# README Document for

# Nimbus 3 MRIR
# Medium Resolution Infrared Radiometer
# Level 1 Data Products:
## MRIRN3L1
## MRIRN3IM

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Version 1.3

James Johnson

| Revision date | Changes | Author |
|---|---|---|
| 06/23/2009 | Initial version | Jean-Jacques Bedet |
| 08/11/2011 | Added image file info | James Johnson |
| 01/20/2015 | Section 7.7 info about data recovery | James Johnson |
| 06/29/2017 | Updated URLs in section 4 and 6 | James Johnson |

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# Illustration Index

# 1 Introduction

## 1.1 Brief Background

This document applies to the Nimbus III Medium Resolution Infrared Radiometer (MRIR) Level-1 data.

The Nimbus III Medium Resolution Infrared Radiometer (MRIR) was designed to measure electromagnetic radiation emitted and reflected from the earth and its atmosphere at 5 wavelengths.

The five wavelengths regions are as follows:

6.5 to 7.0 microns- This channel covers the 6.7 micron water vapor absorption band. Its purpose is to provide information on water vapor distribution in the upper troposphere and, in conjunction with the other channels to provide data concerning relative humidities at these altitudes

10 to 11 microns - microns- This channel measures surface or near surface temperatures over clear portions of the atmosphere. It also provides cloud cover and cloud height information (day and night).

14 to 16 microns – This channel, centered about the strong absorption band of C02 at 15 microns, measures radiation which emanates primarily from the stratosphere.

20 to 23 microns – This channel yields data from the spectral region containing the broad rotational absorption bands of water vapor. This provides similar information to the 6.5 to 7.0 micron channel (lower atmosphere).

0.2 to 4.0 microns – This channel covers more than 99% of the solar spectrum and yields information on the intensity of the reflected solar energy from the earth and its atmosphere.

The Nimbus III was launched on April 14 1969 and was a major upgrade from the Nimbus II satellite with an increase in the number of meteorological experiments from 4 to 7 instruments:

- High Resolution Infrared Radiometer (HRIR
- Medium Resolution Infrared Radiometer (MRIR)

- Infrared interferometer Spectrometer (IRIS)
- Satellite Infrared Spectrometer (SIRS)
- Monitor of Ultraviolet Solar Energy (MUSE)
- Image Dissector Camera System (IDCS)
- Interrogation, Recording and Location System (IRLS)

The orbit of the satellite can be characterized by the following:

- near-circular orbit with apogee of 1179 km
- perigee height of 1095 km
- inclination of 100.311 degrees
- nodal period of 108.17 minutes
- near sun-synchronous

The Nimbus III MRIR data are available from 15 April 1969 through 4 February 1970.

## 1.2 Brief Background on Instruments

The radiant energy from the earth is collected by a mirror inclined to 45 degrees to the axis of rotation (scans perpendicular to flight path). The incident flux is focused onto a thermistor bolometer detector through appropriate filtering which limits the radiation to the desired wavelengths. A portion of a scan yields in-flight data calibration. The energy is modulated by a mechanical chopper to produce an AC signal from the detector. The signals are sampled 33.33 times per second.

## 1.3 Brief Background on Algorithms

The Nimbus III MRIR data was generated from the spacecraft telemetry, attitude, and orbital data. Digitized radiation data, and the Nimbus radiometer calibration package. The data are were created on IBM computers using a 36 bit architecture. Further information can be found on the Nimbus III Users' guide.

# 2 Data Organization

## 2.1 Background

## 2.2 Granularity

The Nimbus III MRIR were originally archived on 7-track tapes and then restored to 9-track tapes. The data in both 7-track and 9-track tapes were stored in 36-bit IBM binary format. A Canadian company (JBI) was contracted to restore to disks all 8 Nimbus III MRIR 9-track tapes. The content of each tape was written using a proprietary format (TAP) that allowed "bad" records to be flagged. Since tapes contain many files, the content of each file on a tape was retrieved and stored in a separate disk file using the same TAP format.

