array there is a corresponding physical tape record separated by inter-record gaps. The number of lines in an array equals the number of data records in a file. For 8-bit data (8 bits per array element) the number of samples in the array will equal the number of bytes in the record. For 16-bit data (16-bit integer word per element) the number of samples in the array will equal the number of bytes in the record divided by two. It should be noted that on some computers, there may be a slight incompatibility in how 16-bit integer records are read in from tape. If the computer you are using has IBM compatible tape units then you will need to swap the two bytes which make up the 16-bit word before using 16-bit integer words. If the image array pixels are 32-bit floating point values, then swap bytes: 1 2 3 4 4 3 2 1.

APPENDIX B

IMAGE LABELS

Image files in the PICS system contain label information located at the beginning of the file. These labels contain pertinent information about the image. These labels describe the size of the image array, in lines and samples; the type of image data, 8-bit unsigned integer, 16-bit integer, or 32-bit floating point files; SPICE information such as viewing geometry and camera conditions, and processing history text. A user can interrogate and modify the image labels with the LABELS program.

PICS labels exist on both disk and magnetic tape files. On disk files, they occupy 512-byte blocks at the start of the file. The home block, the first block in an image file, contains a parameter indicating the number of 512-byte blocks which make up the labels. On magnetic tape, the labels are contained in 512-byte records at the beginning of the file. These records are exact copies of what would be found on a disk file.

Image labels are divided into four sections; there is a home block section, a histogram section, a keyword label section, and a processing history section. The tables shown below give descriptions of the contents and permitted values of each label section.

LABEL SECTIONS

SECTION 1 - The Home block. This section is contained in the first 512-byte block of an image file. It contains information about the image contained in the file, and contains pointers to the other label sections within the file. The format of this block is binary and a detailed description is provided in the description the home block, shown below.

SECTION 2 - The Histogram section, disk blocks 2 to M. These blocks hold the histogram of the image. These blocks may be empty, but 'DISKLO' subroutine will reserve two blocks when labels are initialized. The histogram area consists of 256 bins with each bin a VAX 32-bit long word. The histogram is normalized for 16-bit and 32-bit data. The RMIN and RSCL parameters in the home block section, shown below, specifies the normalization

coefficients.

SECTION 3 - The Keyword label section, disk blocks M+1 to N. The Keyword label area contains information necessary to describe and process an image. Keywords contain information such as mission, spacecraft number, picture number, camera, target, exposure time, spectral information, geometry information, camera state, reseau locations, and other processing information. Keywords take the form: KEYWORD='xxxxxxxxx', where keyword indicates the type of information and xxxxxx contains the value of the keyword. The keywords and associated information are ASCII character strings. Keywords are separated by at least one blank character and the information associated with a keyword is always contained within quotes. A description of permitted keywordS can be found in the keyword label section shown below.

SECTION 4 - The processing history section, disk blocks N+1 to O. This section is reserved for processinng history text. Each program that creates an output image file copies the label information from the input file to the output files and appends a processing text entry to the history text. Processing history text will consist of an ASCII character string of varying length not to exceed 250 characters. The first 20 characters of the processing history have a specific format as outlined below:

```
@ dd-mmm-yy program (any ascii string)
 character  1      = '@' indicates begining of history text string
 character  2      = blank character
 characters 3-11   = dd - day of year, mmm - month , yy - year
 characters 13-19  = name of program which processes image file
 characters 20-n   = short descriptive text of program processing
                       parameters
```

Description of First Label Block (Home Block)

Word	Description
1	Number of lines in image array
2	Number of samples in image array
3	Number of disk blocks/line
4,5	Exclude value (indicates non-valid or empty value)
6	Bit type or format code 8 = 8-bits/pixel 2 = 32-bits/pixel (integer) 16 = 16-bits/pixel 3 = 64-bits/pixel (complex) 32 = 32-bits/pixel 4 = 64-bits/pixel (real) 6 = 6-bits/pixel 5 = formatted numbers 1 = ascii data
7	File type of disk file: 1 = image array 5 = parallel 2 = mosaic 6 = matrix 3 = map 7 = card images 4 = serial vector 8 = text
8	Block length of disk in 16-bit words (256 for VAX)
9	Total number of label blocks reserved at beginning of disk file.
10	Number of arrays in file
11	Histogram format code (same codes as word 6; normally 32)
12	Pointer to first block of histogram area
13	Number of disk blocks reserved for histogram area
14	Number of words used in histogram area
15	Pointer to first block of keyword labels
16	Number of disk blocks reserved for keyword labels
17	Number of words used in keyword labels
18	Pointer to first block or processing history labels
19	Number of disk blocks reserved for processing history
20	Number of words used in processing history labels
21	Starting line position of frame This parameter is generated by a tape to disk program when a sub-image is transferred to disk from tape
22	Starting sample position of frame This parameter is generated by a tape to disk program when a sub-image is transferred to disk from tape
23	Blocking factor on tape. This field contains the number of line records per physical tape record. The last physical record may be different in length from the other records because there may not be an even multiple of line records in the file
24-30	These words are reserved for future use
31,32	Mean value of data without zero (real number)
33,34	Sigma value without zero (real number)
35,36	Mean value with zero included (real number)
37,38	Sigma value with zero included (real number)
39	Index location of lowest non-zero value in histogram
40	Index location of highest value in histogram
41	Index location of histogram peak

42	Spare word reserved for future use
43,44	RMIN: minimum value of scaled histogram (0 for 8-bit) (real number)
45,46	RSCL: scaling factor of histogram (1.0 for 8-bit) (original value = RMIN + dn*RSCL)
47-255	These words are reserved for future use.

Keyword Label Section

Variable	Description and Range
CAL_TARGET_CODE	Planet system code: (J = Jupiter, S = Saturn, U = Uranus, N = Neptune)
CAMERA	Voyager: WA = Camera A, Wide angle NA = Camera B, Narrow angle Viking: 4 = Spacecraft 1, camera B 6 = Spacecraft 2, camera B 7 = Spacecraft 1, camera A 8 = Spacecraft 2, camera A Mariner: A = Camera A, Wide angle B = Camera B, Narrow angle
CAMERA_ANGLES	Declination, right ascension and twist angle of camera in earth mean equatorial 1950 coordinate system (EME1950) in degrees
CAMERA_STATE_1	Voyager: Scan Rate of camera (permitted values: 1, 3, 7) Viking: Light flood condition of camera (0 = flood off, 1 = light flood on)
CAMERA_STATE_2	Voyager: (shutter mode indicator) (0 = Normal shutter mocd) (1 = Wide angle BSIMAN or BOTSIM shutter mode) Viking: Camera gain state (1 = high gain, 0 = low gain)
CAMERA_STATE_3	Voyager: Gain state condition of camera (always contains the number 1) Viking: DC offset condition (1 = offset on, 0 = offset off)
CENTER_LATITUDE	Center latitude of projection when used (-90,90 Degrees)
CENTER_LONGITUDE	Center longitude of projection when used (-360,360 Degrees)
DATUM	Base elevation of topographic image (kilometers)
DISTANCE	Distance from the planet in km/pix (used only for the point perspective projection POIN)
ECCENTRICITY	Eccentricity of planet, also known as

	ellipticity.
EXPOSURE_TIME	Exposure time of camera, (Voyager units are in seconds Viking units are in milli-seconds)
FRAME_ID	Image identifier (FDS for Voyager, FSC for Viking, Etc.)
GMT	Time of exposure in greenwich mean time (year:day:hour:min:sec) in the following format: YYYY:DDD:HH:MM:SS
JULIAN_DATE	Time of exposure in decimal julian days (ephemeris time)
LATITUDE_RANGE	Latitude range used to create image (-90,90 degrees) for non-rectangular projections, the corner latitude, longitude will not necessarily be within the lat,lon range given because the smallest rectangle that will contain the lat,lon boundaries will include some area outside that range.
LEVEL	A specific group of programs have been run on a particular image or mosaic.
LONGITUDE_RANGE	Longitude range used to create image (-360,360 degrees)
MAP_ROTATION	Clockwise rotation of north (0,360 degrees)
MAP_SCALE	Scale in kilometers/pixel or degrees/pixel depending on projection.
MATCH_POINTn	Up to 9 sets of conjugate (matching) points between two LEVEL 1 images used by JIGSAW to update the camera angles. The points are stored in the following order: line, sample of image 1, FSC of the overlapping image, and line and sample of the matching point on the overlapping image.
MISSION	Mission name (MARINER, VIKING, VOYAGER, LANDSAT, NOAA, GALILEO)
NEW_POLE_LATITUDE	New pole latitude if the spherical coordinate system has been rotated. This is the projection pole. (-90,90 degrees)
NEW_POLE_LONGITUDE	New pole longitude if the spherical coordinate system has been rotated. This is the projection pole. (-180,180 degrees)
NO_CAMERA_STATE	Number of camera states to be listed in the keyword label area.

PATH — Path number used in LANDSAT, Thematic mapper and other earth orbiting spacecraft

PHOTO_RAD_POINTn — Up to 8 points that designate bland areas in the image that can be used for correcting brightness errors after radiometry and photometry corrections have been made. The order is lat,lon,line,samp where line,samp is the position in the raw image.

PICTURE_NO — PICNO for VIKING and VOYAGER

PLANET_ANGLES — Declination, right ascension and rotation spin angle of planet in EME1950 in degrees

POSITIVE_LONGITUDE — The direction of positive longitude (WEST or EAST)

PROJECTION — Four letter code for a map projection

CODE	PROJECTION
ALBE	Albers conical equal-area
LAMA	Lambert azimuthal equal-area
LAMB	Lambert conformal
MERC	Mercator
ORTH	Orthographic
POIN	Point perspective
POLA	Polar stereographic
POLY	Polyconic
SIMP	Simple cylindrical
SINU	Sinusoidal
TRAN	Transverse mercator

PROJ_TRANSLATION — Offset of the top left corner of line 1, sample 1 relative to the origin of the map projection

RADIUS — Radius of target in kilometers (3 values - major equatorial axis, minor equatorial axis and the polar axis)

RAW_TIE_POINTn — Up to 9 ground control points used to update camera angles. The order is lat,lon,line,samp, radius where line,samp is the position in the raw image and radius is the local radius in km if known.

RESEAUS — Line,sample,type,weight(1.0 or 0.0) quadruplets of reseau locations (2F7.1,I1,F4.1)

ROW — Row number of LANDSAT, Thematic mapper and other earth orbiting spacecraft

SPACECRAFT_NO	Number of spacecraft
SPACECRAFT_VECTOR	Cartesian Vector from the planet to the spacecraft in kilometers in EME1950
STANDARD_PARALLELS	First and second standard parallels of projection when used (0,90 degrees)
SUN_VECTOR	Cartesian Vector from the planet to the sun in kilometers in EME1950
SYSTEM	Coordinate system of the state of the spacecraft and target which is either Earth Mean Equatorial 1950 or 2000. The coordinate systems are defined in Mert Davies' report of the IAU working group on cartographic coordinates and rotational elements of the planets and satellites: 1982. The 2000 system constants are included in the 1985 update report. 1950 = EME1950 (default) 2000 = J2000
TARGET	Name of planet or satellite that is the target of the image.
VERTICAL_SCALE	Scale of density values (KM/PIXEL)
WAVE_LENGTH	Camera filter position or wave length of image frame. (VOYAGER: 0 = clear, 1 = violet, 2 = blue, 3 = orange, 5 = green, 7 = UV) (VIKING: 1 = blue, 2 = -blue, 3 = violet, 4 = clear, 5 = green, 6 = red)

APPENDIX J

GEOMETRIC DEFINITION OF A PIXEL IN PICS

The purpose here is to describe the spatial or geometric definition of a pixel used in the PICS digital products and software provided by the USGS in Flagstaff. A broad range of factors enters into this question. For example, is a pixel to be conceived of as a point or as an area. The point definition would be most convenient, for instance, when dealing with coordinate grid overlays. This results in an odd number of pixels across a map that has an even number of spatial increments. For changing scales (for instance by even powers of 2) this definition becomes a problem. In this case it makes more sense to treat a pixel as a finite area. Then an even number of pixels covers an even number of spatial increments and decreasing/increasing scales by a power of 2 becomes trivial. However, grids now fall between pixels, at least in a mathematical sense. Their treatment in the generation of hardcopy therefore becomes an issue.

It was decided that the area concept of a pixel was the better choice; we would have to live with the assymmetries introduced in things like cartographic grids. There are various solutions: (1) use two pixels for the width of a grid line, (2) stagger grid pixels back-and-forth across the mathematical position, (3) use a convention whereby grid lines are systemmatically drawn offset from their mathematical position.

The next issue is the conversion between integer coordinates and real coordinates of the pixel mesh. We adopt the convention that pixels are numbered (or named if you like) beginning in the upper left corner with line 1, sample 1 (pixel 1,1); lines increase downward; samples increase to the right. (Even this is not a universal standard; some astronomical systems begin, perhaps more logically, in the lower left corner.) There are three reasonable possibilities for aligning a real, or floating point, coordinate system with the pixel mesh: the coordinate 1.0, 1.0 could be the upper left, the center, or the lower right of pixel 1,1. The convention historically used for geometric calibration files (reseau positions) and also used in the Multimission Image Processing Laboratory at the Jet Propulsion Laboratory, is that the center of the pixel is defined as its location in real coordinates. In other words, the real coordinates of the center of pixel 1,1 are 1.0, 1.0. The top left corner of the pixel is .5, .5 and the bottom right corner is 1.49999..., 1.499999. The

360 instead of 361).

To summarize, the PICS conventions are:

1. Pixels are treated as areas, not as points.

2. The integer coordinates begin with 1,1 (read "line 1, sample 1") for the upper-left-most pixel; lines increase downward; samples increase to the right.

3. Integer and floating point image coordinates are the same at the center of a pixel.

4. Grids will be drawn in the pixels that contain the floating point location of the grid lines except for open boundaries, which will be drawn to the left or above the open boundary.

NSDF

SL-21I PSPG-00712

URANIAN SATELLITES DIMS ON TAPE

THIS DATASET CONSISTS OF ONE MAGNETIC TAPE. THE TAPE IS 9-TRACK, 6250 BPI, BINARY WITH 5 FILES OF DATA. THE TAPE WAS CREATED ON AN IBM COMPUTER. SUPPORT DOCUMENTATION, CONTAINED IN THE DATASET CATALOG, SHOULD BE SENT WITH THE TAPE. THE D AND ITS C NUMBER IS LISTED BELOW.

D#	C#	FILES
D-107967	C-031722	5

Equations to find latitude and longitude of a given pixel (LINE and SAMPLE)

These equations are for the Sinusoidal Equal Area projection and give the latitude and longitude on degrees of the center of a desired pixel. The enclosed Appendix J "Geometric Definition of a Pixel" contains detailed information pertaining to latitude and longitude of a pixel.

$$\text{Latitude} = (-(\text{PROJ\_TRANSLATION(1)}) - \text{LINE} + .5) \times \text{MAP\_SCALE}$$

$$\text{Longitude} = \frac{(-(\text{PROJ\_TRANSLATION(2)}) - \text{SAMPLE} + .5)}{\text{COSINE (Latitude)}} \times \text{MAP\_SCALE}$$

The following is an explanation of each variable in the equations:

Latitude	The latitude of the center of the LINE pixel.
Longitude	The longitude of the center of the SAMPLE pixel.
LINE and SAMPLE	This is the line and sample location of a specific pixel on the image file. Pixel locations are defined by whole numbers.
	Miranda, Ariel, Umbriel, Titania, Oberon
PROJ_TRANSLATION(1)	-1439.99841
PROJ_TRANSLATION(2)	-2880.
MAP_SCALE	0.0625

(This information can be found in the text of the enclosed half tone hard copy for each file and the sample data dump.)

