



Nimbus Temperature-Humidity Infrared Radiometer Global Montage Grayscale L1, TIFF, Version 1

USER GUIDE

How to Cite These Data

As a condition of using these data, you must include a citation:

Gallaher, D. and G. Campbell. 2020. *Nimbus Temperature-Humidity Infrared Radiometer Global Montage Grayscale L1, TIFF, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center.
<https://doi.org/10.5067/CSPBASWAQJ0Z>. [Date Accessed].

FOR QUESTIONS ABOUT THESE DATA, CONTACT NSIDC@NSIDC.ORG

FOR CURRENT INFORMATION, VISIT <https://nsidc.org/data/NmTHIRmtg-1T>



National Snow and Ice Data Center

TABLE OF CONTENTS

1	DATA DESCRIPTION	2
1.1	Parameters	2
1.2	File Information.....	2
1.2.1	Format.....	2
1.2.2	File Contents.....	2
1.2.3	Naming Convention	2
1.3	Spatial Information.....	3
1.3.1	Coverage	3
1.3.2	Resolution.....	3
1.3.3	Geolocation.....	3
1.4	Temporal Information	3
1.4.1	Coverage	3
1.4.2	Resolution.....	3
1.5	Sample Data Image.....	4
2	DATA ACQUISITION AND PROCESSING.....	4
2.1	Background	4
2.2	Acquisition	5
2.3	Processing.....	5
2.4	Limitations	5
2.5	Instrumentation.....	6
3	ACKNOQLEDGMENTS.....	6
3.1	Investigators	6
4	REFERENCES	6
5	RELATED DATA SETS	6
6	RELATED WEBSITES	7
7	DOCUMENT INFORMATION.....	7
7.1	Publication Date	7
7.2	Date Last Updated.....	7

1 DATA DESCRIPTION

This data set contains THIR 6.7 μm and/or 11.5 μm global grayscale imagery from Nimbus 7. It does not contain the digital brightness temperature values. The data are provided only in qualitative form and may be useful for viewing imagery from historic weather events, specifically in the tropical regions.

1.1 Parameters

THIR 6.7 μm grayscale water vapor imagery
 THIR 11.5 μm grayscale temperature imagery

1.2 File Information

1.2.1 Format

TIFF

1.2.2 File Contents

Each data granule consists of a TIFF (.tif) data file and a corresponding XML metadata file (.xml). Up to four granules may be contained in each data directory; ch11.day, ch11.night, ch67day, ch67night.

1.2.3 Naming Convention

Files are named according to the following convention and as described in Table 1.

File Name Convention

Nm[pid].[N7].[ch].[orbit].[yyyy].[mo].[dy].tif

Table 1. File Naming Convention

Variable	Description
Nm	Nimbus
pid	Product ID
N7	Nimbus 7
ch	Channel (ch11 or ch67)
orbit	Night or day
yyyy	Year data observed

Variable	Description
mo	Month data observed
dy	Day data observed
tif	TIFF data format

File Name Example

NmTHIRmtg-1T.N7.ch11.day.1980.06.05.tif

1.3 Spatial Information

1.3.1 Coverage

The coverage is global.

1.3.2 Resolution

The resolution at the time of observation was approximately 5 km at nadir. However, the resolution was degraded during processing and is now estimated to be 16 km.

1.3.3 Geolocation

This data set is not georeferenced; however, most images specify the longitude for each swath.

1.4 Temporal Information

1.4.1 Coverage

The coverage is intermittent within the following date range:

