

**Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER)**

The Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) is a Japanese sensor which is one of five remote sensory devices on board the Terra satellite launched into Earth orbit by NASA in 1999. The instrument has been collecting data since February 2000.

ASTER provides high-resolution images of the planet Earth in 14 different bands of the electromagnetic spectrum, ranging from visible to thermal infrared light. The resolution of images ranges between 15 and 90 meters. ASTER data are used to create detailed maps of surface temperature of land, emissivity, reflectance, and elevation.

In April 2008, the SWIR detectors of ASTER began malfunctioning and were publicly declared non-operational by NASA in January 2009. All SWIR data collected after 1 April 2008 has been marked as unusable.

The ASTER Global Digital Elevation Model (GDEM) is available at no charge to users worldwide via electronic download.

As of 2 April 2016, the entire catalogue of ASTER image data became publicly available online at no cost. It can be downloaded with a free registered account from either NASA's Earth Data Search delivery system or from the USGS Earth Explorer delivery system.

**ASTER Global Digital Elevation Model****Version 1**

On 29 June 2009, the Global Digital Elevation Model (GDEM) was released to the public. A joint operation between NASA and Japan's Ministry of Economy, Trade and Industry (METI), the Global Digital Elevation Model is the most complete mapping of the earth ever made, covering 99% of its surface.

The previous most comprehensive map, NASA's Shuttle Radar Topography Mission, covered approximately 80% of the Earth's surface, with a global resolution of 90 meters, and a resolution of 30 meters over the USA. The GDEM covers the planet from 83 degrees North to 83 degrees South (surpassing SRTM's coverage of 56 °S to 60 °N), becoming the first earth mapping system that provides comprehensive coverage of the Polar Regions. It was created by compiling 1.3 million VNIR images taken by ASTER using single-pass stereoscopic correlation techniques, with terrain elevation measurements taken globally at 30-meter (98 ft) intervals.

Despite the high nominal resolution, however, some reviewers have commented that the true resolution is considerably lower, and not as good as that of SRTM data, and serious artifacts are present. Some of these limitations have been confirmed by METI and NASA, who point out that the current version of the GDEM product is "research grade".

## **Version 2**

During October 2011, version 2 of Global Digital Elevation Model was publicly released. This is considered an improvement upon version 1. These improvements include increased horizontal and vertical accuracy, better horizontal resolution, reduced presence of artifacts, and more realistic values over water bodies. However, one reviewer still regards the Aster version 2 dataset, although showing 'a considerable improvement in the effective level of detail', to still be regarded as 'experimental or research grade' due to presence of artefacts. A 2014 study showed that over rugged mountainous terrain the ASTER version 2 data set can be a more accurate representation of the ground than the SRTM elevation model.

## **ASTER DEM Uses in ArcGIS as training**

**1. Elevation;**

**2. Slope.**