SL-21I

Airbrush DIM

```
*** PROGRAM: COUNT ***  VERSION: 10-AUG-89 PROCESSING DATE: 26-OCT-90 16:01:35


DEVICE:  MUA0:                    TAPE ID:  FLG0044_01


RECORD COUNT ON FILE NUMBER      1

RECORDS      1 TO     43 HAVE RECORD LENGTHS OF    512 BYTES
RECORDS     44 TO   2923 HAVE RECORD LENGTHS OF   5760 BYTES

FORMATTED IPSYS LABEL INFORMATION

TARGET='MIRANDA'                          PROJECTION='SINU'
RADIUS='     241.00     235.00     232.00'
LATITUDE_RANGE='  -90.0000000000,    90.0000000000'
LONGITUDE_RANGE=' -180.0000000000,   180.0000000000'
MAP_SCALE='    0.06250000000'             CENTER_LONGITUDE='     0.0000000000,'
MAP_ROTATION='     0.0000000000,'        NEW_POLE_LATITUDE='     0.0000000000,'
NEW_POLE_LONGITUDE='     0.0000000000,'
PROJ_TRANSLATION='   -1439.99841,    -2880.00000'
POSITIVE_LONGITUDE='EAST'

PROCESSING HISTORY TEXT INFORMATION

@  1-OCT-90 MOSAIC inited Picture_No:  to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   114405760 TOP=Y
@  1-OCT-90 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   116005760 TOP=Y
@ 22-OCT-90 TAPEIN  IA=    1    1  2880  5760  8-BIT TYPE:MUA0:AFLG0044    /FILE:  1
@ 22-OCT-90 TAPOUT  IA=    1    1 2880 5760  8-BIT TAPE:MUA0:FLG0044_01  /FILE:  1


DEVICE:  MUA0:                    TAPE ID:  FLG0044_01


RECORD COUNT ON FILE NUMBER      2

RECORDS      1 TO     43 HAVE RECORD LENGTHS OF    512 BYTES
RECORDS     44 TO   2923 HAVE RECORD LENGTHS OF   5760 BYTES

FORMATTED IPSYS LABEL INFORMATION

                                          TARGET='ARIEL'
PROJECTION='SINU'                         RADIUS='     579.00     579.00     579.00'
LATITUDE_RANGE='  -90.0000000000,    90.0000000000'
LONGITUDE_RANGE=' -180.0000000000,   180.0000000000'
MAP_SCALE='    0.06250000000'             CENTER_LONGITUDE='     0.0000000000,'
MAP_ROTATION='     0.0000000000,'        NEW_POLE_LATITUDE='     0.0000000000,'
NEW_POLE_LONGITUDE='     0.0000000000,'
PROJ_TRANSLATION='   -1439.99841,    -2880.00000'
POSITIVE_LONGITUDE='EAST'

PROCESSING HISTORY TEXT INFORMATION

@  1-OCT-90 MOSAIC inited Picture_No:  to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   114405760 TOP=Y
@  1-OCT-90 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   114405760 TOP=Y
@ 22-OCT-90 TAPEIN  IA=    1    1  2880  5760  8-BIT TYPE:MUA0:AFLG0044    /FILE:  1
@ 22-OCT-90 TAPOUT  IA=    1    1 2880 5760  8-BIT TAPE:MUA0:FLG0044_01  /FILE:  1
```

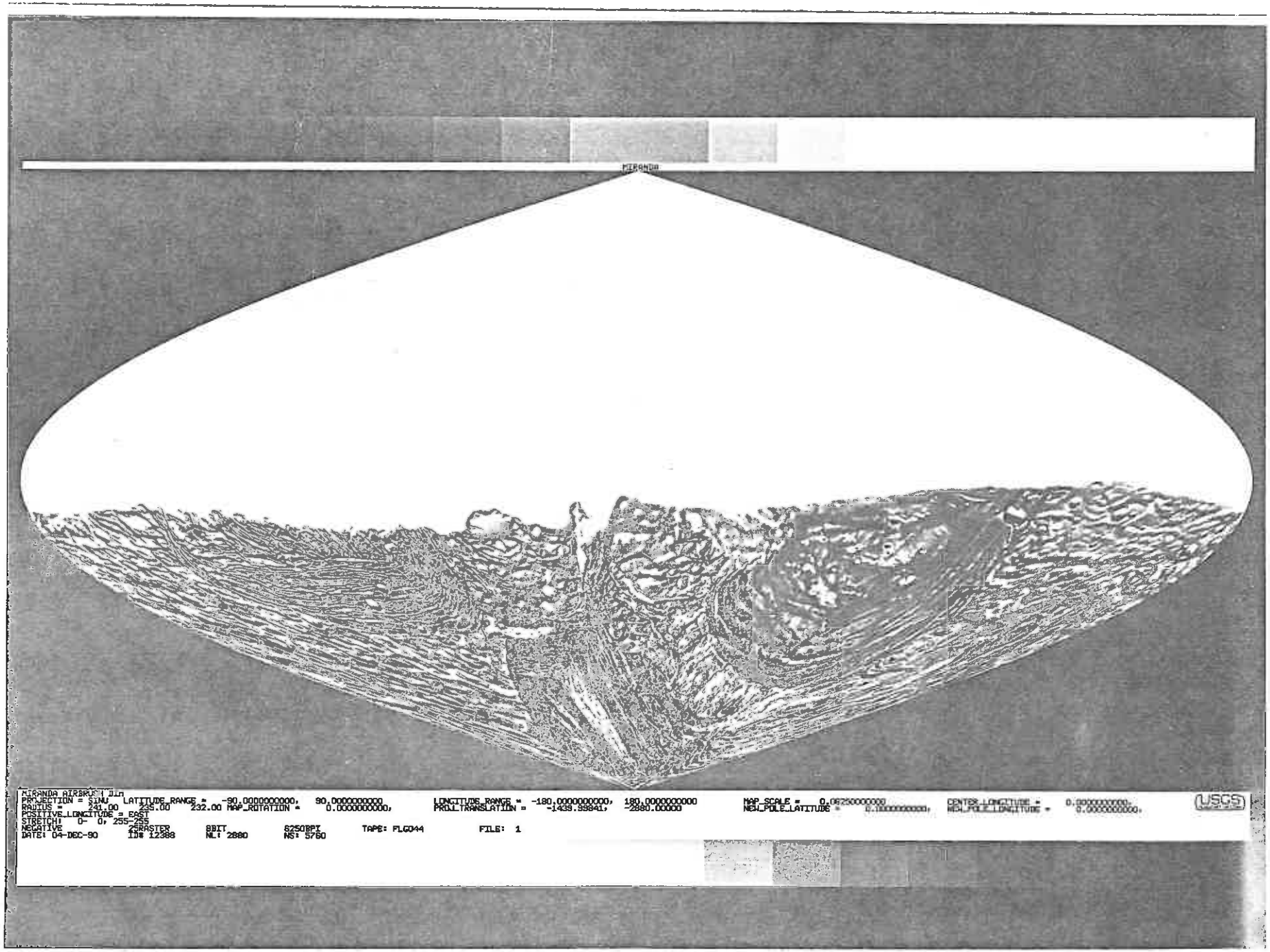
Miranda

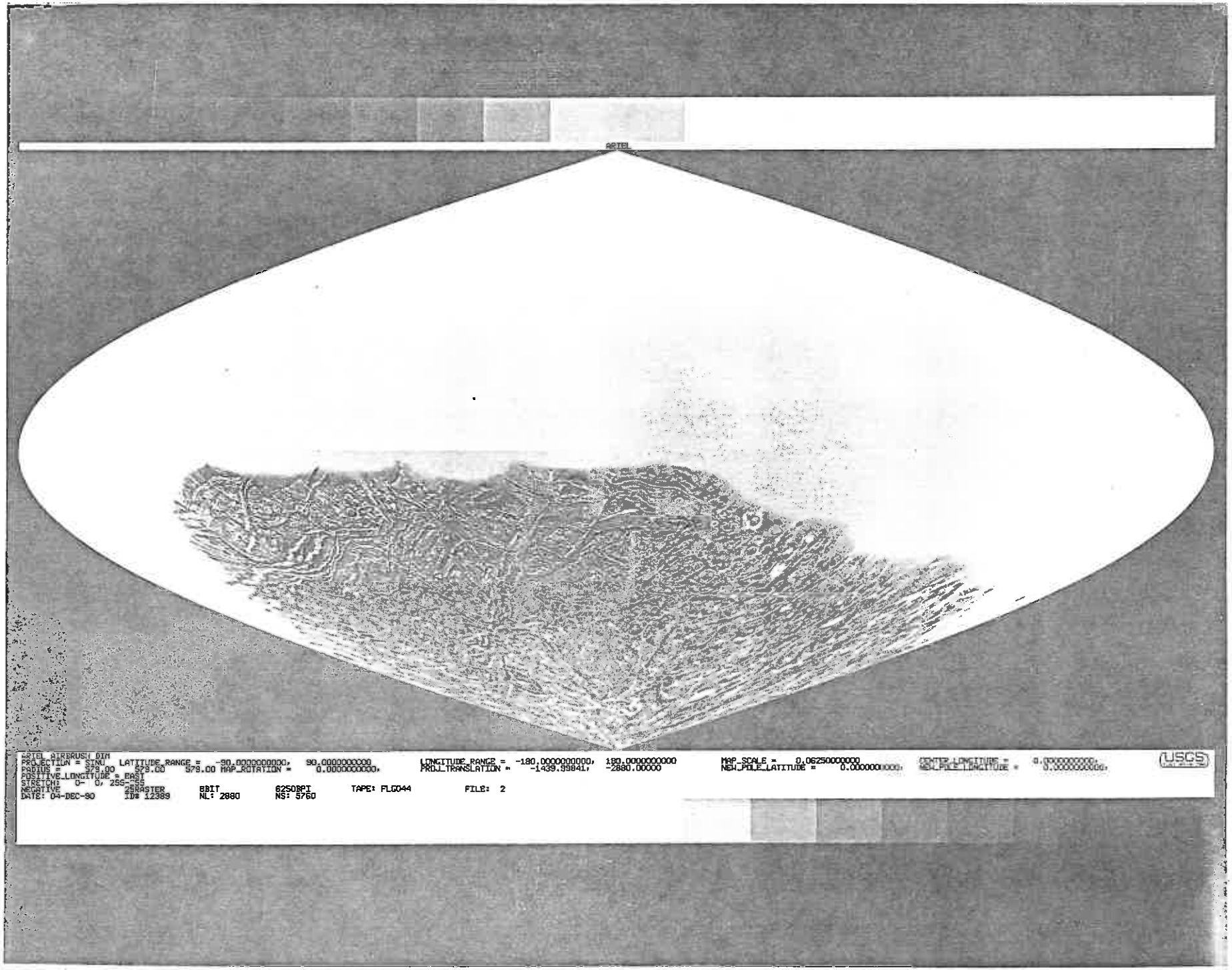
Ariel

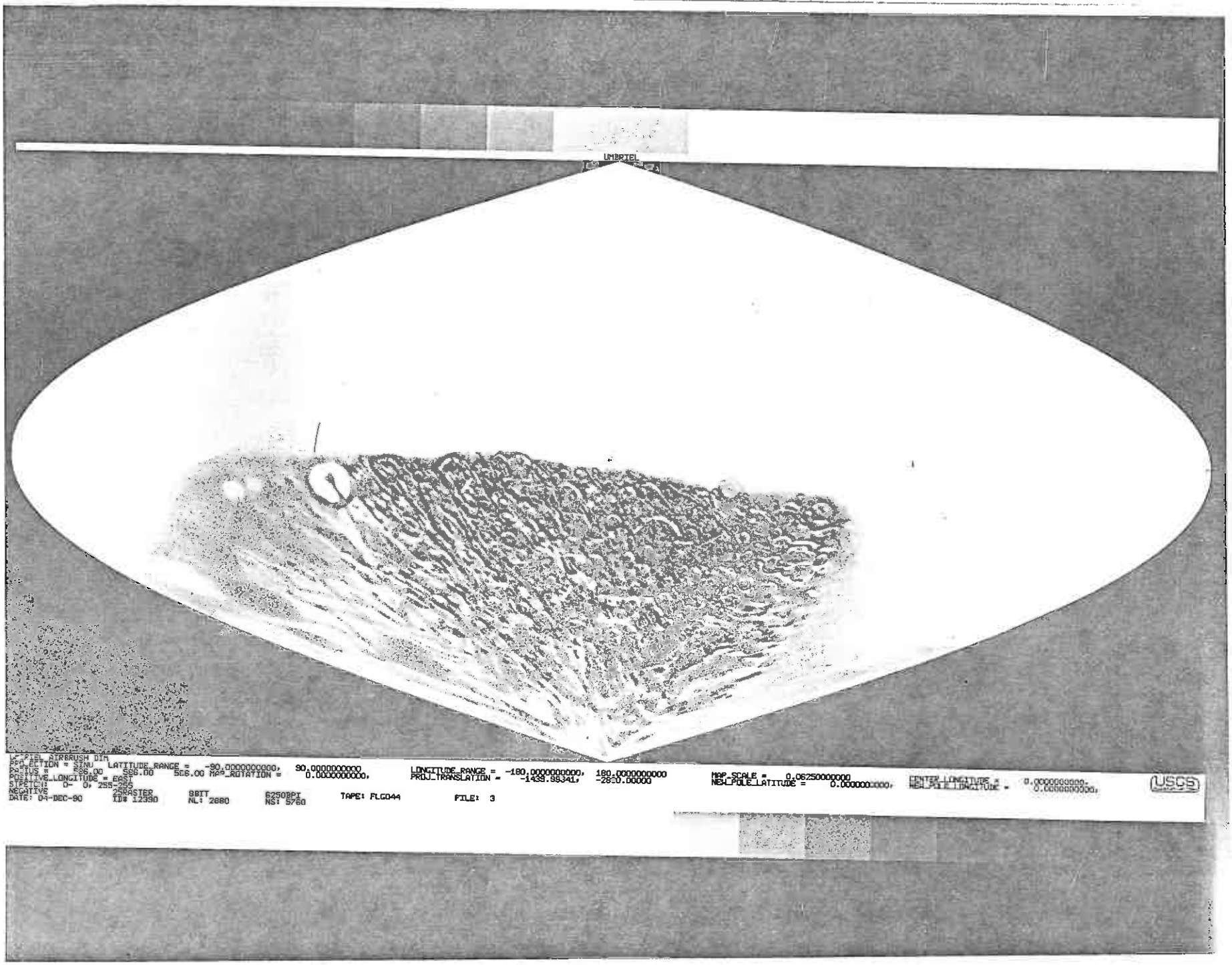
```
DEVICE:  MUA0:                  TAPE ID:  FLG0044_01


RECORD COUNT ON FILE NUMBER     3

RECORDS      1 TO     43 HAVE RECORD LENGTHS OF   512 BYTES
RECORDS     44 TO   2923 HAVE RECORD LENGTHS OF  5760 BYTES

FORMATTED IPSYS LABEL INFORMATION

                                    TARGET='UMBRIEL'
PROJECTION='SINU'                   RADIUS='    586.00    586.00    586.00'
LATITUDE_RANGE='  -90.0000000000,   90.0000000000'
LONGITUDE_RANGE=' -180.0000000000,  180.0000000000'
MAP_SCALE='   0.06250000000'        CENTER_LONGITUDE='    0.0000000000,'
MAP_ROTATION='    0.0000000000,'    NEW_POLE_LATITUDE='    0.0000000000,'
NEW_POLE_LONGITUDE='    0.0000000000,'
PROJ_TRANSLATION='   -1439.99841,   -2880.00000'
POSITIVE_LONGITUDE='EAST'

PROCESSING HISTORY TEXT INFORMATION

@  1-OCT-90 MOSAIC inited Picture_No:  to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   114405760 TOP=Y
@  1-OCT-90 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   116005760 TOP=Y
@ 22-OCT-90 TAPEIN  IA=   1   1  2880  5760  8-BIT TYPE:MUA0:AFLG0044    /FILE:  1
@ 22-OCT-90 TAPOUT  IA=   1   1 2880 5760  8-BIT TAPE:MUA0:FLG0044_01  /FILE:  1


DEVICE:  MUA0:                  TAPE ID:  FLG0044_01


RECORD COUNT ON FILE NUMBER     4

RECORDS      1 TO     43 HAVE RECORD LENGTHS OF   512 BYTES
RECORDS     44 TO   2923 HAVE RECORD LENGTHS OF  5760 BYTES

FORMATTED IPSYS LABEL INFORMATION

                                    TARGET='TITANIA'
PROJECTION='SINU'                   RADIUS='    790.00    790.00    790.00'
LATITUDE_RANGE='  -90.0000000000,   90.0000000000'
LONGITUDE_RANGE=' -180.0000000000,  180.0000000000'
MAP_SCALE='   0.06250000000'        CENTER_LONGITUDE='    0.0000000000,'
MAP_ROTATION='    0.0000000000,'    NEW_POLE_LATITUDE='    0.0000000000,'
NEW_POLE_LONGITUDE='    0.0000000000,'
PROJ_TRANSLATION='   -1439.99841,   -2880.00000'
POSITIVE_LONGITUDE='EAST'

PROCESSING HISTORY TEXT INFORMATION

@  1-OCT-90 MOSAIC inited Picture_No:  to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   114405760 TOP=Y
@  1-OCT-90 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   116005760 TOP=Y
@ 22-OCT-90 TAPEIN  IA=   1   1  2880  5760  8-BIT TYPE:MUA0:AFLG0044    /FILE:  1
@ 22-OCT-90 TAPOUT  IA=   1   1 2880 5760  8-BIT TAPE:MUA0:FLG0044_01  /FILE:  1
```