The Nimbus III MRIR 9-track tapes were archived at the National Space Science Data Center (NSSDC). The tape recovery process involved using specially developed tape drives, bit detection and processing techniques to read the 9-track tapes and store the recovered data in TAP (tape emulation format).

Because a tape may contain multiple files, and in some cases multiple orbits, each tape was read and the content of each file stored on a separate file on disk. The overall TAP format and data on tape was preserved. The TAP files were archived and ingested at the Goddard Earth Sciences Data and Information Services Center (GES DISC) and are available for users to download

## 2.3 File Naming Convention

The Nimbus III MRIR level 1 data are named according to the following convention:

<satellite>-<instrument>-<*YYYYMMDD*>_<*hh-mm-ss*>_<*orbit*>_<*tape*>.TAP where:

*satellite* is always Nimbus3

*instrument* is always MRIR

*YYYYMMDD* is the starting date when the data was collected from the satellite and

*YYYY*: starting 4 digit calendar year (e.g. 1966)

*MM*: starting 2 digit month (e.g. 02 for February)

*DD*: starting 2 digit day of the year (e.g. 04 for day four)

*hh-mm-ss* is the starting time when the data was collected from the satellite and

*hh* : starting 2 digit hour (0-23) (e.g. 02 for hour 2)

*mm*: starting 2 digit minute (0-59) (e.g., 09 for 9 minutes)

*ss*: starting 2 digit seconds (0-59) , (e.g. 11 for 11 seconds)

*orbit* is the orbit number

*tape* is the tape id number (e.g. DR2962)

## 2.4 File Format (TAP)

### 2.4.1 TAP bytes

The first 8 bits retrieved from a 9-track restored tape was stored in a byte as described in the following Figure 1. The tape parity bit ($8^{th}$ bit) was not kept during the restoration process. Bit 0-7 from tape were stored as bit 0-7 on disk.

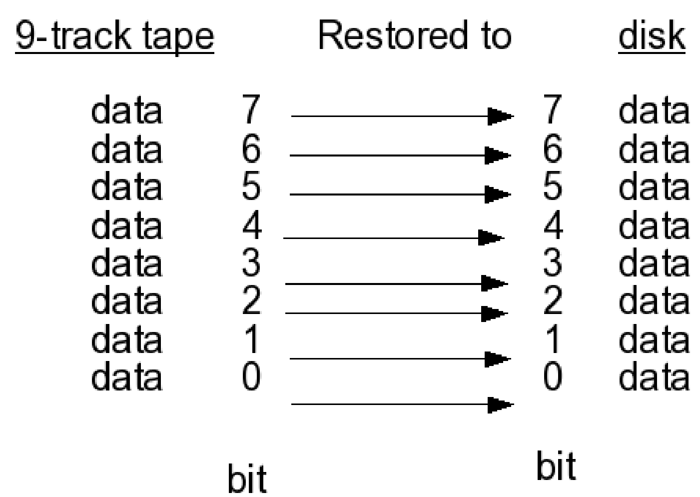


**Figure 1: bit restoration from tape to disk**

### 2.4.2 TAP headers

TAP headers are interleaved between the Nimbus III MRIR data records to indicate the length of the following and preceding data records. A TAP header is a 4 byte record which follows the following convention.

