

# ASTER Technical Guide

The Global Land Cover Facility

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## Overview

This guide provides users the details they need to employ imagery downloaded from the GLCF. This is not intended as a seminal instruction on this topic, but rather as a first step toward practical utilization.

GLCF provides access to a series of targeted ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer) acquisitions. ASTER is a joint Japan-US imager deployed on NASA's Terra platform. Unlike Landsat, ASTER is a pointable, stereoscopic instrument which, along with its rapid revisit period, allows for dynamic monitoring of Earth surface events. Such events range from active volcanism to floods to more gradual impacts such as urban growth and forest change.

Please visit the [ASTER web site](#) for a more comprehensive overview of applications. There is also a very helpful [user guide maintained by the Japanese ASTER team](#).

## Orbit & Acquisition Characteristics

ASTER was launched in 1999 and, as of Q1 2006, remains fully operational. Flying at an altitude of 438 miles, ASTER has a 16-day revisit period and follows a sun-synchronous polar orbit. Each ASTER acquisition is approximately 60km by 60km. Although ASTER imagery is not tiled in the same fashion as Landsat data, it is still available according to the same "[World Reference System](#)" (WRS-2).

## Radiometric Characteristics

The ASTER instrument acquires information across the visible and infrared spectrums. Specifically, information is acquired by three separate instruments:

- VNIR (Visible and Near-Infrared Radiometer)
- SWIR (ShortWave Infrared Radiometer)
- TWIR (Thermal Infrared Radiometer)

Each of the ASTER instruments has a unique series of channels or "bands", each having its own unique radiometric characteristics. The radiometric characteristics of each band are detailed in Table 1 and Figure 1. Understanding the radiometric characteristics of the individual bands can help determine the most appropriate application for each band or combination of bands. For example, Bands 2 and 3n are often utilized in calculating vegetation indices while the thermal bands are used monitor atmospheric and thermal anomalies. Through the use of third-party software bands 3n and 3b can be utilized to create detailed elevation models.

**Table 1: Radiometric Characteristics**

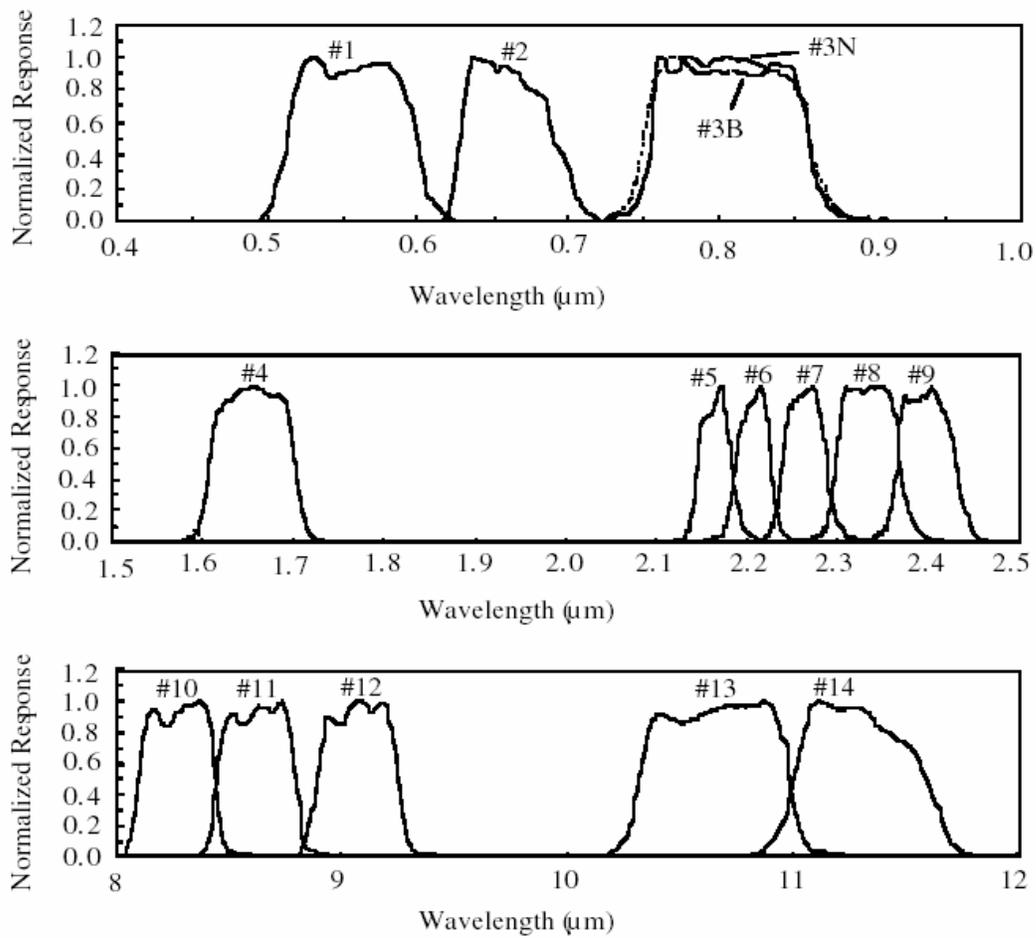
Instrument and Band	Spectral Coverage	Spatial Resolution
VNIR 1	0.52~0.60 $\mu$ m	15m
VNIR 2	0.63~0.69 $\mu$ m	15m
VNIR 3n	0.76~0.86 $\mu$ m	15m
Stereoscopic (3b)	0.76~0.86 $\mu$ m	15m
SWIR 4	1.600~1.700 $\mu$ m	30m
SWIR 5	2.145~2.185 $\mu$ m/	30m
SWIR 6	2.185~2.225 $\mu$ m	30m
SWIR 7	2.235~2.285 $\mu$ m	30m
SWIR 8	2.295~2.365 $\mu$ m	30m
SWIR 9	2.360~2.430 $\mu$ m	30m
TIR 10	8.125~8.475 $\mu$ m	90m
TIR 11	8.475~8.825 $\mu$ m	90m
TIR 12	8.925~9.275 $\mu$ m	90m
TIR 13	10.25~10.95 $\mu$ m	90m
TIR 14	10.95~11.65 $\mu$ m	90m

## Data Format Properties

GLCF makes a standardized ASTER product available to its user community. All data has been radiometrically and geometrically corrected (officially referred to as L1B data). ASTER imagery is provided to the GLCF user in GeoTIFF format and is designed for maximum usability and ease of integration with standard graphics software.

Each ASTER scene is available with its bands as separate files: instead of having to download all bands, users download only the files/bands they want. Most files are compressed using [gzip](#), so that files have a ".gz" extension. The first step a user must follow after download is to uncompress the file (this may be done with a variety of standard software packages, including WinZip and gzip). The image can then be opened in its native [GeoTIFF file format](#). A GeoTIFF file can be used as a TIFF file in any graphics software, or, if the user has spatial software, the GeoTIFF header will provide georeferencing information. The georeference formats employed by the GLCF for ASTER imagery include a UTM projection and a WGS84 datum and ellipsoid. All these characteristics are listed in the metadata file accompanying the scene. Most of these characteristics can be converted to other format options, depending on need and software. [Contact the GLCF](#) or visit the [ASTER program web site](#) for further details.

See [File Format Guide](#) for utilization instruction.



**Figure 1: Bands as a function of wavelength (Source: GDS, 2001)**