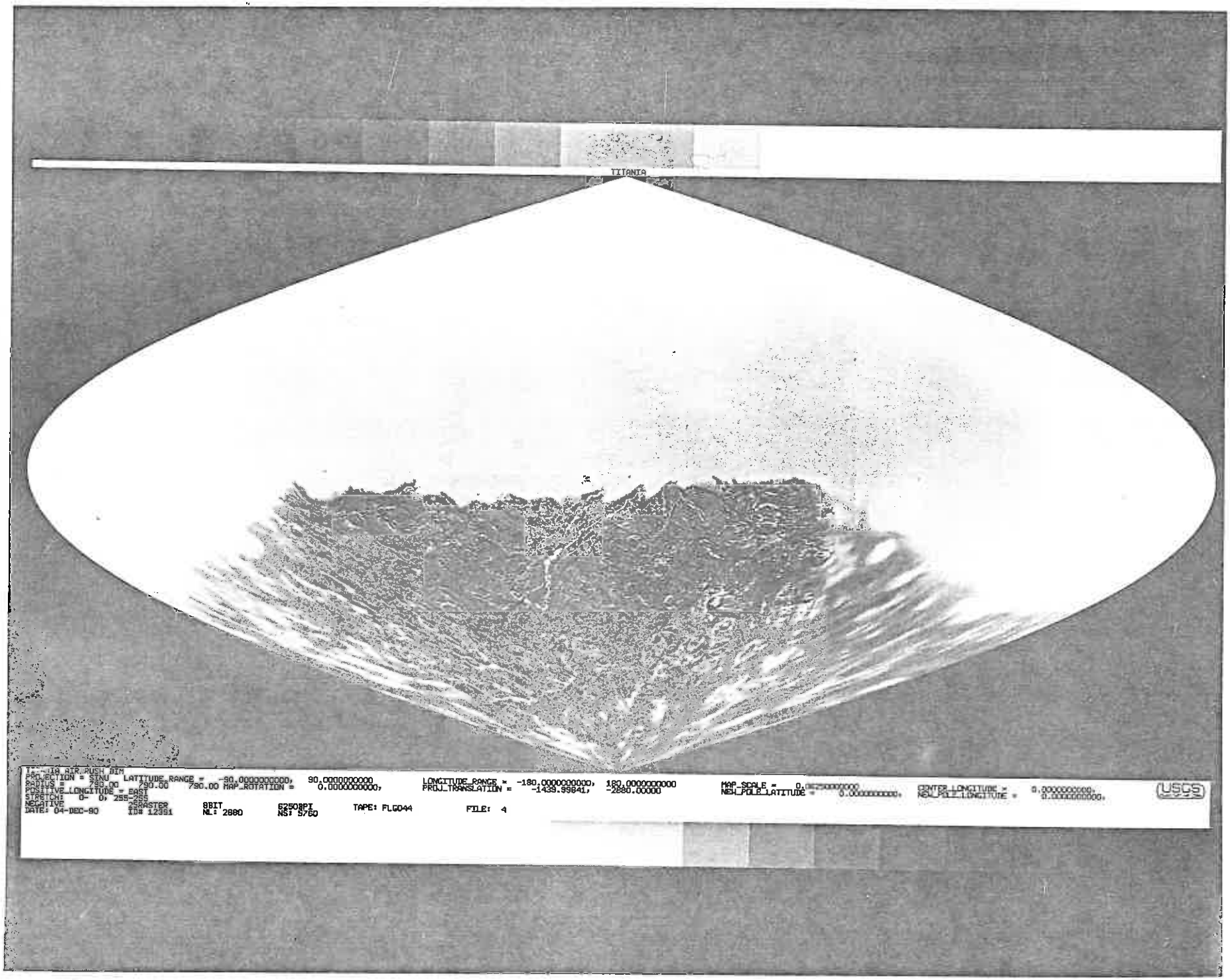
```
DEVICE:  MUA0:                    TAPE ID:  FLG0044_01


RECORD COUNT ON FILE NUMBER      5

RECORDS      1 TO     43 HAVE RECORD LENGTHS OF    512 BYTES
RECORDS     44 TO   2923 HAVE RECORD LENGTHS OF   5760 BYTES

FORMATTED IPSYS LABEL INFORMATION

                                    TARGET='OBERON'
PROJECTION='SINU'                   RADIUS='    762.00    762.00    762.00'
LATITUDE_RANGE='  -90.0000000000,   90.0000000000'
LONGITUDE_RANGE=' -180.0000000000,  180.0000000000'
MAP_SCALE='    0.06250000000'       CENTER_LONGITUDE='    0.0000000000,'
MAP_ROTATION='     0.0000000000,'  NEW_POLE_LATITUDE='    0.0000000000,'
NEW_POLE_LONGITUDE='     0.0000000000,'
PROJ_TRANSLATION='   -1439.99841,   -2880.00000'
POSITIVE_LONGITUDE='EAST'

PROCESSING HISTORY TEXT INFORMATION

@  1-OCT-90 MOSAIC inited Picture_No:  to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   114405760 TOP=Y
@  1-OCT-90 MOSAIC updated Picture_No: to(nl,ns)28805760 Input(sl,ss,nl,ns)   1   116005760 TOP=Y
@ 22-OCT-90 TAPEIN  IA=   1   1  2880  5760  8-BIT TYPE:MUA0:AFLG0044    /FILE:  1
@ 22-OCT-90 TAPOUT  IA=   1   1 2880 5760  8-BIT TAPE:MUA0:FLG0044_01  /FILE:  1
*** END ***  17:04(connect)    3:29.33(cpu) 14645(I/O)   184(faults)
```

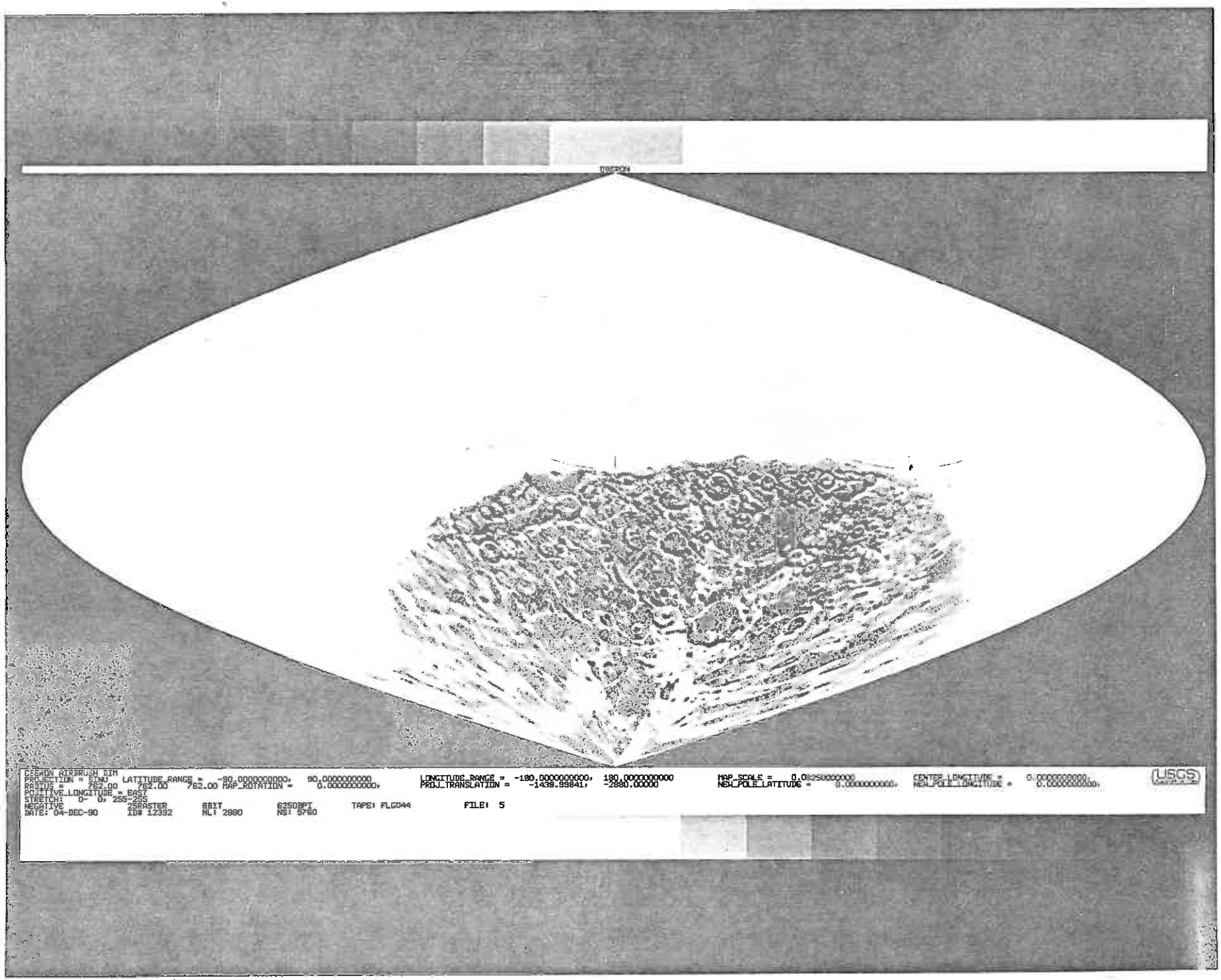
Oberon


MIRANDA
MIRANDA AIRBRUSH 1.IM
PROJECTION = SINU LATITUDE_RANGE = -90.0000000000, 90.0000000000 LONGITUDE_RANGE = -180.0000000000, 180.0000000000 MAP_SCALE = 0.0625000000
RADIUS = 241.00 235.00 232.00 MAP_ROTATION = 0.0000000000, PROJ_TRANSLATION = -1439.99841, -2880.00000 CENTER_LONGITUDE = 0.0000000000,
POSITIVE_LONGITUDE = EAST
STRETCH1 0- 0, 255-255
NEGATIVE 2SRASTER 8BIT 6250BPI TAPE: FLG044 FILE: 1
DATE: 04-DEC-90 ID# 12388 NL: 2880 NS: 5760
USGS


ARIEL
ARIEL AIRBRUSH DIM
PROJECTION = SINU LATITUDE_RANGE = -90.0000000000, 90.0000000000 LONGITUDE_RANGE = -180.0000000000, 180.0000000000 MAP_SCALE = 0.0625000000
RADIUS = 579.00 579.00 579.00 MAP_ROTATION = 0.0000000000, PROJ_TRANSLATION = -1439.99841, -2880.00000 NEW_POLE_LATITUDE = 0.0000000000, CENTER_LONGITUDE = 0.0000000000,
POSITIVE_LONGITUDE = EAST NEW_POLE_LONGITUDE = 0.0000000000,
STRETCH: 0- 0, 255-255
NEGATIVE 2SRASTER 8BIT 6250BPI TAPE: FLG044 FILE: 2
DATE: 04-DEC-90 ID# 12389 NL: 2880 NS: 5760
USGS


UMBRIEL
LF_FIEL AIRBRUSH DIM
PROJECTION = SINU LATITUDE_RANGE = -90.0000000000, 90.0000000000 LONGITUDE_RANGE = -180.0000000000, 180.0000000000 MAP_SCALE = 0.0625000000
A_AXIS_RADIUS = 596.00 596.00 596.00 MAP_ROTATION = 0.0000000000, PROJ_TRANSLATION = -1439.99341, -2820.00000 NEG_POLE_LATITUDE = 0.0000000000, CENTER_LONGITUDE = 0.0000000000,
POSITIVE_LONGITUDE = EAST NEG_POLE_LONGITUDE = 0.0000000000,
STRETCH: 0- 0, 255-255
NEGATIVE 2SRASTER 8BIT 6250BPI
DATE: 04-DEC-90 ID# 12390 NL: 2880 NS: 5760 TAPE: FLC044 FILE: 3
USGS


TITANIA
) I:--IA AIR.RUSH DIM
PROJECTION = SINU LATITUDE_RANGE = -90.0000000000, 90.0000000000 LONGITUDE_RANGE = -180.0000000000, 180.0000000000 MAP_SCALE = 0.0625000000
RADIUS = 790.00 790.00 MAP_ROTATION = 0.0000000000, PROJ_TRANSLATION = -1439.99841, -2880.00000 NEW_POLE_LATITUDE = 0.0000000000. CENTER_LONGITUDE = 0.0000000000.
POSITIVE_LONGITUDE = EAST NEW_POLE_LONGITUDE = 0.0000000000.
STRETCH: 0- 0, 255-255
NEGATIVE 2RASTER 8BIT 6250BPI TAPE: FLG044 FILE: 4
DATE: 04-DEC-90 ID# 12391 NL: 2880 NS: 5760
USGS


OBERON
OBERON AIRBRUSH DIM
PROJECTION = SINU LATITUDE_RANGE = -90.0000000000, 90.0000000000 LONGITUDE_RANGE = -180.0000000000, 180.0000000000 MAP_SCALE = 0.0825000000
RADIUS = 762.00 762.00 762.00 MAP_ROTATION = 0.0000000000, PROJ_TRANSLATION = -1439.99841, -2880.00000 NEW_POLE_LATITUDE = 0.0000000000, CENTER_LONGITUDE = 0.0000000000,
POSITIVE_LONGITUDE = EAST NEW_POLE_LONGITUDE = 0.0000000000,
STRETCH: 0- 0, 255-255
NEGATIVE 2SRASTER 8BIT 6250BPI TAPE: FLG044 FILE: 5
DATE: 04-DEC-90 ID# 12392 NL: 2880 NS: 5760
USGS

USGS Tape File Array Format

Magnetic tapes are 9 track with a density of 800, 1600, or 6250 BPI. The track type and density should be clearly labeled on the tape reel face.

A magnetic tape will contain one or more array files separated by end-of-file marks (EOF). The last file on a tape is indicated by two EOF's in succession at the end of the file. Contained within a file are a series of records separated by inter-record gaps.

LABEL FORMAT

The first part of each file may contain label information. Flagstaff presently has two label formats: the "new" format has 512 byte records and the "old" format has 72 byte records.

New format: Labels have the following 16-bit words in the first record.

Word 1	number of lines
Word 2	number of samples
Word 6	format code: 8 = 8-bit integer 16 = 16-bit integer 32 = 32-bit real
Word 9	number of 256 word (512 byte) records used for labels, all of which precede the first data record.

Old format: Labels with 72 byte records contain the number of lines (NL) and the number of bytes per line (NB) in the first record. Decode them by READ ( ), NL, NB with FORMAT (T33,2I4).

DATA FORMAT

Data records are unblocked. For each line in an array there is a corresponding physical tape record separated by inter-record gaps. The number of lines in an array equals the number of data records in a file. For 8-bit data (8 bits per array element) the number of samples in the array will equal the number of bytes in the record. For 16-bit data (16-bit integer word per element) the number of samples in the array will equal the number of bytes in the record divided by two. It should be noted that on some computers, there may be a slight incompatibility in how 16-bit integer records are read in from tape. If the computer you are using has IBM compatible tape units then you will need to swap the two bytes which make up the 16-bit word before using 16-bit integer words. If the image array pixels are 32-bit floating point values, then swap bytes: 1 2 3 4 4 3 2 1.

APPENDIX B

IMAGE LABELS

Image files in the PICS system contain label information located at the beginning of the file. These labels contain pertinent information about the image. These labels describe the size of the image array, in lines and samples; the type of image data, 8-bit unsigned integer, 16-bit integer, or 32-bit floating point files; SPICE information such as viewing geometry and camera conditions, and processing history text. A user can interrogate and modify the image labels with the LABELS program.

PICS labels exist on both disk and magnetic tape files. On disk files, they occupy 512-byte blocks at the start of the file. The home block, the first block in an image file, contains a parameter indicating the number of 512-byte blocks which make up the labels. On magnetic tape, the labels are contained in 512-byte records at the beginning of the file. These records are exact copies of what would be found on a disk file.

Image labels are divided into four sections; there is a home block section, a histogram section, a keyword label section, and a processing history section. The tables shown below give descriptions of the contents and permitted values of each label section.

LABEL SECTIONS

SECTION 1 - The Home block. This section is contained in the first 512-byte block of an image file. It contains information about the image contained in the file, and contains pointers to the other label sections within the file. The format of this block is binary and a detailed description is provided in the description the home block, shown below.

SECTION 2 - The Histogram section, disk blocks 2 to M. These blocks hold the histogram of the image. These blocks may be empty, but 'DISKLO' subroutine will reserve two blocks when labels are initialized. The histogram area consists of 256 bins with each bin a VAX 32-bit long word. The histogram is normalized for 16-bit and 32-bit data. The RMIN and RSCL parameters in the home block section, shown below, specifies the normalization

coefficients.