- A number greater than zero indicates the length of a record
- A negative number indicates that a record has bytes that could not be restored from tapes and filled with zeros. The length of a record is obtained by taking the absolute value.
- a zero indicates the start of a file
- Two consecutive TAP headers with zero values are used to specify the end of a file.
- A data record is preceded by a header and followed by a header listing the length of the data record

An example of a C program to retrieved the length of a TAP header is illustrated in Appendix 7.1

### 2.4.3 MRIR Word

The basic unit of the Nimbus III data is a word which is a 36-bit IBM binary word. This means that in order to extract a 36-bit word from the restored files, 4.5 bytes (8-bits) must be read. With half 36 bit words, 2.25 bytes must be read. An example of how to extract a 36 bit word or ½ 36 bit word is illustrated in Appendix 7.2

To preserve space while maintaining a good resolution, data were originally stored using a scaling technique. The idea was to multiply a number by a factor before storing the value to tapes. Nimbus III data can be converted back to the initial value by dividing the stored value on tape (or TAP files) by 2**(35-B), where B is the scaling factor listed on the Nimbus III Data record format Table 1, Table 2, Table 3, and Table 4.

A word of 36 bits with a scaling factor of B is converted by using the relation:

value = (integer value of 36 bits) / (2**(35-B))

When a word is divided in two ½ Word (WordD, and WordA), the actual values are converted by using the relation:

A wordD of 18bits with a scaling factor of B is converted in real by using the relation:

value = (integer value of 18 bits) / (2**(17-B))

A wordA of 18bits with a scaling factor of B is converted in real by using the relation:

value = (integer value of 18 bits) / (2**(35-B))

The scaling factor is mentioned and used in tables describing the Nimbus III MRIR records.

## 2.5 Data Structure Inside a File

Two TAP 4 byte headers are stored before and after each Nimbus III MRIR records. The first Nimbus III MRIR record is an orbit data document record (68 bytes) followed by multiple data records. A Nimbus III data record is composed of a Data record documentation followed by several swath data records. The length of a data record (L) in words can be computed using the relation.