30 Oct 1978 to 17 May 1984

1.4.2 Resolution

Daily

1.5 Sample Data Image

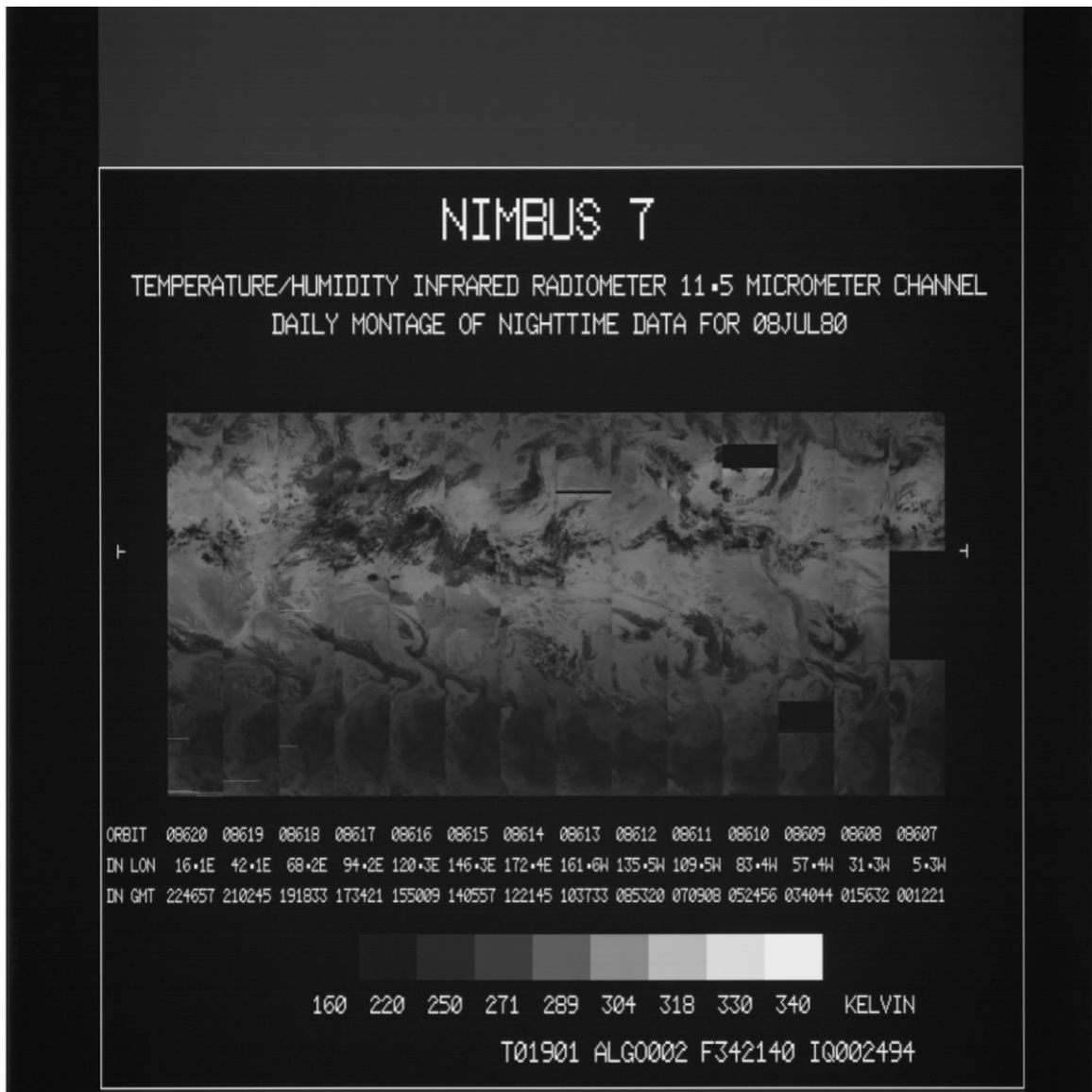


Figure 1. This figure shows a nighttime montage image composed of orbit swaths observed by the THIR instrument on-board Nimbus 7. This montage shows THIR 11.5 μm grayscale radiative temperatures from orbits 08607 to 08620 observed on July 8, 1980. The swath orbit number, swath longitude, and the swath observation time (GMT) are burned into the bottom of the image. Note, this metadata may not be included in all images.