SECTION 3 - The Keyword label section, disk blocks M+1 to N. The Keyword label area contains information necessary to describe and process an image. Keywords contain information such as mission, spacecraft number, picture number, camera, target, exposure time, spectral information, geometry information, camera state, reseau locations, and other processing information. Keywords take the form: KEYWORD='xxxxxxxxx', where keyword indicates the type of information and xxxxxx contains the value of the keyword. The keywords and associated information are ASCII character strings. Keywords are separated by at least one blank character and the information associated with a keyword is always contained within quotes. A description of permitted keywordS can be found in the keyword label section shown below.

SECTION 4 - The processing history section, disk blocks N+1 to 0. This section is reserved for processinng history text. Each program that creates an output image file copies the label information from the input file to the output files and appends a processing text entry to the history text. Processing history text will consist of an ASCII character string of varying length not to exceed 250 characters. The first 20 characters of the processing history have a specific format as outlined below:

```
@ dd-mmm-yy program (any ascii string)
 character  1      = '@' indicates begining of history text string
 character  2      = blank character
 characters 3-11   = dd - day of year, mmm - month , yy - year
 characters 13-19  = name of program which processes image file
 characters 20-n   = short descriptive text of program processing
                       parameters
```

Description of First Label Block (Home Block)

Word	Description
1	Number of lines in image array
2	Number of samples in image array
3	Number of disk blocks/line
4,5	Exclude value (indicates non-valid or empty value)
6	Bit type or format code 8 = 8-bits/pixel 2 = 32-bits/pixel (integer) 16 = 16-bits/pixel 3 = 64-bits/pixel (complex) 32 = 32-bits/pixel 4 = 64-bits/pixel (real) 6 = 6-bits/pixel 5 = formatted numbers 1 = ascii data
7	File type of disk file: 1 = image array 5 = parallel 2 = mosaic 6 = matrix 3 = map 7 = card images 4 = serial vector 8 = text
8	Block length of disk in 16-bit words (256 for VAX)
9	Total number of label blocks reserved at beginning of disk file.
10	Number of arrays in file
11	Histogram format code (same codes as word 6; normally 32)
12	Pointer to first block of histogram area
13	Number of disk blocks reserved for histogram area
14	Number of words used in histogram area
15	Pointer to first block of keyword labels
16	Number of disk blocks reserved for keyword labels
17	Number of words used in keyword labels
18	Pointer to first block or processing history labels
19	Number of disk blocks reserved for processing history
20	Number of words used in processing history labels
21	Starting line position of frame This parameter is generated by a tape to disk program when a sub-image is transferred to disk from tape
22	Starting sample position of frame This parameter is generated by a tape to disk program when a sub-image is transferred to disk from tape
23	Blocking factor on tape. This field contains the number of line records per physical tape record. The last physical record may be different in length from the other records because there may not be an even multiple of line records in the file
24-30	These words are reserved for future use
31,32	Mean value of data without zero (real number)
33,34	Sigma value without zero (real number)
35,36	Mean value with zero included (real number)
37,38	Sigma value with zero included (real number)
39	Index location of lowest non-zero value in histogram
40	Index location of highest value in histogram
41	Index location of histogram peak

42	Spare word reserved for future use
43,44	RMIN: minimum value of scaled histogram (0 for 8-bit) (real number)
45,46	RSCL: scaling factor of histogram (1.0 for 8-bit) (original value = RMIN + dn*RSCL)
47-255	These words are reserved for future use.

Keyword Label Section

Variable	Description and Range
CAL_TARGET_CODE	Planet system code: (J = Jupiter, S = Saturn, U = Uranus, N = Neptune)
CAMERA	Voyager: WA = Camera A, Wide angle NA = Camera B, Narrow angle Viking: 4 = Spacecraft 1, camera B 6 = Spacecraft 2, camera B 7 = Spacecraft 1, camera A 8 = Spacecraft 2, camera A Mariner: A = Camera A, Wide angle B = Camera B, Narrow angle
CAMERA_ANGLES	Declination, right ascension and twist angle of camera in earth mean equatorial 1950 coordinate system (EME1950) in degrees
CAMERA_STATE_1	Voyager: Scan Rate of camera (permitted values: 1, 3, 7) Viking: Light flood condition of camera (0 = flood off, 1 = light flood on)
CAMERA_STATE_2	Voyager: (shutter mode indicator) (0 = Normal shutter mocd) (1 = Wide angle BSIMAN or BOTSIM shutter mode) Viking: Camera gain state (1 = high gain, 0 = low gain)
CAMERA_STATE_3	Voyager: Gain state condition of camera (always contains the number 1) Viking: DC offset condition (1 = offset on, 0 = offset off)
CENTER_LATITUDE	Center latitude of projection when used (-90,90 Degrees)
CENTER_LONGITUDE	Center longitude of projection when used (-360,360 Degrees)
DATUM	Base elevation of topographic image (kilometers)
DISTANCE	Distance from the planet in km/pix (used only for the point perspective projection POIN)
ECCENTRICITY	Eccentricity of planet, also known as

	ellipticity.
EXPOSURE_TIME	Exposure time of camera, (Voyager units are in seconds Viking units are in milli-seconds)
FRAME_ID	Image identifier (FDS for Voyager, FSC for Viking, Etc.)
GMT	Time of exposure in greenwich mean time (year:day:hour:min:sec) in the following format: YYYY:DDD:HH:MM:SS
JULIAN_DATE	Time of exposure in decimal julian days (ephemeris time)
LATITUDE_RANGE	Latitude range used to create image (-90,90 degrees) for non-rectangular projections, the corner latitude, longitude will not necessarily be within the lat,lon range given because the smallest rectangle that will contain the lat,lon boundaries will include some area outside that range.
LEVEL	A specific group of programs have been run on a particular image or mosaic.
LONGITUDE_RANGE	Longitude range used to create image (-360,360 degrees)
MAP_ROTATION	Clockwise rotation of north (0,360 degrees)
MAP_SCALE	Scale in kilometers/pixel or degrees/pixel depending on projection.
MATCH_POINTn	Up to 9 sets of conjugate (matching) points between two LEVEL 1 images used by JIGSAW to update the camera angles. The points are stored in the following order: line, sample of image 1, FSC of the overlapping image, and line and sample of the matching point on the overlapping image.
MISSION	Mission name (MARINER, VIKING, VOYAGER, LANDSAT, NOAA, GALILEO)
NEW_POLE_LATITUDE	New pole latitude if the spherical coordinate system has been rotated. This is the projection pole. (-90,90 degrees)
NEW_POLE_LONGITUDE	New pole longitude if the spherical coordinate system has been rotated. This is the projection pole. (-180,180 degrees)
NO_CAMERA_STATE	Number of camera states to be listed in the keyword label area.

PATH — Path number used in LANDSAT, Thematic mapper and other earth orbiting spacecraft

PHOTO_RAD_POINTn — Up to 8 points that designate bland areas in the image that can be used for correcting brightness errors after radiometry and photometry corrections have been made. The order is lat,lon,line,samp where line,samp is the position in the raw image.

PICTURE_NO — PICNO for VIKING and VOYAGER

PLANET_ANGLES — Declination, right ascension and rotation spin angle of planet in EME1950 in degrees

POSITIVE_LONGITUDE — The direction of positive longitude (WEST or EAST)

PROJECTION — Four letter code for a map projection

CODE	PROJECTION
ALBE	Albers conical equal-area
LAMA	Lambert azimuthal equal-area
LAMB	Lambert conformal
MERC	Mercator
ORTH	Orthographic
POIN	Point perspective
POLA	Polar stereographic
POLY	Polyconic
SIMP	Simple cylindrical
SINU	Sinusoidal
TRAN	Transverse mercator

PROJ_TRANSLATION — Offset of the top left corner of line 1, sample 1 relative to the origin of the map projection

RADIUS — Radius of target in kilometers (3 values - major equatorial axis, minor equatorial axis and the polar axis)

RAW_TIE_POINTn — Up to 9 ground control points used to update camera angles. The order is lat,lon,line,samp, radius where line,samp is the position in the raw image and radius is the local radius in km if known.

RESEAUS — Line,sample,type,weight(1.0 or 0.0) quadruplets of reseau locations (2F7.1,I1,F4.1)

ROW — Row number of LANDSAT, Thematic mapper and other earth orbiting spacecraft

APPENDIX J

GEOMETRIC DEFINITION OF A PIXEL IN PICS

The purpose here is to describe the spatial or geometric definition of a pixel used in the PICS digital products and software provided by the USGS in Flagstaff. A broad range of factors enters into this question. For example, is a pixel to be conceived of as a point or as an area. The point definition would be most convenient, for instance, when dealing with coordinate grid overlays. This results in an odd number of pixels across a map that has an even number of spatial increments. For changing scales (for instance by even powers of 2) this definition becomes a problem. In this case it makes more sense to treat a pixel as a finite area. Then an even number of pixels covers an even number of spatial increments and decreasing/increasing scales by a power of 2 becomes trivial. However, grids now fall between pixels, at least in a mathematical sense. Their treatment in the generation of hardcopy therefore becomes an issue.

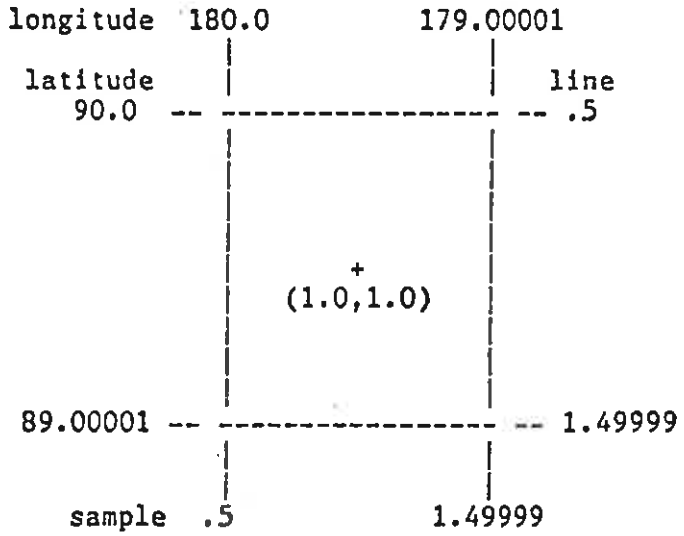
It was decided that the area concept of a pixel was the better choice; we would have to live with the assymmetries introduced in things like cartographic grids. There are various solutions: (1) use two pixels for the width of a grid line, (2) stagger grid pixels back-and-forth across the mathematical position, (3) use a convention whereby grid lines are systemmatically drawn offset from their mathematical position.

The next issue is the conversion between integer coordinates and real coordinates of the pixel mesh. We adopt the convention that pixels are numbered (or named if you like) beginning in the upper left corner with line 1, sample 1 (pixel 1,1); lines increase downward; samples increase to the right. (Even this is not a universal standard; some astronomical systems begin, perhaps more logically, in the lower left corner.) There are three reasonable possibilities for aligning a real, or floating point, coordinate system with the pixel mesh: the coordinate 1.0, 1.0 could be the upper left, the center, or the lower right of pixel 1,1. The convention historically used for geometric calibration files (reseau positions) and also used in the Multimission Image Processing Laboratory at the Jet Propulsion Laboratory, is that the center of the pixel is defined as its location in real coordinates. In other words, the real coordinates of the center of pixel 1,1 are 1.0, 1.0. The top left corner of the pixel is .5, .5 and the bottom right corner is 1.49999..., 1.499999. The

bottom and right edge of a pixel is the mathematically open boundary. This is the standard adopted in the PICS software and its digital products.

Cartographic conventions must also be defined. Many of our digital products are in some map projection with an associated latitude and longitude range. The projection representation of a pixel is mathematically open at the increasing (right and lower) boundaries, and mathematically closed at its left and upper boundaries. An exception occurs at the physical limits of a projection; the lower boundary of the lowest pixel is closed to include the limit of the projection (e. g. the south pole). In the case of a rectangular projection such as a Mercator or a Simple Cylindrical, the left edge of pixel 1,1 is labeled with the left end of the longitude range and the right edge of the right most pixel is labeled with the right end of the longitude range. For example, if an image is in a Simple Cylindrical projection with a longitude range of -180.0 to +180.0, a latitude range of -90.0 to +90.0 and a scale of one degree/pixel, the image will have 180 lines and 360 samples. The latitude and longitude of the top left corner of pixel 1,1 is 90.0, 180.0. (if the planet has positive longitude to the west). The latitude and longitude of the bottom right corner of pixel 180,360 is -90.0, -180.0.

Coordinates of Pixel 1,1



Finally, we must select a convention for drawing grid lines for various cartographic coordinates on planetary images and maps. The convention used in PICS is that a grid line is drawn in the pixels that contain its floating point value until the open boundary is reached and then an exception is made so that the outer range of latitude and longitude will always appear on the image. This means, in the example given above, a 10 degree grid would start on pixel 1 and be drawn on every tenth pixel (11,21,31,...) until the open boundary is reached. Then the line would be drawn on the pixel previous to the open boundary (line 180 instead of line 181, or sample

360 instead of 361).

To summarize, the PICS conventions are:

1. Pixels are treated as areas, not as points.

2. The integer coordinates begin with 1,1 (read "line 1, sample 1") for the upper-left-most pixel; lines increase downward; samples increase to the right.

3. Integer and floating point image coordinates are the same at the center of a pixel.

4. Grids will be drawn in the pixels that contain the floating point location of the grid lines except for open boundaries, which will be drawn to the left or above the open boundary.

NSDF

SL-21K PSPG-00714

URANIAN SATELLITES MDIMS ON TAPES

THIS DATA SET CONSISTS OF ONE TAPE. THE TAPE IS 9-TRACK, 6250 BPI BINARY, WITH 5 FILES OF DATA CONTAINED. THE TAPE WAS CREATED ON AN IBM COMPUTER. SUPPORT DOCUMENTATION,CONTAINED IN THE DATASET CATALOG SHOULD BE SENT WITH THE TAPE. THE D AND C NUMBER IS LISTED BELOW.

D#	C#	FILES
D-107968	C-031723	5

Equations to find latitude and longitude of a given pixel (LINE and SAMPLE)

These equations are for the Sinusoidal Equal Area projection and give the latitude and longitude on degrees of the center of a desired pixel. The enclosed Appendix J "Geometric Definition of a Pixel" contains detailed information pertaining to latitude and longitude of a pixel.

$$\text{Latitude} = (-(\text{PROJ\_TRANSLATION(1)}) - \text{LINE} + .5) \times \text{MAP\_SCALE}$$

$$\text{Longitude} = \frac{(-(\text{PROJ\_TRANSLATION(2)}) - \text{SAMPLE} + .5)}{\text{COSINE (Latitude)}} \times \text{MAP\_SCALE}$$

The following is an explanation of each variable in the equations:

Latitude	The latitude of the center of the LINE pixel.
Longitude	The longitude of the center of the SAMPLE pixel.
LINE and SAMPLE	This is the line and sample location of a specific pixel on the image file. Pixel locations are defined by whole numbers.
	Miranda, Ariel, Umbriel, Titania, Oberon
PROJ_TRANSLATION(1)	-1439.99841
PROJ_TRANSLATION(2)	-2880.
MAP_SCALE	0.0625
	(This information can be found in the text of the enclosed half tone hard copy for each file and the sample data dump.)