L = (swaths per records)*(words per swath) + (number of nadir angles) + 7

The overall structure of the Nimbus III files is depicted in Figure 2

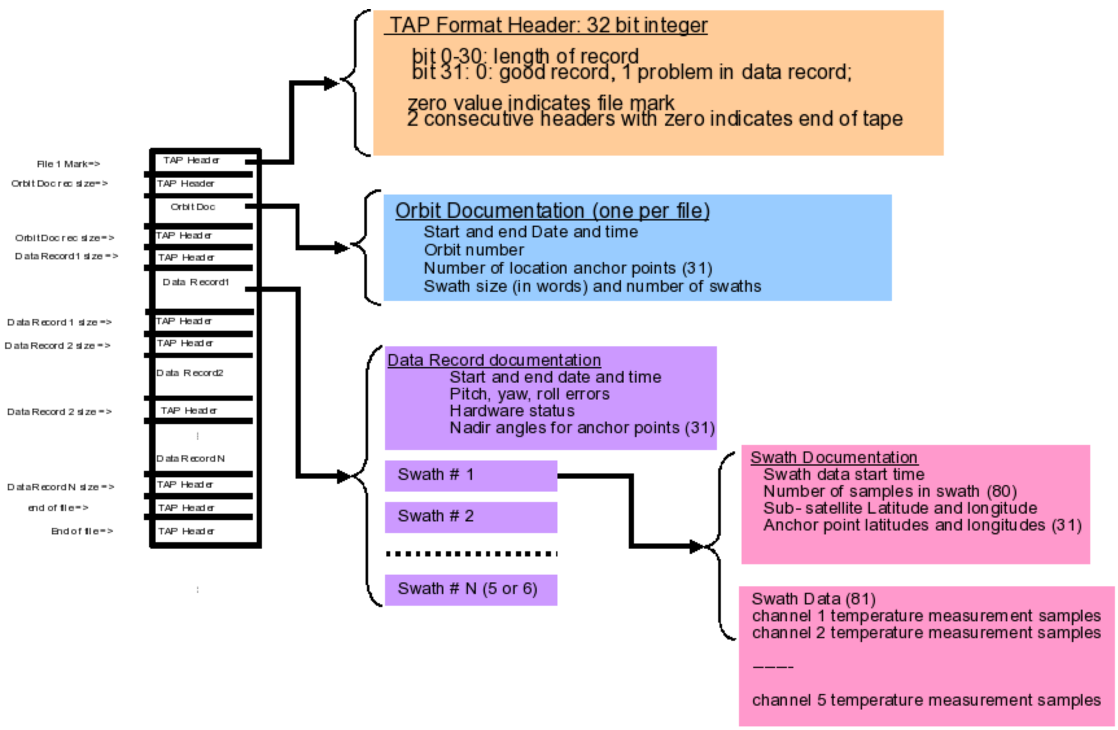


**Figure 2: Nimbus III MRIR file structure**

## 2.6 Key Metadata Fields

These are most likely to be used by users:

Temporal

- start Date / Time
- end Date/ Time

Geolocation

- latitude
- longitude

## 3 Data Contents

Described below are all the parameters associated with the Nimbus III MRIR files.

Table 2 describes in details all the parameters associated with an orbit. There is one orbit documentation record per file.

Table 3 describes in details all fields in a record documentation. There is one data record documentation per data record

Table 4 describes in details all fields in a swath data record. There are multiple swath data records in a single data record.

## 4 Data Services

The data product landing pages provide information about the data, as well as links to download the data files and relevant documentation:

https://disc.gsfc.nasa.gov/datacollection/MRIRN3L1_001.html
https://disc.gsfc.nasa.gov/datacollection/MRIRN3IM_001.html

## 5 Data Interpretation and Screening

### 5.1 Geolocation

The MRIR radiometer scans the earth in a clockwise direction from right to left. Each earth scan is defined by a family of mirror nadir angles. For each mirror angle, the latitude and longitude of the corresponding point on the earth's surface is recorded. The position of individual samples between two anchor points is determined by interpolation.

The latitude and longitude of the corresponding point on the earth's surface are used as references in computation of positions for each sample. There is still no information available describing how many anchor points were used for a swath.

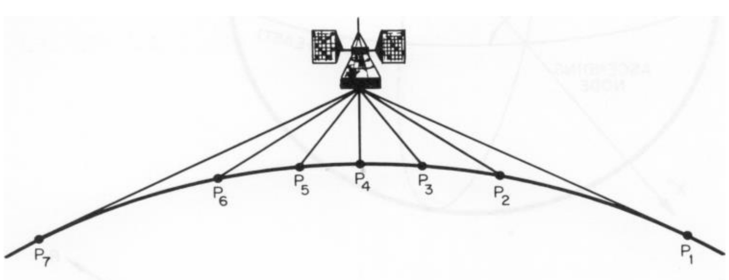


**Figure 3: Nimbus III anchor points**

# 6 More Information

## 6.1 Point of Contact

URL: https://disc.gsfc.nasa.gov/

Name: GES DISC Help desk support group

email: help-disc@listserv.gsfc.nasa.gov

phone: 301-614-5224

fax: 301-614-5268

Address: Goddard Earth Sciences Data and Information Services Center

Code 610.2

NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA

## 6.2 References

- Nimbus III Users' Guide
- The Medium Resolution Infrared Radiometer Pictorial Data Catalog Volume 115 May through 21, June 1966
- The radiation balance of the earth-atmosphere system over both polar regions obtained from radiation measurements of the Nimbus II meteorological satellite, September 1967

# 7 Appendices

## 7.1 Example on How to Extract the Record Length Listed in a TAP using C

```
int  Read_TAP_Header  (ifd)     /* read TAP header      */

int   ifd;

/*   This function reads a TAP header ( 4 bytes) and return the size in
bytes
     of the next record to read
     input
            ifd: file reference
     output
            reclen: size of the next record in bytes
*/

{
     BYTE  bytebuf[200];
     int j, size, value,reclen,signbit,mask;
     char tap_mess[100],reclen_str[20];

      size = read( ifd, bytebuf, 4) ;           /* read 4 bytes header
*/

      mask = 1 ;
      signbit = (bytebuf[0] >> 7) & mask;     /* get sign bit */
      value = 0;

      /* concatenate 4 bytes into an integer */
       for (j=0; j<=3; j++)
           {
              value = value << 8;
              value = value | bytebuf[3-j];
           }

      reclen = value;
      return reclen;
}
```