2 DATA ACQUISITION AND PROCESSING

2.1 Background

The Temperature-Humidity Infrared Radiometer (THIR) transformed measured radiation detected by the 6.7 μm channel (water vapor window) and the 11.5 μm channel (IR window) into electrical

voltages that were recorded on tape and played back when the satellite flew within range of a receiving station. These data were then transmitted to the Goddard Space Flight Center (GSFC), where each orbit swath was archived as a grayscale image on 70 mm black and white film and on 7-track, digital magnetic tape. The digital data was fully processed for scientific studies in the 1980's and is accessible via the Goddard Earth Sciences Data and Information Services Center ([GES DISC](#)).

In addition, daily global maps were generated from the swaths and archived on 5 inch film. To create the global maps, Nimbus 7 swaths were manually aligned and photographed to create a montage. The film and tape were stored in boxes for many years. Over time the quality of both the film and tape began to degrade. In 2017 an effort to rescue and preserve the grayscale images began. This effort is described in the Processing section below.

2.2 Acquisition

Nimbus 7 was a second-generation meteorological research and development (R&D) spacecraft designed to serve as stabilized, earth-oriented platforms for testing advanced systems to sense and collect atmospheric science data. Nimbus 7 scanned the entire globe every one to two days. As such, most locations on Earth were imaged at least once per day and more frequently where swaths overlap, such as near the poles.

2.3 Processing

In 2017 the U.S. Geological Survey utilized a high-speed camera system to scan reels of 5 inch film. Approximately 4,000 images were scanned and saved as black and white TIFF files, from which 1,659 images were retained because of duplication issues. The scanned images were then sent to NSIDC, where the observation date and time for each image was identified and written into the filename for each granule. In addition, the source swaths for each montage were identified using the archive box number and the film reel beginning number and ending number. The archive box and film reel numbers are embedded in the 'Image Description' tag for each TIFF file.

2.4 Limitations

- The post-processing spatial resolution is estimated to be 16 km. The spatial resolution of the data was degraded as a result of data smoothing introduced when the film was exposed and developed.
- This data set contains gaps in temporal coverage due to missing data.
- This data set is not georeferenced.

2.5 Instrumentation

The Temperature-Humidity Infrared Radiometer (THIR) on-board Nimbus 7 was a single scanning radiometer that operated in the 6.7 μm window (6.5 μm - 7.0 μm) and 11.5 μm window (10.5 μm - 12.5 μm). The instrument was a non-imaging radiometer consisting of a 12.7 cm Cassegrain system and scanning mirror common to both channels, a beam splitter, filters, and two germanium-immersed thermistor bolometers. Incoming radiant energy was collected by a flat scanning mirror inclined at 45 deg to the optical axis. The mirror rotated through 360 deg at 48 rpm and scanned in a plane normal to the spacecraft velocity. For additional information see the [Nimbus 7](#) users guide.

3 ACKNOWLEDGMENTS

3.1 Investigators

David Gallaher (retired)

National Snow and Ice Data Center
CIRES, 449 UCB
University of Colorado
Boulder, CO 80309-0449 USA

G. Garrett Campbell (retired)

National Snow and Ice Data Center
CIRES, 449 UCB
University of Colorado
Boulder, CO 80309-0449 USA

4 REFERENCES

Gallaher, D., G. G. Campbell, and W. N. Meier. In Press. Anomalous Variability in Antarctic Sea Ice Extents During the 1960's with the Use of Nimbus Satellite Data. *Journal of Selected Topics in Applied Earth Observations and Remote Sensing*.

Meier, W. N., D. Gallaher, and G. G. Campbell. 2013. New Estimates of Arctic and Antarctic Sea Ice Extent During September 1964 from Recovered Nimbus I Satellite Imagery. *The Cryosphere Discuss* 7:35-53. doi: [10.5194/tcd-7-35-2013](https://doi.org/10.5194/tcd-7-35-2013).

5 RELATED DATA SETS

See the [Nimbus Data Rescue Project | Data Sets](#) page.

6 RELATED WEBSITES

- [NASA Science | Missions: Nimbus](#)
- [Temperature-Humidity Infrared Radiometer \(THIR\) - Nimbus 7](#)
- [Nimbus Documentation and Conference Materials](#)

7 DOCUMENT INFORMATION

7.1 Publication Date

22 January 2020

7.2 Date Last Updated

23 March 2020