SL - 21K

MDIM

```
 *** PROGRAM: COUNT ***  VERSION: 10-AUG-89 PROCESSING DATE: 27-NOV-90 09:47:25


DEVICE:  MUB0:                    TAPE ID:  FLG0046_01


RECORD COUNT ON FILE NUMBER      1

RECORDS      1 TO     43 HAVE RECORD LENGTHS OF    512 BYTES
RECORDS     44 TO   2923 HAVE RECORD LENGTHS OF   5760 BYTES

FORMATTED IPSYS LABEL INFORMATION

MISSION='VOYAGER'                          SPACECRAFT_NO=' 2'
FRAME_ID=' 2684630'                        TARGET='MIRANDA'
CAMERA='WA'                                CAL_TARGET_CODE='U'
CAMERA_STATE_1='1   :1 SCAN RATE'          CAMERA_STATE_2=''
CAMERA_STATE_3='1 (LOW GAIN)'              EXPOSURE_TIME=' 0.4800'
NO_CAMERA_STATE='3'                        PICTURE_NO='1718U2-001'
PROJECTION='SINU'                          RADIUS='    242.00    242.00    242.00'
LATITUDE_RANGE='-90.0000000000,   90.0000000000'
LONGITUDE_RANGE='-180.0000000000,  180.0000000000'
MAP_SCALE='0.06250000000'                  CENTER_LONGITUDE='0.0000000000'
JULIAN_DATE=' 2446455.204504'              SYSTEM='2000'
CAMERA_ANGLES='   17.972  244.441  296.941'
PLANET_ANGLES='  -11.220  259.215  355.850'
SPACECRAFT_VECTOR='    12477.    26062.    -9419.'
SUN_VECTOR='     583133433.    2568172856.    1117089662.'
WAVE_LENGTH='2 (CLEAR )'                   MAP_ROTATION='0.0000000000'
NEW_POLE_LATITUDE='0.00000000000'          NEW_POLE_LONGITUDE='0.0000000000'
PROJ_TRANSLATION='-1439.99841,   -2880.00000'
POSITIVE_LONGITUDE='EAST'                  RESEAUS


PROCESSING HISTORY TEXT INFORMATION

@   8-DEC-86 MIPLRF  01/28/86  AREA:    1    1  800  800 LINC:  1.0 SINC:  1.0
@   8-DEC-86 MIPLRF FROM=W1:2684630.1
@ 23-MAR-87 SPICELAB  SOURCE = MED
@ 26-MAR-87 REMRX   01-MAR-87 BOX SIZE   9 X  9
@ 26-MAR-87 RADCAL  01-MAR-87 AREA:    1    1  800  800 LINC:  1.0 SINC:  1.0
@ 26-MAR-87 RADCAL W0=0.8465E+03 EXP=0.4800E+00 GAIN= 1.0 OFF=   0.0 OFFT=   0.0
@ 30-MAR-87 B16MAD  14-JAN-86 AREA:    1    1  800  800 LINC:  1.0 SINC:  1.0
@ 30-MAR-87 B16MAD  MUL1,ADD:     0.80000     0.00000
@ 30-MAR-87 TRIM    01-MAR-87 AREA:    1    1  800  800 LINC:  1.0 SINC:  1.0
@ 30-MAR-87 TRIM    Top,Bottom,Left,Right: 31 20 20 20 filled with     0
@ 30-MAR-87 GEOM  (Rows,Columns):    0    0  T-file: WORK2:TFILE.DAT
@ 30-MAR-87 SUNANG  12/01/86  AREA:    1    1  246  682 LINC:  1.0 SINC:  1.0
@ 30-MAR-87 B16MAD  14-JAN-86 AREA:    1    1  246  682 LINC:  1.0 SINC:  1.0
@ 30-MAR-87 B16MAD  MUL1,ADD:     1.46300     0.00000
@  1-APR-87 DEMAGD  17-NOV-86 AREA:    1    1  492 1364 LINC:  1.0 SINC:  1.0
@  1-APR-87 DEMAGD  Double the original by averaging.
@  1-APR-87 DEMAGD  17-NOV-86 AREA:    1    1  984 2728 LINC:  1.0 SINC:  1.0
@  1-APR-87 DEMAGD  Double the original by averaging.
@  1-APR-87 DEMAGD  17-NOV-86 AREA:    1    1 1968 5456 LINC:  1.0 SINC:  1.0
@  1-APR-87 DEMAGD  Double the original by averaging.
@  2-APR-87 MASK    15-APR-86 AREA:    1    1 1968 5456 LINC:  1.0 SINC:  1.0
@  2-APR-87 MASK    MIN,MAX:    2    2
@  4-APR-87 B16MAD  14-JAN-86 AREA:    1    1 1968 5456 LINC:  1.0 SINC:  1.0
```

Miranda

```
@  4-APR-87 B16MAD  MUL1,ADD:      0.66500      0.00000
@ 15-APR-87 DSK2DSK 28-JUL-86 AREA:     1     1 1968 5452 LINC:  1.0 SINC:  1.0
@  6-JUN-87  *** FLT16B *** 10-JAN-86 AREA: 1, 1,  1968, 5452 LINC:1 SINC:1
@  6-JUN-87   TYPE=HPF  LINE= 151 SAMP= 151 LOW=      1 HIGH= 32767 NORM= 16384.0
@  9-JUN-87 MAPMOS inited   to(nl,ns)14415761 Input(sl,ss,nl,ns) 524   114455452
@  9-JUN-87 MAPMOS updated  to(nl,ns)14415761 Input(sl,ss,nl,ns) 401   114445764
@  9-JUN-87 B16MAD  14-JAN-86 AREA:     1     1 1441 5761 LINC:  1.0 SINC:  1.0
@  9-JUN-87 B16MAD  MUL1,MUL2,ADD:      1.00000      1.00000-16384.00000
@ 23-JUN-87 MAPMOS updated  to(nl,ns)14415761 Input(sl,ss,nl,ns) 274   114415761
@ 23-JUN-87  *** FLT16B *** 10-JAN-86 AREA: 1, 1,  1441, 5761 LINC:1 SINC:1
@ 23-JUN-87   TYPE=LPF  LINE= 251 SAMP= 251 LOW=      1 HIGH= 32767 NORM= 16384.0
@ 23-JUN-87 B16MAD  14-JAN-86 AREA:     1     1 1441 5761 LINC:  1.0 SINC:  1.0
@ 23-JUN-87 B16MAD  MUL1,MUL2,ADD:      1.00000      1.00000-16384.00000
@ 28-SEP-90 BT2BT   15-MAR-87 AREA:     1     1 1441 5761 LINC:  1.0 SINC:  1.0
@ 28-SEP-90 BT2BT  Obit: 8  Ibit:16 (mul,add):       0.05000     -20.00000
@ 15-OCT-90 GEOM  (Rows,Columns):     0     0  T-file: TFILE
@ 21-NOV-90 TAPEIN  IA=   1   1  2880  5760  8-BIT TYPE:MUB0:AFLG0046    /FILE:  1
@ 21-NOV-90 TAPOUT  IA=   1   1 2880 5760  8-BIT TAPE:MUB0:FLG0046_01  /FILE:  1


DEVICE:  MUB0:                    TAPE ID:  FLG0046_01


RECORD COUNT ON FILE NUMBER     2

RECORDS     1 TO     43 HAVE RECORD LENGTHS OF   512 BYTES
RECORDS    44 TO   2923 HAVE RECORD LENGTHS OF  5760 BYTES

FORMATTED IPSYS LABEL INFORMATION

MISSION='VOYAGER'                          SPACECRAFT_NO=' 2'
FRAME_ID='   2684340'                      TARGET='ARIEL'
CAMERA='NA'                                CAL_TARGET_CODE='U'
CAMERA_STATE_1='1  :1 SCAN RATE'           CAMERA_STATE_2=''
CAMERA_STATE_3='1 (LOW GAIN)'              EXPOSURE_TIME=' 3.8400'
NO_CAMERA_STATE='3'                        PICTURE_NO='1548U2-001'
PROJECTION='SINU'                          RADIUS='580.0'
ECCENTRICITY='0.000000'
LATITUDE_RANGE='-90.0000000000,   90.0000000000'
LONGITUDE_RANGE='-180.0000000000,  180.0000000000'
MAP_SCALE='0.06250000000'                      CENTER_LONGITUDE='0.0000000000'
JULIAN_DATE=' 2446455.110625'                  SYSTEM='1950'
CAMERA_ANGLES='    8.759  253.580  267.537'
PLANET_ANGLES='  -14.852  256.499  333.579'
SPACECRAFT_VECTOR='    46394.   156570.   -25261.'
SUN_VECTOR='     583250959.    2568166903.    1116999027.'
WAVE_LENGTH='1 (VIOLET)'                       MAP_ROTATION='0.0000000000'
NEW_POLE_LATITUDE='0.00000000000'              NEW_POLE_LONGITUDE='0.0000000000'
PROJ_TRANSLATION='-1439.99841,   -2880.00000'
POSITIVE_LONGITUDE='WEST'                      RESEAUS
RAW_TIE_POINT3='  -31.434,   85.269,  104.000,  541.000'
RAW_TIE_POINT5='  -43.358,   37.502,  346.000,  458.000'


PROCESSING HISTORY TEXT INFORMATION

@ 12-JUN-86 MIPLRF  01/28/86  AREA:     1     1  800  800 LINC:  1.0 SINC:  1.0
@ 12-JUN-86 MIPLRF FROM=2684340.1
@ 12-JUN-86 FINDRX   14-APR-86
```

Ariel

```
@ 12-JUN-86 REMRX   16-APR-86 BOX SIZE    5 X  5
@ 12-JUN-86 RADCAL  06/06/86/ AREA:     1    1  800  800 LINC:  1.0 SINC:  1.0
@ 12-JUN-86 RADCAL W0=0.5289E+02 EXP=0.3840E+01 GAIN= 1.0 OFF=    0.0 OFFT=    0.0
@ 12-JUN-86 GEOM  (Rows,Columns):     0    0  T-file: 1548T.DAT
@ 14-JUN-86 GEOM  (Rows,Columns):     0    0  T-file: DUB2:1548P.DAT
@ 14-JUN-86  *** FLT16B *** 10-JAN-86 AREA: 1, 1,  1934, 1934 LINC:1 SINC:1
@ 14-JUN-86   TYPE=HPF  LINE= 101 SAMP= 101 LOW=    50 HIGH= 10000 NORM=  5000.0
@ 17-JUN-86 MASK  IMIN=     2 IMAX=     2
@ 17-JUN-86 MOSAIC OVERLAY MODE
@ 17-JUN-86 MOSAIC SL:SS     1     1 INPUT SL:SS:NL:NS     1     1 1934 1934
@ 17-JUN-86 MOSAIC OVERLAY MODE
@ 17-JUN-86 MOSAIC SL:SS     1     1 INPUT SL:SS:NL:NS     1     1 1934 1934
@ 26-JUN-86  *** FLT16B *** 10-JAN-86 AREA: 1, 1,  1934, 1934 LINC:1 SINC:1
@ 26-JUN-86   TYPE=LPFZ LINE=    5 SAMP=    5 LOW=   100 HIGH= 10000 NORM= 16384.0
@ 25-SEP-90 BT2BT   15-MAR-87 AREA:     1     1 1934 1934 LINC:  1.0 SINC:  1.0
@ 25-SEP-90 BT2BT  Obit: 8  Ibit:16 (mul,add):       0.02550       0.00000
@ 26-SEP-90 GEOM  (Rows,Columns):     0     0  T-file: TFILE
@ 27-SEP-90 STRETCH 07-JUL-89 AREA:     1     1 2880 5760 LINC:  1.0 SINC:  1.0
@ 27-SEP-90 STRETCH MAP INPUT,OUTPUT:       0,     0:    80,     0:   191,   255:   255,   255:
@ 21-NOV-90 TAPEIN  IA=    1    1  2880  5760  8-BIT TYPE:MUB0:AFLG0046    /FILE:  1
@ 21-NOV-90 TAPOUT  IA=    1    1 2880 5760  8-BIT TAPE:MUB0:FLG0046_01  /FILE:  1


DEVICE:  MUB0:                    TAPE ID:  FLG0046_01


RECORD COUNT ON FILE NUMBER      3

RECORDS      1 TO     43 HAVE RECORD LENGTHS OF    512 BYTES
RECORDS     44 TO   2923 HAVE RECORD LENGTHS OF   5760 BYTES

FORMATTED IPSYS LABEL INFORMATION

MISSION='VOYAGER'                          SPACECRAFT_NO=' 2'
FRAME_ID='   2682545'                      TARGET='UMBRIEL'
CAMERA='NA'                                CAL_TARGET_CODE='U'
CAMERA_STATE_1='5  :1 SCAN RATE'           CAMERA_STATE_2=''
CAMERA_STATE_3='1 (LOW GAIN)'              EXPOSURE_TIME=' 1.9200'
NO_CAMERA_STATE='3'                        PICTURE_NO='0473U2-001'
PROJECTION='SINU'
LATITUDE_RANGE='-90.0000000000,   90.0000000000'
LONGITUDE_RANGE='-180.0000000000,  180.0000000000'
MAP_SCALE='0.06250000000'                  CENTER_LONGITUDE='0.0000000000'
JULIAN_DATE=' 2446454.513403'              SYSTEM='1950'
CAMERA_ANGLES='  -10.163  286.359  202.726'
PLANET_ANGLES='  -14.880  256.587  232.753'
SPACECRAFT_VECTOR='  -291539.   991807.   185634.'
SUN_VECTOR='     583297788.    2568224182.    1116766007.'
WAVE_LENGTH='0 (CLEAR )'                   MAP_ROTATION='0.0000000000'
NEW_POLE_LATITUDE='0.00000000000'          NEW_POLE_LONGITUDE='0.0000000000'
PROJ_TRANSLATION='-1439.99841,   -2880.00000'
POSITIVE_LONGITUDE='WEST'                  RESEAUS
RAW_TIE_POINT1='  -90.000,    0.000,  453.000,  343.000'


PROCESSING HISTORY TEXT INFORMATION

@  4-JUN-86 MIPLRF  01/28/86  AREA:     1    1  800  800 LINC:  1.0 SINC:  1.0
@  4-JUN-86 MIPLRF FROM=2682545.1
```