## 7.2 Example on How to Extract a Word (36 bits from) from a TAP File using C

From main read reclen bytes of data into bytebuf.
Where ifd is an integer and bybuf is an array of unisgned char

```
size = read( ifd, bytebuf, reclen) ;

read first ½ word

val1 = (float) GetWord2( &bytebuf[0],2.25,1,offset);
offset = offset + 2.25;

read 2nd ½ word

val2 = (float) GetWord2( &bytebuf[0],2.25,1,offset);
offset = offset + 2.25;


long long GetWord2 (initval,len,pos,offset)

BYTE initval[];
float len;
int pos;
float offset;

/*   this function calculates the values of a word of size len bytes

     input
          initval  array containing the bytes
          len      number of bytes (e.g. 4.5 for 36 bits, 2.25 for
words 18 bits)
          pos      word position of length len i n the array initval >=
1
          offset   # of bytes offset from the beginning of initval (
e.g. 2.25 for half     word )
     output
          value    integer containing the computed value of the word
                   scaling factor is not applied to the word
*/

{


int j,start_byte,end_byte,start_shift,end_shift,nloop;
BYTE byteclean,signbit;
long long value,signval;
float start_word,end_word;

value = 0;

           start_byte  = (int) floor( (double) (len*(pos-1) + offset))
;
           end_byte    = (int) (start_byte + len) ;

           start_word  = (float) (len*(pos-1)+offset) ;
           end_word    = (float) (len*pos+offset);

           start_shift = (int) ((start_word -start_byte)*8);
           end_shift   = (int) ((end_word - floor( (double)
end_word))*8);
           if (end_shift > 0 ) { end_shift = 8 - end_shift;}
```

```
        signbit=0;
        value = value << 8;
        byteclean = initval[start_byte];
        byteclean = byteclean << start_shift;
        signbit = byteclean ;
        signbit = signbit >> 7;   /* get sign bit */
        byteclean = byteclean << 1;
        byteclean = byteclean >> start_shift+1;
        value = value | byteclean;

        for (j=start_byte+1; j< end_byte; j++) {
            value = value << 8;
            value = value | initval[j];
        }

        value = value << 8;
        value = value | initval[end_byte];
        value = value >> end_shift;

        signval = 1;
        if (signbit == 1 ) { signval = -1;}
   return signval*value;
}
```

7.3 Description of Metadata Fields

Following is a list of the XML metadata fields and a brief description for the MRIR data.

**Table 1: XML Metadata Fields**

| field | Description | Value |
|---|---|---|
| LongName | Long name of the product | MRIR/Nimbus-3 Level 1 Meteorological Radiation Data |
| ShortName | Short name of the product | MRIRN3L1 |
| VersionID | Version ID of the ingested data product, not the processing version. | 001 |
| GranuleID | Granule ID (same as the name of the file). | Example: Nimbus3-MRIR-19690415 t172737_o00020_DR2969.TAP |
| Format | File Format (see section on TAP for a full description). | TAP |
| ChecksumType | Type of checksum | CRC32 |
| ChecksumValue | Value of the checksum using cksum command | Example: 3378917185 |
| SizeBytes DataGranule | Total size of the data granule in bytes | Example: 4855962 |
| InsertDateTime | Date and time when the granule was inserted into the archive. The date is YYYY-MM-DD and the time is in hh-mm-ss format | Example: 2009-05-30 17:20:44 |
| RangeBeginning Date | Begin date when the data was collected. The date is in YYYY-MM-DD format | Example: 1969-05-30 |
| RangeBeginning Time | Begin time of date when the data was collected. The time is in hh-mm-ss format | Example: 14:16:38 |
| RangeEnding Date | End date when the data was collected. The date is in YYYY-MM-DD format | Example: 1969-05-30 |
| RangeEnding Time | End time of date when the data was collected. The time is in hh-mm-ss format | Example: 15:11:08 |

