



SMEX02 ASTER Level 1B Data, Iowa, Version 1

USER GUIDE

How to Cite These Data

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

Jackson, T. and M. Cosh. 2003. *SMEX02 ASTER Level 1B Data, Iowa, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. <https://doi.org/10.5067/KYFJ3QI6YGI2>. [Date Accessed].

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

FOR CURRENT INFORMATION, VISIT <https://nsidc.org/data/NSIDC-0197>



National Snow and Ice Data Center

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1 DETAILED DATA DESCRIPTION

Investigators acquired a series of Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) images from the Terra satellite. Three ASTER scenes were mosaicked and the regional study area extracted to form one image for each of ASTER's 14 spectral channels. These data represent a single snapshot; the satellite overpass time was 17:20 GMT on 1 July 2002. The study area is the Walnut Creek Watershed area in Iowa, USA

1.1 Format

The data are in unsigned integer binary files in terms of scaled radiance, one file for each band, in PC byte order (little endian). There is no header information included in these files.

VNIR files (bands 1-3) are 3702 columns by 7662 rows.
SWIR files (bands 4-9) are 1852 columns by 3832 rows.
TIR files (bands 10-14) are 618 columns by 1278 rows.

The digit number (DN) was converted to radiance ($W/(m^2 \cdot sr \cdot \mu m)$) using the following equation:

$Radiance = (DNvalue - 1) \times \text{unit conversion coefficients}$.

1.2 File Naming Convention

File names use the following conventions:

ASTER_mmddyyyy_bxx(x).bil

where: mm = month, dd = day, yyyy = year, xx(x) = band number. For example, in the file "ASTER_07012002_b7.bil," data were collected on 1 July 2002 by the SWIR band 7.

1.3 File Size

SWIR files are 13.5 MB, TIR files are 1.5 MB, and VNIR files are 54.1 MB.

1.4 Volume

Total volume is 251 MB.

1.5 Spatial Coverage

Southernmost Latitude: 41.70°N
Northernmost Latitude: 42.73°N
Westernmost Longitude: 93.84°W

Easternmost Longitude: 93.16°W

The following table shows the Universal Transverse Mercator (UTM) geographic locations of the various sensor data (UTM coordinates are in meters).

Table 1. UTM Geographic Locations

Sensor	VNIR		SWIR		TIR	
	Easting	Northing	Easting	Northing	Easting	Northing
Upper Left	431093 E	4731101 N	431077 E	4731113 N	431076 E	4731102 N
Upper Right	486608 E	4731101 N	486607 E	4731113 N	486606 E	4731102 N
Lower Left	431093 E	4616186 N	431077 E	4616183 N	431076 E	4616173 N
Lower Right	486608 E	4616186 N	486607 E	4616183 N	486606 E	4616173 N

1.5.1 Spatial Resolution

VNIR has 15 m resolution, SWIR has 30 m resolution, and TIR has 90 m resolution.

1.5.2 Projection Description

Universal Transverse Mercator (UTM) Zone 15

1.6 Temporal Coverage

Data were collected on 1 July 2002 by the ASTER instrument.

1.7 Parameter or Variable

1.7.1 Parameter Description

The parameters are VNIR, SWIR, and TIR radiance imagery. Three ASTER scenes were mosaicked and the regional study area extracted to form one image for each of ASTER's 14 spectral channels.

1.7.2 Sample Data Record



Figure 1. This sample shows a portion of the data file "ASTER_07012002_b7.bil."

2 SOFTWARE AND TOOLS

Open these files in an appropriate image processing or image viewing application.

3 DATA ACQUISITION AND PROCESSING

3.1 Sensor or Instrument Description

ASTER is an advanced optical sensor of 14 spectral channels ranging from the visible to thermal infrared region.

The high-resolution VNIR radiometer observes solar radiation reflected from Earth's surface in three visible and near-infrared bands (1-3). The spectral region is 0.52-0.86 μm . VNIR has a pointing capability of $\pm 24^\circ$ from nadir in the cross-track direction. The radiometer is calibrated in orbit using halogen lamps.

SWIR is a high-resolution, multispectral radiometer that detects reflected solar radiation from Earth's surface in the wavelength region of 1.6 - 2.43 μm (bands 4-9). SWIR can also change the boresight in the cross-track direction by $\pm 8.55^\circ$ from nadir using a pointing mechanism.

TIR is an advanced radiometer with five spectral bands (10-14) in the thermal infrared (8-12 μm).

For more information, please see the ASTER User Guide.

The band spectral range and conversion coefficients are listed in the following table.

Table 2. Band Spectral Range and Conversion Coefficients

Sensor	Band Number	Spectral Range (μm)	Unit Conversion Coefficient ($\text{W}/(\text{m}^2 \cdot \text{sr} \cdot \mu\text{m})/\text{DN}$)
VNIR	1	0.52-0.60	0.676
	2	0.63-0.69	0.708
	3N	0.78-0.86	0.862
SWIR	4	1.60-1.70	0.2174
	5	2.145-2.185	0.0696
	6	2.185-2.225	0.0625
	7	2.235-2.285	0.0597
	8	2.295-2.365	0.0417
	9	2.360-2.430	0.0318
	TIR	10	8.125-8.475
11		8.475-8.825	0.006780
12		8.925-9.275	0.006590
13		10.25-10.95	0.005693
14		10.95-11.65	0.005225

4 REFERENCES AND RELATED PUBLICATIONS

ASTER User Guide

5 CONTACTS AND ACKNOWLEDGMENTS

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6 DOCUMENT INFORMATION

6.1 Publication Date

November 2003

6.2 Date Last Updated

22 March 2021