Umbriel

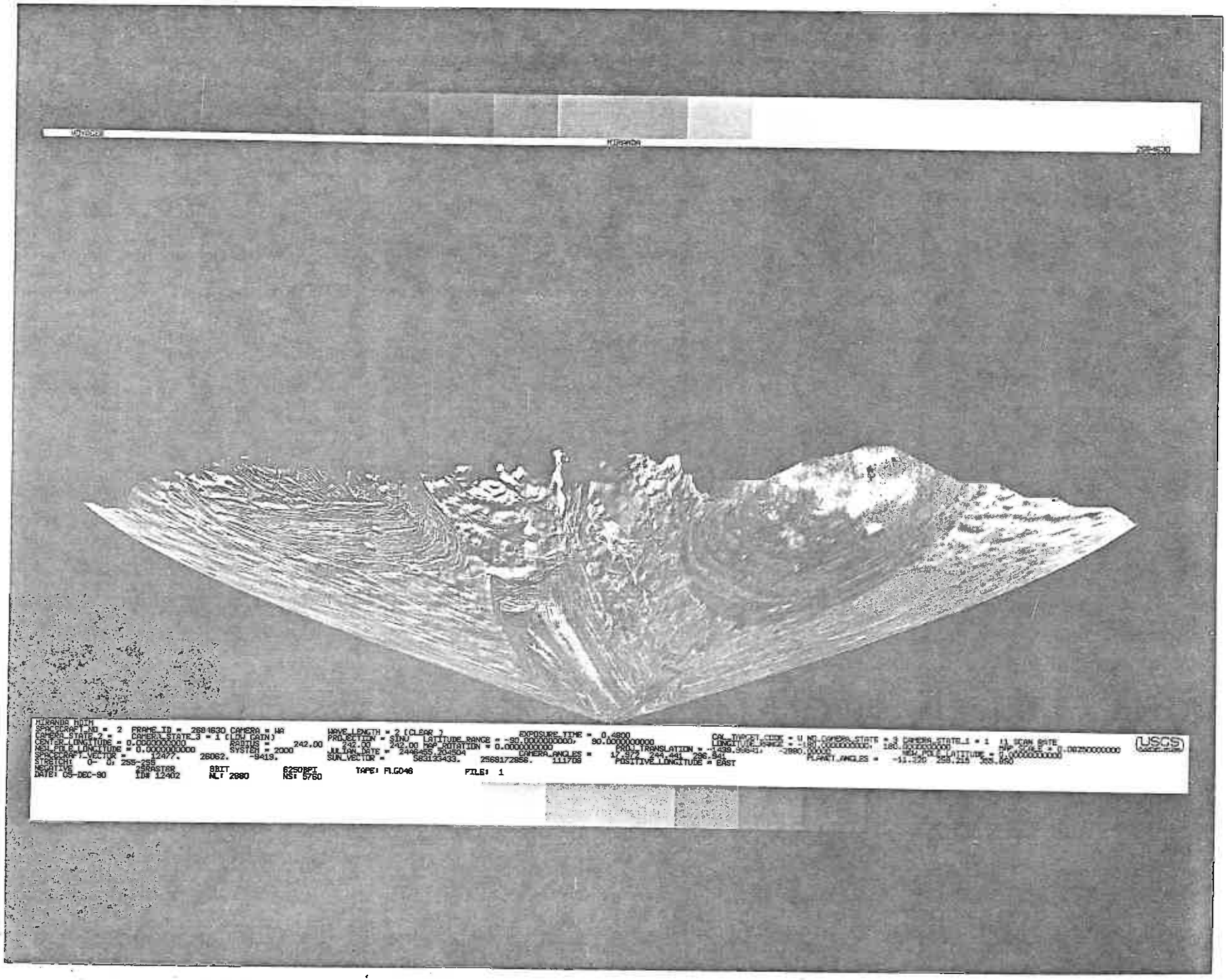
```
@  4-JUN-86 FINDRX   14-APR-86
@  4-JUN-86 REMRX   16-APR-86 BOX SIZE   5 X  5
@  4-JUN-86 RADCAL  01/15/86/ AREA:    1    1  800  800 LINC:  1.0 SINC:  1.0
@  4-JUN-86 RADCAL W0=0.1599E+03 EXP=0.1920E+01 GAIN= 1.0 OFF=   0.0 OFFT=   0.0
@ 24-NOV-87 GEOM  (Rows,Columns):    0    0  T-file: 0473T.DAT
@ 24-NOV-87 GEOM  (Rows,Columns):    0    0  T-file: 0473T2.DAT
@  2-DEC-87 MASK    15-APR-86 AREA:    1    1  467  467 LINC:  1.0 SINC:  1.0
@  2-DEC-87 MASK    MIN,MAX:    2    2
@  2-DEC-87  *** FLT16B *** 10-JAN-86 AREA: 1, 1,   467,  467 LINC:1 SINC:1
@  2-DEC-87   TYPE=HPF  LINE=  75 SAMP=  75 LOW=   100 HIGH=  5000 NORM=  2500.0
@  2-DEC-87  *** FLT16B *** 10-JAN-86 AREA: 1, 1,   467,  467 LINC:1 SINC:1
@  2-DEC-87   TYPE=LPF  LINE=   3 SAMP=   3 LOW=     1 HIGH= 32767 NORM= 16384.0
@  2-DEC-87 MAPMOS updated Picture_No: 1332U2-001to(nl,ns) 467 467 Input(sl,ss,nl,ns)   1   1 467 467
@  2-DEC-87  *** FLT16B *** 10-JAN-86 AREA: 1, 1,   467,  467 LINC:1 SINC:1
@  2-DEC-87   TYPE=LPF  LINE=   3 SAMP=   3 LOW=     1 HIGH= 32767 NORM= 16384.0
@ 26-SEP-90 BT2BT   15-MAR-87 AREA:    1    1  467  467 LINC:  1.0 SINC:  1.0
@ 26-SEP-90 BT2BT  Obit: 8  Ibit:16 (mul,add):       0.12750    -191.25000
@ 27-SEP-90 GEOM  (Rows,Columns):    0    0  T-file: TFILE
@ 27-SEP-90 STRETCH 07-JUL-89 AREA:    1    1 2880 5760 LINC:  1.0 SINC:  1.0
@ 27-SEP-90 STRETCH MAP INPUT,OUTPUT:      0,     0:    64,     0:   191,   255:   255,   255:
@ 21-NOV-90 TAPEIN  IA=   1   1  2880  5760  8-BIT TYPE:MUB0:AFLG0046    /FILE:  1
@ 21-NOV-90 TAPOUT  IA=   1   1 2880 5760  8-BIT TAPE:MUB0:FLG0046_01  /FILE:  1


DEVICE:  MUB0:                  TAPE ID:  FLG0046_01


RECORD COUNT ON FILE NUMBER     4

RECORDS     1 TO    43 HAVE RECORD LENGTHS OF   512 BYTES
RECORDS    44 TO  2923 HAVE RECORD LENGTHS OF  5760 BYTES

FORMATTED IPSYS LABEL INFORMATION

MISSION='VOYAGER'                       SPACECRAFT_NO=' 2'
FRAME_ID='   2683649'                   TARGET='TITANIA'
CAMERA='NA'                             CAL_TARGET_CODE='U'
CAMERA_STATE_1='1  :1 SCAN RATE'        CAMERA_STATE_2=''
CAMERA_STATE_3='1 (LOW GAIN)'           EXPOSURE_TIME=' 1.9200'
NO_CAMERA_STATE='3'                     PICTURE_NO='1137U2-001'
PROJECTION='SINU'
LATITUDE_RANGE='-90.0000000000,   90.0000000000'
LONGITUDE_RANGE='-180.0000000000,  180.0000000000'
MAP_SCALE='0.06250000000'               CENTER_LONGITUDE='0.0000000000'
JULIAN_DATE=' 2446454.882292'           SYSTEM='1950'
CAMERA_ANGLES='    8.585  244.456  283.744'
PLANET_ANGLES='  -14.761  256.674  321.102'
SPACECRAFT_VECTOR='   213896.   446551.   -74529.'
SUN_VECTOR='     583559785.    2568152684.    1116783977.'
WAVE_LENGTH='0 (CLEAR )'                MAP_ROTATION='0.0000000000'
NEW_POLE_LATITUDE='0.00000000000'       NEW_POLE_LONGITUDE='0.0000000000'
PROJ_TRANSLATION='-1439.99841,   -2880.00000'
POSITIVE_LONGITUDE='WEST'               RESEAUS
RAW_TIE_POINT1='  -90.000,    0.000,  275.000,  347.000'


PROCESSING HISTORY TEXT INFORMATION

@ 30-JAN-86 MIPLRF  01/28/86  AREA:    1    1  800  800 LINC:  1.0 SINC:  1.0
```

Titania

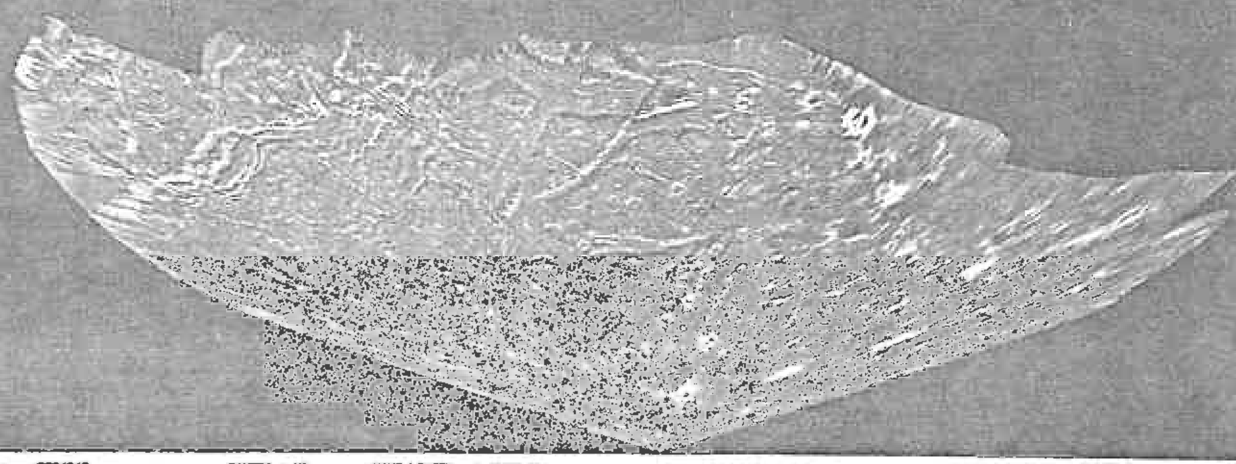
```
@ 30-JAN-86 MIPLRF FROM=2683649.1
@  4-FEB-86 REMRX   23-JAN-86 BOX SIZE    7 X  7
@  4-FEB-86 RADCAL  01/15/86/ AREA:     1     1  800  800 LINC:  1.0 SINC:  1.0
@  4-FEB-86 RADCAL W0=0.1599E+03 EXP=0.1920E+01 GAIN= 1.0 OFF=    0.0 OFFT=    0.0
@ 24-NOV-87 GEOM  (Rows,Columns):     0     0  T-file: 1137T.DAT
@ 24-NOV-87 GEOM  (Rows,Columns):     0     0  T-file: 1137T2.DAT
@ 26-NOV-87 MASK     15-APR-86 AREA:     1     1  948  948 LINC:  1.0 SINC:  1.0
@ 26-NOV-87 MASK     MIN,MAX:     2     2
@ 30-NOV-87  *** FLT16B *** 10-JAN-86 AREA: 1, 1,   948,  948 LINC:1 SINC:1
@ 30-NOV-87   TYPE=HPF  LINE= 151 SAMP= 151 LOW=      1 HIGH= 32767 NORM= 16384.0
@ 30-NOV-87 MAPMOS updated Picture_No: 1523U2-001to(nl,ns) 948 948 Input(sl,ss,nl,ns)   1   1 948 948
@ 30-NOV-87 B16MAD  14-JAN-86 AREA:     1     1  948  948 LINC:  1.0 SINC:  1.0
@ 30-NOV-87 B16MAD  MUL1,MUL2,ADD:      1.00000      1.00000-16384.00000
@ 30-NOV-87  *** FLT16B *** 10-JAN-86 AREA: 1, 1,   948,  948 LINC:1 SINC:1
@ 30-NOV-87   TYPE=HPF  LINE= 151 SAMP= 151 LOW=    100 HIGH=  5000 NORM=  2500.0
@ 16-OCT-90 BT2BT    15-MAR-87 AREA:     1     1  948  948 LINC:  1.0 SINC:  1.0
@ 16-OCT-90 BT2BT  Obit: 8  Ibit:16 (mul,add):       0.12750    -191.25000
@ 16-OCT-90 GEOM  (Rows,Columns):     0     0  T-file: TFILE
@ 17-OCT-90 STRETCH 07-JUL-89 AREA:     1     1 2880 5760 LINC:  1.0 SINC:  1.0
@ 17-OCT-90 STRETCH MAP INPUT,OUTPUT:       0,     0:    48,     0:   191,   255:   255,   255:
@ 21-NOV-90 TAPEIN  IA=   1   1  2880  5760  8-BIT TYPE:MUB0:AFLG0046    /FILE:  1
@ 21-NOV-90 TAPOUT  IA=   1   1 2880 5760  8-BIT TAPE:MUB0:FLG0046_01  /FILE:  1


DEVICE:  MUB0:                  TAPE ID:  FLG0046_01


RECORD COUNT ON FILE NUMBER     5

RECORDS      1 TO     43 HAVE RECORD LENGTHS OF   512 BYTES
RECORDS     44 TO   2923 HAVE RECORD LENGTHS OF  5760 BYTES

FORMATTED IPSYS LABEL INFORMATION

MISSION='VOYAGER'                       SPACECRAFT_NO=' 2'
FRAME_ID='   2683623'                    TARGET='OBERON'
CAMERA='NA'                             CAL_TARGET_CODE='U'
CAMERA_STATE_1='1  :1 SCAN RATE'        CAMERA_STATE_2=''
CAMERA_STATE_3='1 (LOW GAIN)'           EXPOSURE_TIME=' 1.9200'
NO_CAMERA_STATE='3'                     PICTURE_NO='1111U2-001'
PROJECTION='SINU'
LATITUDE_RANGE='-90.0000000000,   90.0000000000'
LONGITUDE_RANGE='-180.0000000000,  180.0000000000'
MAP_SCALE='0.06250000000'               CENTER_LONGITUDE='0.0000000000'
JULIAN_DATE=' 2446454.867847'           SYSTEM='1950'
CAMERA_ANGLES='  -50.858  222.394   19.681'
PLANET_ANGLES='  -14.899  256.636   34.023'
SPACECRAFT_VECTOR='   309810.   281946.   514894.'
SUN_VECTOR='     583628918.    2567976073.    1117361692.'
WAVE_LENGTH='0 (CLEAR )'                MAP_ROTATION='0.0000000000'
NEW_POLE_LATITUDE='0.00000000000'       NEW_POLE_LONGITUDE='0.0000000000'
PROJ_TRANSLATION='-1439.99841,   -2880.00000'
POSITIVE_LONGITUDE='WEST'
RAW_TIE_POINT1='  -90.000,    0.000,  385.000,  203.000'


PROCESSING HISTORY TEXT INFORMATION

@ 13-FEB-86 MIPLRF  01/28/86  AREA:     1     1  800  800 LINC:  1.0 SINC:  1.0
```

Oberon

```
@ 13-FEB-86 MIPLRF FROM=623.1
@ 13-FEB-86 REMRX   23-JAN-86 BOX SIZE   7 X  7
@ 13-FEB-86 RADCAL  01/15/86/ AREA:    1    1  800  800 LINC:  1.0 SINC:  1.0
@ 13-FEB-86 RADCAL W0=0.1599E+03 EXP=0.1920E+01 GAIN= 1.0 OFF=   0.0 OFFT=   0.0
@ 16-JUL-87 B16MAD  14-JAN-86 AREA:    1    1  800  800 LINC:  1.0 SINC:  1.0
@ 16-JUL-87 B16MAD  MUL1,MUL2,ADD:     1.00000     1.00000     0.00000
@ 16-JUL-87 GEOM  (Rows,Columns):    0    0  T-file: 1111T.DAT
@ 22-JUL-87 GEOM  (Rows,Columns):    0    0  T-file: 1111T.DAT
@ 30-JUL-87 MASK    15-APR-86 AREA:    1    1  517  517 LINC:  1.0 SINC:  1.0
@ 30-JUL-87 MASK    MIN,MAX:    2    2
@ 31-JUL-87  *** FLT16B *** 10-JAN-86 AREA: 1, 1,   517,  517 LINC:1 SINC:1
@ 31-JUL-87   TYPE=HPF  LINE=  75 SAMP=  75 LOW=     1 HIGH= 32767 NORM= 16384.0
@  6-AUG-87  *** FLT16B *** 10-JAN-86 AREA: 1, 1,   517,  517 LINC:1 SINC:1
@  6-AUG-87   TYPE=LPF  LINE=   3 SAMP=   3 LOW=     1 HIGH= 32767 NORM= 16384.0
@ 26-SEP-90 BT2BT   15-MAR-87 AREA:    1    1  517  517 LINC:  1.0 SINC:  1.0
@ 26-SEP-90 BT2BT  Obit: 8  Ibit:16 (mul,add):      0.11087   -1696.30432
@ 28-SEP-90 GEOM  (Rows,Columns):    0    0  T-file: TFILE
@ 21-NOV-90 TAPEIN  IA=   1   1  2880  5760  8-BIT TYPE:MUB0:AFLG0046    /FILE:  1
@ 21-NOV-90 TAPOUT  IA=   1   1 2880 5760  8-BIT TAPE:MUB0:FLG0046_01  /FILE:  1
*** END ***  26:16(connect)    3:33.84(cpu) 14658(I/0)   323(faults)
```


MIRANDA
MIRANDA
MIRANDA 7DIM
SPACECRAFT_NO = 2 FRAME_ID = 2881630 CAMERA = NA WAVE_LENGTH = 2 (CLEAR) EXPOSURE_TIME = 0.4800 CAL_TARGET_CODE = 0 NO CAMERA_STATE = 3 CAMERA_STATE_1 = 1 11 SCAN RATE
CAMERA_STATE_2 = CAMERA_STATE_3 = 1 (LOW GAIN) PROJECTION = SINU LATITUDE_RANGE = -90.000000000, 90.000000000 LONGITUDE_RANGE = -180.000000000, 180.000000000 MAP SCALE = 0.007500000000
CENTER_LONGITUDE = 0.000000000 RADIUS = 242.00 242.00 242.00 MAP_ROTATION = 0.000000000 PROJ_TRANSLATION = -1439.99841, -2880.0000 NEW_POLE_LATITUDE = 0.000000000
NEW_POLE_LONGITUDE = 0.000000000 SYSTEM = 2000 JULIAN_DATE = 2448455.204504 CAMERA_ANGLES = 17.972 244.441 296.941 PLANET_ANGLES = -11.220 258.215 358.860
SPACECRAFT_VECTOR = 12477. 26062. -9419. SUN_VECTOR = 583133433. 2568172858. 111708 POSITIVE_LONGITUDE = EAST
STRETCH: 0- 0, 255-255
NEGATIVE 28RASTER 8BIT 6250BPI TAPE: FLG046 FILE: 1
DATE: 05-DEC-90 ID# 12402 NLI 2880 NSI 5760
USGS

VOYAGER ARIEL



ARIEL
SPACECRAFT_NO = 2 FRAME_ID = 2584340
CAMERA_STATE_1 = 1 CAMERA_STATE_2 =
LONGITUDE_RANGE = -180.0000000000, 180.0000000000
PROJ_TRANSLATION = -2250.0000
CAMERA_ANGLES =
SUN_VECTOR = 111630
STRETCH: 0- 0,
NEGATIVE
DATE: 05-DEC-90

CAMERA = NA WAVE_LENGTH = 1 (VIOLET)
CAMERA_STATE_3 = 1 (LOW GAIN)
MAP_SCALE = 0.06250000000
NEW_POLE_LATITUDE = 0.00000000000
PLANET_ANGLES = -14.852 256.499 333.579
POSITIVE_LONGITUDE = WEST
TAPE: FLG046 FILE: 2