| field | Description | Value |
|---|---|---|
| Platform ShortName | Acronym or short name of the satellite or platform. | Nimbus3 |
| Instrument ShortName | Acronym or short name of the instrument. | MRIR |
| SensorShortName | Name of the sensor | MRIR |
| Gpolygon PointLatitude | Latitudes of the polygons that represent the satellite coverage. Rectangles have been selected in this case. Each point of a rectangle is identified by its latitude and longitude | Example:<br><br>-80.000000<br>-90.000000<br>-90.000000<br>-80.000000 |
| Gpolygon PointLongitude | Longitudes of the polygons that represent the satellite coverage. Rectangles have been selected in this case. Each point of a rectangle is identified by its latitude and longitude | Example:<br><br>180.000000<br>180.000000<br>-180.000000<br>-180.000000 |
| Orbit | Satellite orbit number. There is one orbit per file. A given orbit may have several files (partial orbits or data collected from different stations) | Example: 1043 |
| Average_Elevation | Average elevation in km of the satellite during an orbit | Example: 1140.915 |
| Station_Code | DAF Station identification code | Example: 2 |
| Elapsed_Min_Time | Duration in minutes of data collected during an orbit | Example: 25 |

7.4 Description of orbit documentation records

This record is unique for each file and provides information on the starting and end Date/time for a file, size and number of swaths, orbit number, and the number of anchor points used to identify the geo-location of the data.

**Table 2: Nimbus III Orbit Documentation record**

| Word No. | Quantity | Units | Scaling | Remarks |
|---|---|---|---|---|
| 1 | Nimbus Day | ---------- | B=35 | Start day of the year (1966) for this file (orbit) |
| 2 | Hour | hh | B=35 | Start hour for this file(orbit) |
| 3 | Minute | mm | B=35 | Start minute for this file(orbit) |
| 4 | Second | ss | B=35 | Start seconds for this file(orbit) |
| 5 | Nimbus Day | ------------ | B=35 | End day of the year (1966) for this orbit |
| 6 | Hour | hh | B=35 | End hour for this orbit |
| 7 | Minute | mm | B=35 | End minute for this orbit |
| 8 | Second | ss | B=35 | End seconds for this orbit |
| 9 | Mirror Rotation | Deg/Sec | B=26 | Rotation rate of radiometer mirror |
| 10 | Sampling Frequency | Samples /Sec | B=35 | Digital sampling frequency per second of vehicle time |
| 11 | Orbit Number | ------------ | B=35 | Orbit Number |
| 12 | Station Code | ------------ | B=35 | Data Acquisition Facility (DAF) Station identification |
| 13 | Swath Block size | ------------ | B=35 | Number of 36-bit words per swath |
| 14 | Swaths/records | ------------- | B=35 | Number of swath per record |
| 15 | Number of locator points | -------------- | B=35 | Number of anchor points per swath for which latitudes and longitudes are computed |

## 7.5 Description of Data Record Documentation

The data documentation record provides information describing the subsequent swath data records.

