



Nimbus High Resolution Infrared Radiometer Remapped Digital Data Daily L3, GeoTIFF, 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. 2013. *Nimbus High Resolution Infrared Radiometer Remapped Digital Data Daily L3, GeoTIFF, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center.

<https://doi.org/10.5067/NIMBUS/NIMHRIR3G>. [Date Accessed].

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

FOR CURRENT INFORMATION, VISIT <https://nsidc.org/data/NmHRIR3G>



National Snow and Ice Data Center

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1 DETAILED DATA DESCRIPTION

1.1 Format

Data files are available in Geographic Tagged Image File Format (GeoTIFF).

1.2 File Naming Convention

This section explains the file naming convention used for NmHRIR3G data files.

Example file name: NmHRIR3H.downIR.[YYYY][MM][DD].G.tif

Refer to Table 1 for descriptions of the file name variables listed above.

Table 1. NmHRIR3G File Naming Convention

Variable	Description
NmHRIR3G	Product
DownIR	To remove reflected light contamination in the raw data, only the descending half of the orbit was used.
YYYY	Year
MM	Month
DD	Day
G	Equatorial projection
.tif	GeoTIFF

1.3 File Size

Data files are roughly 16 MB.

1.4 Spatial Coverage

Northernmost Latitude: 60° N

Southernmost Latitude: 60° S

Easternmost Longitude: 180° E

Westernmost Longitude: 180° W

1.4.1 Spatial Resolution

Roughly 20 km

1.4.2 Projection and Grid Description

Data are provided in a 20 km cylindrical equidistant projection. The grid was constructed by defining a 2000 east-west by 664 north-south global array at the equator to establish roughly 20 km x 20 km cells. Only the portion of the grid from 60° N to 60° S (2000 X 664) is saved for the final output.

1.5 Temporal Coverage

Intermittent data are available within the following date ranges:

Table 2: Temporal Coverage by Satellite

Satellite	Date Range
Nimbus 1	29 August to 21 September, 1964
Nimbus 2	16 May to 14 November, 1966
Nimbus 3	17 April, 1969 to 30 November, 1969

1.5.1 Temporal Resolution

Daily

1.6 Parameter or Variable

The parameter of interest in this data set is brightness temperature. See Section 0 below.

2 SOFTWARE AND TOOLS

2.1 Software and Tools

Any GeoTIFF-compatible software package can be used to read and display NmHRIR3G data files.

2.2 Quality Assessment

The correction applied in the NmHRIR1H data set improves the visual appearance of the data and better represents the shapes of clouds and coastlines. In regions with very little spatial information, for example where the measurements are very noisy or very uniform, the shifts offer little or no improvement.

3 DATA ACQUISITION AND PROCESSING

3.1.1 Processing Steps

To construct the daily composites, all reprocessed HRIR swaths for each 24-hour period were accumulated from the Nimbus High Resolution Infrared Radiometer Digital Swath Data Level 1 (NmHRIR1H) data set. When multiple observations were available in a grid cell, the observation closest to satellite nadir was selected. The cosine of the selected observation's view angle is stored in the view angle for brightness temperature data field for users who wish to make additional corrections based on view angle.

The underlying NmHRIR1H data have been corrected to minimize seemingly random alignment errors that caused cloud edges and land features to appear jagged. See Section 3 above.

3.1.2 Errors and Limitations

Most extant Nimbus 1 and 2 observations were collected at night; however, a few daytime orbits have survived. Although the daytime measurements are contaminated by reflected solar radiation, these data have been included for their qualitative and historical value.

Whereas Nimbus I and II operated almost exclusively in nighttime mode, Nimbus III was equipped with an infrared filter that could be inserted into the optical path to acquire daytime reflected solar radiation. However, no flag was set in the data to indicate whether the filter was in or out. Furthermore, a few daytime orbits were collected with no filter in place and contain mixed IR and visible radiation.

In general, daytime orbits appear to correspond to temperatures below 150 K. Bit 7 in the Flags data field is set to on to indicate the PIs' best guess that the filter was in place. Although no calibration exists for the daytime visible data, obvious distinctions between land, cloud, water, and ice surfaces are apparent. However, the visible observations are so scattered in time and space that constructing land surface or cloud maps from these data alone would result in significant sampling errors.

3.2 Sensor or Instrument Description

The HRIR on Nimbus I and II was a single scanning radiometer that operated in the 3.4 μm to 4.2 μm near-infrared region. The instrument utilized an optical system and a lead selenide photoconductive detector cell to obtain measurements of blackbody temperatures from 210K – 330K. To allow daytime operation, the Nimbus III HRIR was augmented with a band-pass filter that transmitted reflected solar radiation in the 0.7 μm to 1.3 μm region. The change-over from nighttime to daytime operation was accomplished by actuating a relay, either automatically or by ground station command, to insert the filter into the optical path.

For all three missions, the scan mirror was inclined to 45 degrees with a scan rate of 44.7 revolutions per minute. The instantaneous field of view was 8.8 milliradians and the scan line separation was 8.3 km. The radiometer's instantaneous field of view covered roughly 0.5 degrees, which at an altitude of 1100 km corresponded to a ground resolution of approximately 8 km at nadir.

4 REFERENCES AND RELATED PUBLICATIONS

4.1 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).

4.2 Related Data Collections

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

4.3 Related Websites

- [NASA Science | Missions: Nimbus](#)
- [Advanced Vidicon Camera System \(AVCS\)](#)
- [High-Resolution Infrared Radiometer \(HRIR\)](#)
- [Image Dissector Camera System \(IDCS\)](#)

5 CONTACTS AND ACKNOWLEDGMENTS

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6 DOCUMENT INFORMATION

6.1 Publication Date

October 2013

6.2 Date Last Updated

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