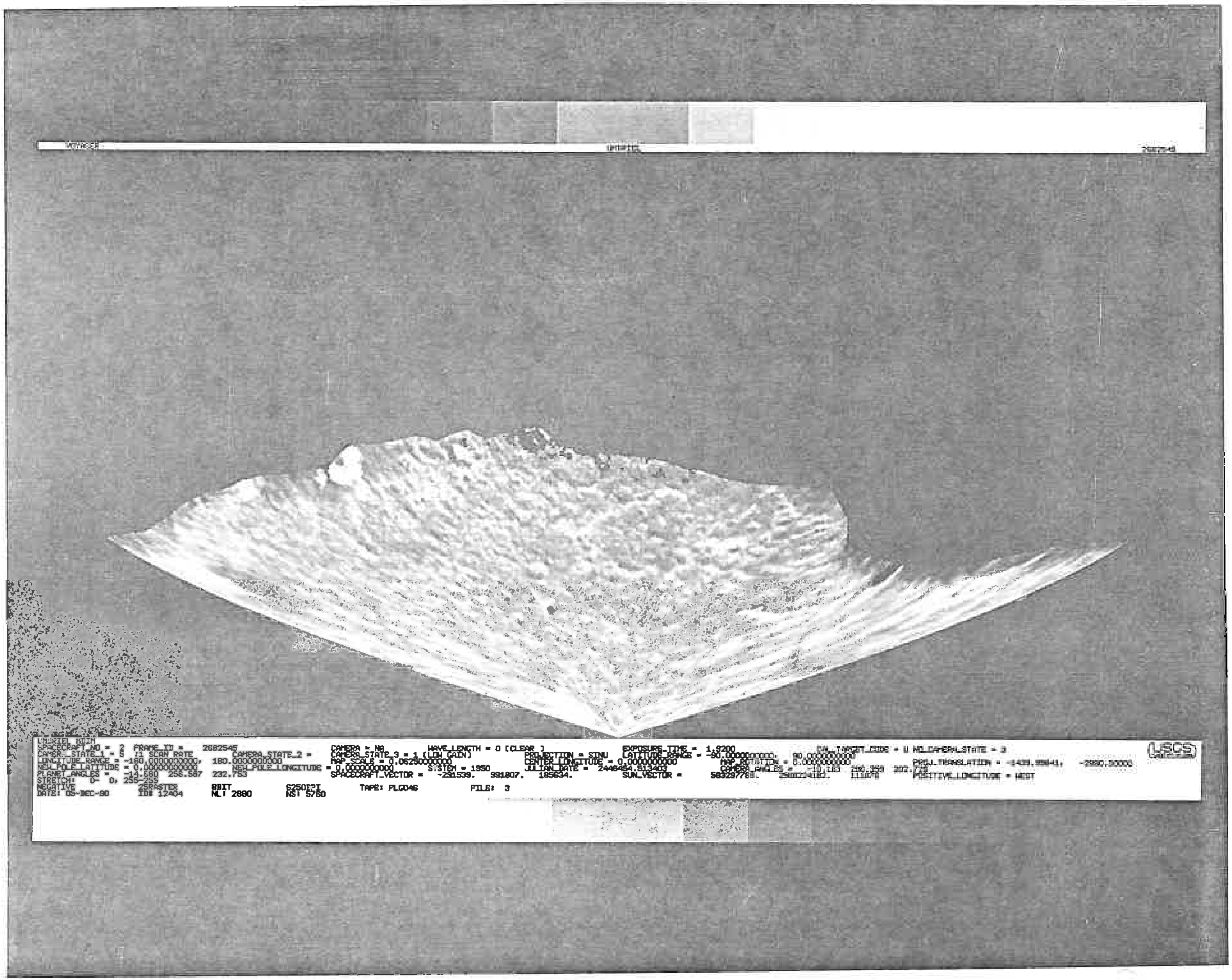
PROJECTION = SINU
CENTER_LONGITUDE = 0.0000000000
NEW_POLE_LONGITUDE = 0.0000000000

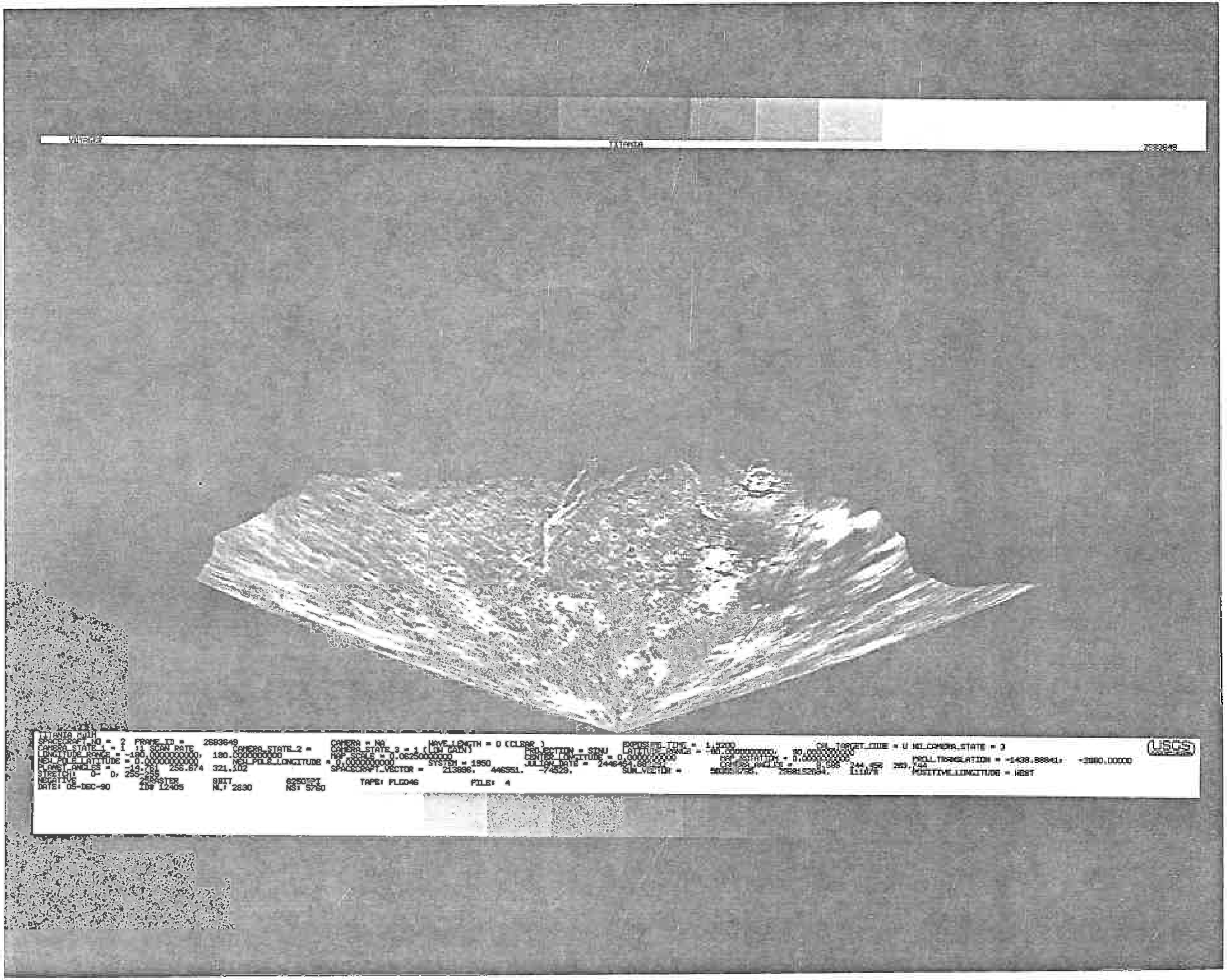
EXPOSURE_TIME = 3.8400
LATITUDE_RANGE = -90.0000000000, 90.0000000000
RADIUS = 580.0
SYSTEM = 1950
SPACECRAFT_VECTOR = 46394. 156570. -25261.

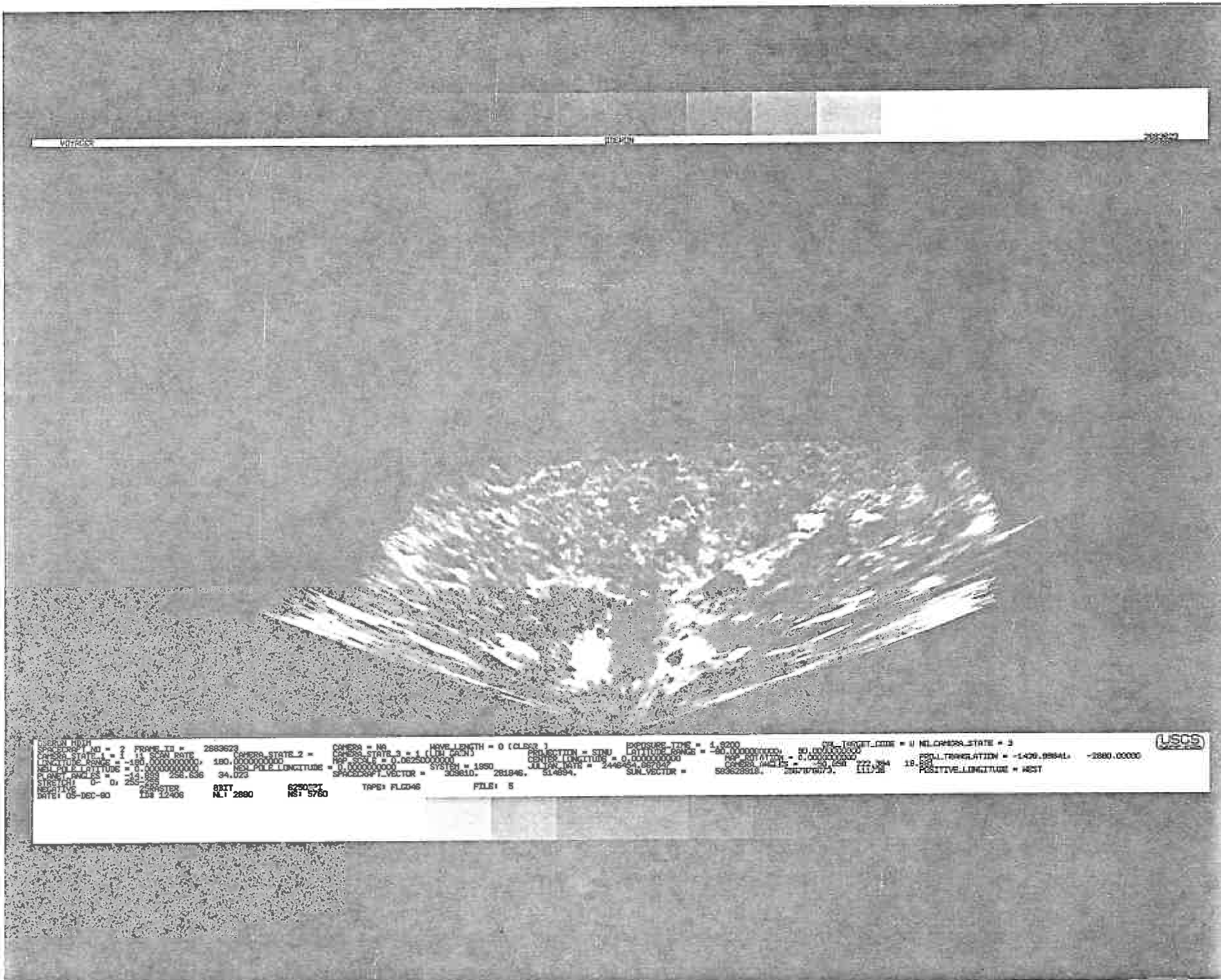
CAL_TARGET_CODE = U NO_CAMERA_STATE = 3
ECCENTRICITY = 0.000000
JULIAN_DATE = 2448455.110625

MAP_ROTATION = 0.0000000000

USGS


SPACECRAFT_NO = 2 FRAME_ID = 2682545
CAMERA = NA
WAVE_LENGTH = 0 (CLEAR)
EXPOSURE_TIME = 1.9200
CAMERA_STATE_2 =
CAMERA_STATE_3 = 1 (LOW GAIN)
PROJECTION = SINU
LONGITUDE_RANGE = -180.0000000000, 180.0000000000
MAP_SCALE = 0.06250000000
CENTER_LONGITUDE = 0.0000000000
NEW_POLE_LATITUDE = 0.0000000000
NEW_POLE_LONGITUDE = 0.0000000000
SYSTEM = 1950
JULIAN_DATE = 2446454.513403
PLANET_ANGLES = -14.680 256.587 232.753
SPACECRAFT_VECTOR = -231539. 991807. 185634.
SUN_VECTOR =
STRETCH: 0- 0, 255-255
NEGATIVE
25RASTER
8BIT
6250BPI
TAPE: FLGD46
FILE: 3
DATE: 05-DEC-90
ID# 12404
NL: 2880
NS: 5760
POSITIVE_LONGITUDE = WEST
USGS


TITANIA
2683649
TITANIA
SPACECRAFT_NO = 2 FRAME_ID = 2683649
CAMERA = NA
WAVE_LENGTH = 0 (CLEAR)
CAMERA_STATE_1 = 1
CAMERA_STATE_2 =
CAMERA_STATE_3 = 1 (LOW GAIN)
PROJECTION = SINU
LONGITUDE_RANGE = -180.0000000000, 180.0000000000
MAP_SCALE = 0.06250000000
NEW_POLE_LATITUDE = 0.0000000000
NEW_POLE_LONGITUDE = 0.0000000000
SYSTEM = 1950
PLANET_ANGLES = -14.761 256.674 321.102
SPACECRAFT_VECTOR = 213896. 446551. -74529.
STRETCH: 0- 0, 255-255
NEGATIVE
8BIT
TAPE: FLG046
FILE: 4
DATE: 05-DEC-90
ID# 12405
NL: 2630
NS: 5760
CAL_TARGET_CODE = U
POSITIVE_LONGITUDE = WEST
USGS



SPACECRAFT_NO = 2 FRAME_ID = 2683623
CAMERA = NA
CAMERA_STATE_2 =
CAMERA_STATE_3 = 1 (LOW GAIN)
PROJECTION = SINU
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CENTER_LONGITUDE = 0.0000000000
NEW_POLE_LATITUDE = 0.0000000000
NEW_POLE_LONGITUDE = 0.0000000000
SYSTEM = 1950
JULIAN_DATE = 2446454.867847
PLANET_ANGLES = -14.899 256.636 34.023
SPACECRAFT_VECTOR = 309610. 281846. 514894.
SUN_VECTOR =
EXPOSURE_TIME = 1.9200
POSITIVE_LONGITUDE = WEST
STRETCH: 0- 0, 255-255
NEGATIVE
25RASTER
8BIT
TAPE: FLG046
FILE: 5
DATE: 05-DEC-80
ID# 12406
NL: 2880
NS: 5760
USGS

USGS Tape File Array Format

Magnetic tapes are 9 track with a density of 800, 1600, or 6250 BPI. The track type and density should be clearly labeled on the tape reel face.

A magnetic tape will contain one or more array files separated by end-of-file marks (EOF). The last file on a tape is indicated by two EOF's in succession at the end of the file. Contained within a file are a series of records separated by inter-record gaps.

LABEL FORMAT

The first part of each file may contain label information. Flagstaff presently has two label formats: the "new" format has 512 byte records and the "old" format has 72 byte records.

New format: Labels have the following 16-bit words in the first record.

Word 1	number of lines
Word 2	number of samples
Word 6	format code: 8 = 8-bit integer 16 = 16-bit integer 32 = 32-bit real
Word 9	number of 256 word (512 byte) records used for labels, all of which precede the first data record.

Old format: Labels with 72 byte records contain the number of lines (NL) and the number of bytes per line (NB) in the first record. Decode them by READ ( ), NL, NB with FORMAT (T33,2I4).

DATA FORMAT

Data records are unblocked. For each line in an array there is a corresponding physical tape record separated by inter-record gaps. The number of lines in an array equals the number of data records in a file. For 8-bit data (8 bits per array element) the number of samples in the array will equal the number of bytes in the record. For 16-bit data (16-bit integer word per element) the number of samples in the array will equal the number of bytes in the record divided by two. It should be noted that on some computers, there may be a slight incompatibility in how 16-bit integer records are read in from tape. If the computer you are using has IBM compatible tape units then you will need to swap the two bytes which make up the 16-bit word before using 16-bit integer words. If the image array pixels are 32-bit floating point values, then swap bytes: 1 2 3 4 4 3 2 1.

APPENDIX B

IMAGE LABELS

Image files in the PICS system contain label information located at the beginning of the file. These labels contain pertinent information about the image. These labels describe the size of the image array, in lines and samples; the type of image data, 8-bit unsigned integer, 16-bit integer, or 32-bit floating point files; SPICE information such as viewing geometry and camera conditions, and processing history text. A user can interrogate and modify the image labels with the LABELS program.