**Table 3: Data Record Documentation**

| Word No. | Quantity | Units | Scaling | Remarks |
|---|---|---|---|---|
| 1D | Nimbus Day | ------- | B=17 | Start Day of the year for this data record |
| 1A | Hour | hh | B=35 | Start hour for this data record |
| 2D | Minute | mm | B=17 | Start minute for this data record |
| 2A | Second | ss | B=35 | Start seconds for this data record |
| 3D | Roll Error | Degrees | B=14 | Roll Error at start Date/time (word 1 and 2) for this record |
| 3A | Pitch Error | Degrees | B=32 | Pitch Error at start Date/time (word 1 and 2) for this record |
| 4D | Yaw Error | Degrees | B=14 | Yaw Error at start Date/time (word 1 and 2) for this record |
| 4A | Height | Km | B=35 | Height of the spacecraft at start Date/time (word 1 and 2) for this record |
| 5D | Not used | | B=17 | Not used |
| 5A | Housing one Temperature | Degrees K | B=32 | Measured temperature of housing one at time specified in words one and two |
| 6D | Housing two Temperature | Volts | B=14 | Measured temperature of housing two at time specified in words one and two |
| 6A | Electronics temperature | Degrees K | B=32 | Measured temperature of electronics at start Date/time (word 1 and 2) for this record |
| 7D | Chopper one Temperature | Degrees K | B=14 | Measured temperature of chopper at start Date/time (word 1 and 2) for this record |
| 7A | Chopper one Temperature | Degrees K | B=32 | Measured temperature of chopper at start Date/time (word 1 and 2) for this record |

| Word No. | Quantity | Units | Scaling | Remarks |
|---|---|---|---|---|
| 8D | GHA of SUN | Degrees | B=14 | GHA of Sun of at start Date/time (word 1 and 2) for this record |
| 8A | Dec of SUN | Degrees | B=32 | Declination of sun at start Date/time (word 1 and 2) for this record. Ninety degrees added to eliminate negative sign |
| 9 | Nadir Angle | Degrees | B=29 | Nadir angle corresponding to the first anchor point and measured in the plane of the scanning radiometer |
| ----- | | | | |
| ----- | | | | |
| N | Nadir Angle | Degrees | B=29 | Nadir angle corresponding to the last anchor point and measured in the plane of the scanning radiometer |

## 7.6 Description of a Swath Data Record

**Table 4: Swath Data Record**

| Word No. | Quantity | Units | Scaling | Remarks |
|---|---|---|---|---|
| (N+1)D | seconds | ss | B=8 | Seconds elapsed since the start of the Date/time of this data record |
| (N+1)A | Data population | ------- | B=35 | Number of data points in this swath |
| (N+2)D | Latitude | Degrees | B=11 | Latitude of the subsatellite point for this swath |
| (N+2)A | Longitude | Degrees | B=29 | Longitude of the subsatellite point for this swath, positive westward 0 to 360 |
| (N+3)D | Latitude | Degrees | B=11 | Latitude of viewed point for the first anchor point |

| Word No. | Quantity | Units | Scaling | Remarks |
|---|---|---|---|---|
| (N+3)A | Longitude | Degrees | B=29 | Longitude of viewed point for the first anchor point. |
| … | | | | |
| … | | | | |
| (N+3+M)D | latitude | Degrees | B=11 | Latitude of viewed point for the Mth anchor point |
| (N+3+M)A | Longitude | Degrees | B=29 | Longitude of viewed point for the Mth anchor point |
| (N+3+M+1)D | MRIR Data | Degrees | B=14 | First MRIR temperature measurement , channel 1 |
| (N+3+M+1)A | MRIR Data | Degrees | B=32 | First MRIR temperature measurement, channel 1 |
| … | | | | |
| … | | | | |
| (N+3+M+K)D | MRIR Data | Degrees | B=14 | Last MRIR temperature measurement , channel 1 |
| (N+3+M+K)A | MRIR Data | Degrees | B=32 | Last MRIR temperature measurement, channel 1 |
| (N+3+M+K+1)D | MRIR Data | Degrees | B=14 | First MRIR temperature measurement , channel 2 |
| (N+3+M+K+1)A | MRIR Data | Degrees | B=32 | First MRIR temperature measurement , channel 2 |
| … | | | | |
| … | | | | |
| (N+3+M+2*K)D | MRIR Data | Degrees | B=14 | Last MRIR temperature measurement , channel 2 |
| (N+3+M+2*K)A | MRIR Data | Degrees | B=32 | Last MRIR temperature measurement , channel 2 |
| … | | | | |
| … | | | | |
| (N+3+M+4*K+1)D | MRIR Data | Degrees | B=14 | First MRIR temperature measurement , channel 5 |
| (N+3+M+4*K+1)A | MRIR Data | Degrees | B=32 | First MRIR temperature measurement , channel 5 |
| … | | | | |
| … | | | | |

| Word No. | Quantity | Units | Scaling | Remarks |
|---|---|---|---|---|
| (N+3+M+5*K)D | MRIR Data | Degrees | B=14 | Last MRIR temperature measurement , channel 5 |
| (N+3+M+5*K)A | MRIR Data | Degrees | B=32 | Last MRIR temperature measurement , channel 5 |

Note:  All remaining or unused portions of a swath data block are set to zero, giving a swath block size as specified in the documentation record.

## 7.7 Quality Assurance Procedures

### 7.7.1 Data Producer QA

The Data Producer's QA information can be found in the XML metadata file under the section ProducersQA. The information begins with the following:

```
Record No, Bytes, Bad bytes
0,filemark
1,84,0
2,filemark
3,102,0
4,11928,0
  :
<n-1>,11928,0
<n>,filemark
```

On each line there are 3 comma separated numbers: the first is the record number, the second is the record length in bytes, and the third is the number of bad bytes. The first Record #0 is a filemark which separates different files. Record # 1 has 84 bytes - this is the BCD header length. If the number of bad bytes is 0, this indicates the header is good. If the number is non-zero, there are bad bytes in the header. Record # 2 marks the end of the BCD header, and the start of the next file record. Record #3 has 102 bytes - this is the data header length. If the number of bad bytes is 0, this means all bytes are good, if the number is non-zero, there are bad bytes in the header. Record #4 is 11928 bytes. This is the nominal data record length. If the number of bad bytes is 0, that indicates this data record is good, if the number is non-zero, there are bad bytes in the data record. From this point, all subsequent records are data records and should have a length of 11928 with no bad bytes. A final filemark will indicate the end of the file. Sometimes the data are split into different orbits or orbit section files, and this will be noted with another filemark

### 7.7.2 Physical QA

Each restored file was read and its corresponding orbit documentation was extracted and used to derive the file name and to create a XML metadata file.

For each file the number of “bad” records was derived.

Plots of selected swaths were generated (with and without a world map) and some were compared with published papers.

During data recovery 2466 files were recovered from 20 tapes. Of these there were 4 files that were not recovered due to file corruption making them unreadable. Other issues include 92 files have the readout orbit number set to zero, which is easily identified in their file names. An additional 97 files have small elapsed time, indicating short files with a single or a few data records. This is normal, and often a duplicate file with the same name will contain more data records.

### 7.7.3 Science QA

MRIR data were examined and validated using Nimbus3 MRIR documentation (e.g., The Nimbus III Medium resolution infrared pictorial data catalog).

## 7.8 Image Files

The **MRIRN3IM** data product consists of 4 x 5 inch photographic film sheets from the Nimbus-3 Medium Resolution Infrared Radiometer. Each film sheet contains an entire orbit (daylight portion) of data measured at five wavelength bands: 6.4-6.9, 10-11, 14-16, 5-30, and 0.2-4.0 micrometers. There are also associated latitude grids, time, and gray scales representing different temperatures. The images ... are saved as JPEG 2000 digital files. About 3 weeks of images are archived into a TAR file. The processing techniques used to produce the data set and a full description of the data set are contained in section 4.3.4 of the "Nimbus III Users' Guide."

## 7.9 Acronyms

*DAF:* Data Acquisition Facility

*EOS:* Earth Observing System

*GES DISC*: Goddard Earth Sciences Data and Information Services Center

*GSFC*: Goddard Space Flight Center

*MRIR*: High Resolution Infrared Radiometer

*L1:* Level 1 Data

*NASA:* National Aeronautics and Space Administration

*QA:* Quality Assessment

*UT:* universal Time