PICS labels exist on both disk and magnetic tape files. On disk files, they occupy 512-byte blocks at the start of the file. The home block, the first block in an image file, contains a parameter indicating the number of 512-byte blocks which make up the labels. On magnetic tape, the labels are contained in 512-byte records at the beginning of the file. These records are exact copies of what would be found on a disk file.

Image labels are divided into four sections; there is a home block section, a histogram section, a keyword label section, and a processing history section. The tables shown below give descriptions of the contents and permitted values of each label section.

LABEL SECTIONS

SECTION 1 - The Home block. This section is contained in the first 512-byte block of an image file. It contains information about the image contained in the file, and contains pointers to the other label sections within the file. The format of this block is binary and a detailed description is provided in the description the home block, shown below.

SECTION 2 - The Histogram section, disk blocks 2 to M. These blocks hold the histogram of the image. These blocks may be empty, but 'DISKLO' subroutine will reserve two blocks when labels are initialized. The histogram area consists of 256 bins with each bin a VAX 32-bit long word. The histogram is normalized for 16-bit and 32-bit data. The RMIN and RSCL parameters in the home block section, shown below, specifies the normalization

coefficients.

SECTION 3 - The Keyword label section, disk blocks M+1 to N. The Keyword label area contains information necessary to describe and process an image. Keywords contain information such as mission, spacecraft number, picture number, camera, target, exposure time, spectral information, geometry information, camera state, reseau locations, and other processing information. Keywords take the form: KEYWORD='xxxxxxxxx', where keyword indicates the type of information and xxxxxx contains the value of the keyword. The keywords and associated information are ASCII character strings. Keywords are separated by at least one blank character and the information associated with a keyword is always contained within quotes. A description of permitted keywordS can be found in the keyword label section shown below.

SECTION 4 - The processing history section, disk blocks N+1 to O. This section is reserved for processinng history text. Each program that creates an output image file copies the label information from the input file to the output files and appends a processing text entry to the history text. Processing history text will consist of an ASCII character string of varying length not to exceed 250 characters. The first 20 characters of the processing history have a specific format as outlined below:

```
@ dd-mmm-yy program (any ascii string)
 character  1      = '@' indicates begining of history text string
 character  2      = blank character
 characters 3-11   = dd - day of year, mmm - month , yy - year
 characters 13-19  = name of program which processes image file
 characters 20-n   = short descriptive text of program processing
                       parameters
```

Description of First Label Block (Home Block)

Word	Description
1	Number of lines in image array
2	Number of samples in image array
3	Number of disk blocks/line
4,5	Exclude value (indicates non-valid or empty value)
6	Bit type or format code 8 = 8-bits/pixel 2 = 32-bits/pixel (integer) 16 = 16-bits/pixel 3 = 64-bits/pixel (complex) 32 = 32-bits/pixel 4 = 64-bits/pixel (real) 6 = 6-bits/pixel 5 = formatted numbers 1 = ascii data
7	File type of disk file: 1 = image array 5 = parallel 2 = mosaic 6 = matrix 3 = map 7 = card images 4 = serial vector 8 = text
8	Block length of disk in 16-bit words (256 for VAX)
9	Total number of label blocks reserved at beginning of disk file.
10	Number of arrays in file
11	Histogram format code (same codes as word 6; normally 32)
12	Pointer to first block of histogram area
13	Number of disk blocks reserved for histogram area
14	Number of words used in histogram area
15	Pointer to first block of keyword labels
16	Number of disk blocks reserved for keyword labels
17	Number of words used in keyword labels
18	Pointer to first block or processing history labels
19	Number of disk blocks reserved for processing history
20	Number of words used in processing history labels
21	Starting line position of frame This parameter is generated by a tape to disk program when a sub-image is transferred to disk from tape
22	Starting sample position of frame This parameter is generated by a tape to disk program when a sub-image is transferred to disk from tape
23	Blocking factor on tape. This field contains the number of line records per physical tape record. The last physical record may be different in length from the other records because there may not be an even multiple of line records in the file
24-30	These words are reserved for future use
31,32	Mean value of data without zero (real number)
33,34	Sigma value without zero (real number)
35,36	Mean value with zero included (real number)
37,38	Sigma value with zero included (real number)
39	Index location of lowest non-zero value in histogram
40	Index location of highest value in histogram
41	Index location of histogram peak

42	Spare word reserved for future use
43,44	RMIN: minimum value of scaled histogram (0 for 8-bit) (real number)
45,46	RSCL: scaling factor of histogram (1.0 for 8-bit) (original value = RMIN + dn*RSCL)
47-255	These words are reserved for future use.

Keyword Label Section

Variable	Description and Range
CAL_TARGET_CODE	Planet system code: (J = Jupiter, S = Saturn, U = Uranus, N = Neptune)
CAMERA	Voyager: WA = Camera A, Wide angle NA = Camera B, Narrow angle Viking: 4 = Spacecraft 1, camera B 6 = Spacecraft 2, camera B 7 = Spacecraft 1, camera A 8 = Spacecraft 2, camera A Mariner: A = Camera A, Wide angle B = Camera B, Narrow angle
CAMERA_ANGLES	Declination, right ascension and twist angle of camera in earth mean equatorial 1950 coordinate system (EME1950) in degrees
CAMERA_STATE_1	Voyager: Scan Rate of camera (permitted values: 1, 3, 7) Viking: Light flood condition of camera (0 = flood off, 1 = light flood on)
CAMERA_STATE_2	Voyager: (shutter mode indicator) (0 = Normal shutter mocd) (1 = Wide angle BSIMAN or BOTSIM shutter mode) Viking: Camera gain state (1 = high gain, 0 = low gain)
CAMERA_STATE_3	Voyager: Gain state condition of camera (always contains the number 1) Viking: DC offset condition (1 = offset on, 0 = offset off)
CENTER_LATITUDE	Center latitude of projection when used (-90,90 Degrees)
CENTER_LONGITUDE	Center longitude of projection when used (-360,360 Degrees)
DATUM	Base elevation of topographic image (kilometers)
DISTANCE	Distance from the planet in km/pix (used only for the point perspective projection POIN)
ECCENTRICITY	Eccentricity of planet, also known as

	ellipticity.
EXPOSURE_TIME	Exposure time of camera, (Voyager units are in seconds Viking units are in milli-seconds)
FRAME_ID	Image identifier (FDS for Voyager, FSC for Viking, Etc.)
GMT	Time of exposure in greenwich mean time (year:day:hour:min:sec) in the following format: YYYY:DDD:HH:MM:SS
JULIAN_DATE	Time of exposure in decimal julian days (ephemeris time)
LATITUDE_RANGE	Latitude range used to create image (-90,90 degrees) for non-rectangular projections, the corner latitude, longitude will not necessarily be within the lat,lon range given because the smallest rectangle that will contain the lat,lon boundaries will include some area outside that range.
LEVEL	A specific group of programs have been run on a particular image or mosaic.
LONGITUDE_RANGE	Longitude range used to create image (-360,360 degrees)
MAP_ROTATION	Clockwise rotation of north (0,360 degrees)
MAP_SCALE	Scale in kilometers/pixel or degrees/pixel depending on projection.
MATCH_POINTn	Up to 9 sets of conjugate (matching) points between two LEVEL 1 images used by JIGSAW to update the camera angles. The points are stored in the following order: line, sample of image 1, FSC of the overlapping image, and line and sample of the matching point on the overlapping image.
MISSION	Mission name (MARINER, VIKING, VOYAGER, LANDSAT, NOAA, GALILEO)
NEW_POLE_LATITUDE	New pole latitude if the spherical coordinate system has been rotated. This is the projection pole. (-90,90 degrees)
NEW_POLE_LONGITUDE	New pole longitude if the spherical coordinate system has been rotated. This is the projection pole. (-180,180 degrees)
NO_CAMERA_STATE	Number of camera states to be listed in the keyword label area.

PATH — Path number used in LANDSAT, Thematic mapper and other earth orbiting spacecraft

PHOTO_RAD_POINTn — Up to 8 points that designate bland areas in the image that can be used for correcting brightness errors after radiometry and photometry corrections have been made. The order is lat,lon,line,samp where line,samp is the position in the raw image.

PICTURE_NO — PICNO for VIKING and VOYAGER

PLANET_ANGLES — Declination, right ascension and rotation spin angle of planet in EME1950 in degrees

POSITIVE_LONGITUDE — The direction of positive longitude (WEST or EAST)

PROJECTION — Four letter code for a map projection

CODE	PROJECTION
ALBE	Albers conical equal-area
LAMA	Lambert azimuthal equal-area
LAMB	Lambert conformal
MERC	Mercator
ORTH	Orthographic
POIN	Point perspective
POLA	Polar stereographic
POLY	Polyconic
SIMP	Simple cylindrical
SINU	Sinusoidal
TRAN	Transverse mercator

PROJ_TRANSLATION — Offset of the top left corner of line 1, sample 1 relative to the origin of the map projection

RADIUS — Radius of target in kilometers (3 values - major equatorial axis, minor equatorial axis and the polar axis)

RAW_TIE_POINTn — Up to 9 ground control points used to update camera angles. The order is lat,lon,line,samp, radius where line,samp is the position in the raw image and radius is the local radius in km if known.

RESEAUS — Line,sample,type,weight(1.0 or 0.0) quadruplets of reseau locations (2F7.1,I1,F4.1)

ROW — Row number of LANDSAT, Thematic mapper and other earth orbiting spacecraft

SPACECRAFT_NO	Number of spacecraft
SPACECRAFT_VECTOR	Cartesian Vector from the planet to the spacecraft in kilometers in EME1950
STANDARD_PARALLELS	First and second standard parallels of projection when used (0,90 degrees)
SUN_VECTOR	Cartesian Vector from the planet to the sun in kilometers in EME1950
SYSTEM	Coordinate system of the state of the spacecraft and target which is either Earth Mean Equatorial 1950 or 2000. The coordinate systems are defined in Mert Davies' report of the IAU working group on cartographic coordinates and rotational elements of the planets and satellites: 1982. The 2000 system constants are included in the 1985 update report. 1950 = EME1950 (default) 2000 = J2000
TARGET	Name of planet or satellite that is the target of the image.
VERTICAL_SCALE	Scale of density values (KM/PIXEL)
WAVE_LENGTH	Camera filter position or wave length of image frame. (VOYAGER: 0 = clear, 1 = violet, 2 = blue, 3 = orange, 5 = green, 7 = UV) (VIKING: 1 = blue, 2 = -blue, 3 = violet, 4 = clear, 5 = green, 6 = red)

APPENDIX J

GEOMETRIC DEFINITION OF A PIXEL IN PICS

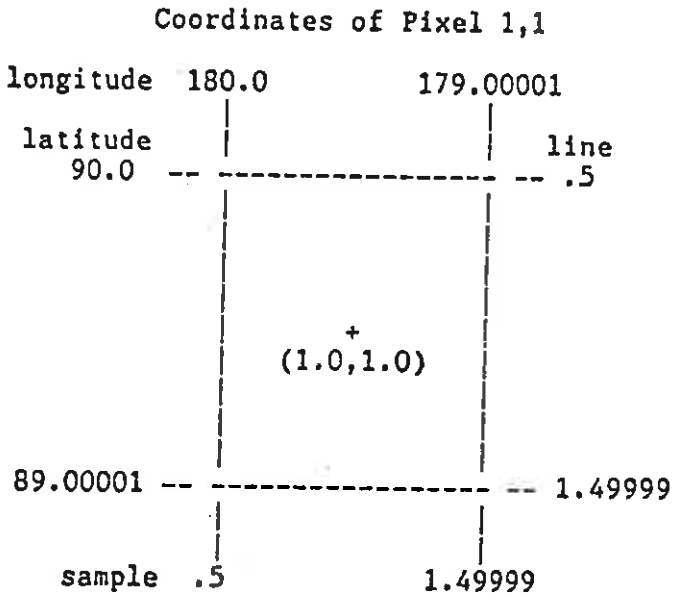
The purpose here is to describe the spatial or geometric definition of a pixel used in the PICS digital products and software provided by the USGS in Flagstaff. A broad range of factors enters into this question. For example, is a pixel to be conceived of as a point or as an area. The point definition would be most convenient, for instance, when dealing with coordinate grid overlays. This results in an odd number of pixels across a map that has an even number of spatial increments. For changing scales (for instance by even powers of 2) this definition becomes a problem. In this case it makes more sense to treat a pixel as a finite area. Then an even number of pixels covers an even number of spatial increments and decreasing/increasing scales by a power of 2 becomes trivial. However, grids now fall between pixels, at least in a mathematical sense. Their treatment in the generation of hardcopy therefore becomes an issue.

It was decided that the area concept of a pixel was the better choice; we would have to live with the assymmetries introduced in things like cartographic grids. There are various solutions: (1) use two pixels for the width of a grid line, (2) stagger grid pixels back-and-forth across the mathematical position, (3) use a convention whereby grid lines are systemmatically drawn offset from their mathematical position.

The next issue is the conversion between integer coordinates and real coordinates of the pixel mesh. We adopt the convention that pixels are numbered (or named if you like) beginning in the upper left corner with line 1, sample 1 (pixel 1,1); lines increase downward; samples increase to the right. (Even this is not a universal standard; some astronomical systems begin, perhaps more logically, in the lower left corner.) There are three reasonable possibilities for aligning a real, or floating point, coordinate system with the pixel mesh: the coordinate 1.0, 1.0 could be the upper left, the center, or the lower right of pixel 1,1. The convention historically used for geometric calibration files (reseau positions) and also used in the Multimission Image Processing Laboratory at the Jet Propulsion Laboratory, is that the center of the pixel is defined as its location in real coordinates. In other words, the real coordinates of the center of pixel 1,1 are 1.0, 1.0. The top left corner of the pixel is .5, .5 and the bottom right corner is 1.49999..., 1.499999. The

bottom and right edge of a pixel is the mathematically open boundary. This is the standard adopted in the PICS software and its digital products.

Cartographic conventions must also be defined. Many of our digital products are in some map projection with an associated latitude and longitude range. The projection representation of a pixel is mathematically open at the increasing (right and lower) boundaries, and mathematically closed at its left and upper boundaries. An exception occurs at the physical limits of a projection; the lower boundary of the lowest pixel is closed to include the limit of the projection (e. g. the south pole). In the case of a rectangular projection such as a Mercator or a Simple Cylindrical, the left edge of pixel 1,1 is labeled with the left end of the longitude range and the right edge of the right most pixel is labeled with the right end of the longitude range. For example, if an image is in a Simple Cylindrical projection with a longitude range of -180.0 to +180.0, a latitude range of -90.0 to +90.0 and a scale of one degree/pixel, the image will have 180 lines and 360 samples. The latitude and longitude of the top left corner of pixel 1,1 is 90.0, 180.0. (if the planet has positive longitude to the west). The latitude and longitude of the bottom right corner of pixel 180,360 is -90.0, -180.0.



Finally, we must select a convention for drawing grid lines for various cartographic coordinates on planetary images and maps. The convention used in PICS is that a grid line is drawn in the pixels that contain its floating point value until the open boundary is reached and then an exception is made so that the outer range of latitude and longitude will always appear on the image. This means, in the example given above, a 10 degree grid would start on pixel 1 and be drawn on every tenth pixel (11,21,31,...) until the open boundary is reached. Then the line would be drawn on the pixel previous to the open boundary (line 180 instead of line 181, or sample

360 instead of 361).

To summarize, the PICS conventions are:

1. Pixels are treated as areas, not as points.

2. The integer coordinates begin with 1,1 (read "line 1, sample 1") for the upper-left-most pixel; lines increase downward; samples increase to the right.

3. Integer and floating point image coordinates are the same at the center of a pixel.

4. Grids will be drawn in the pixels that contain the floating point location of the grid lines except for open boundaries, which will be drawn to the left or above the open boundary.

From: NCFHRS::ALOPEZ 10-FEB-1995 10:39:32.33
To: NCF::MYERS
CC:
Subj:

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(80)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(120)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(160)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(200)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(240)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(280)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(320)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(360)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(400)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
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HEX DUMP OF sl-21i

FILE 3 RECORD 2923 5760 BYTES

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(120)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(160)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(200)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(240)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(280)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(320)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(360)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
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(520)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(560)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(600)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(640)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(680)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(720)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(760)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
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HEX DUMP OF sg-21g

FILE 6 RECORD 2924 5762 BYTES

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(120)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(160)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(200)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(240)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(280)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(320)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(360)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
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(680)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(720)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(760)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
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(120)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(160)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(200)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(240)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(280)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(320)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(360)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(400)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(440)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
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HEX DUMP OF sl-21e

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(120)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(160)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(200)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(240)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
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(320)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(360)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(400)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(440)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(480)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(520)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(560)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(600)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(640)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(680)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(720)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(760)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(800)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000