

# Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER)

## Outline of ASTER

Advanced Spaceborne Thermal Emission and Reflection radiometer (ASTER) can observe the Earth's surface with fourteen bands in visible and near-infrared, short-wave infrared, and thermal infrared wavelength regions. This provides the capability useful for rock identification, mineral exploration, and geologic structure. ASTER is onboard the NASA's Terra spacecraft and launched on December 18, 1999 by ATLAS II rocket. ASTER is in operation now, over more than thirteen years.

## Features of ASTER

- ASTER is a optical instrument of high resolution, composed of a visible and near-infrared radiometer (VNIR), a short-wave infrared radiometer (SWIR), and a thermal infrared radiometer (TIR).
- VNIR can detect solar reflected light in visible and near-infrared wavelength region, and acquire stereo-viewing data using nadir and backward viewing telescopes. ASTER global 3D DEM data (ASTER GDEM) is publicly released for the world users.
- SWIR can detect solar reflected light in short-wavelength spectral region, and acquire image data containing rocks, minerals, and vegetation in detail.
- TIR can detect the emitted energy from the Earth's surface in thermal infrared wavelength region. It can acquire images for discriminating minerals using thermal emission characteristics.
- High reliable sterling cooler is used and in operation.

## Major Characteristics

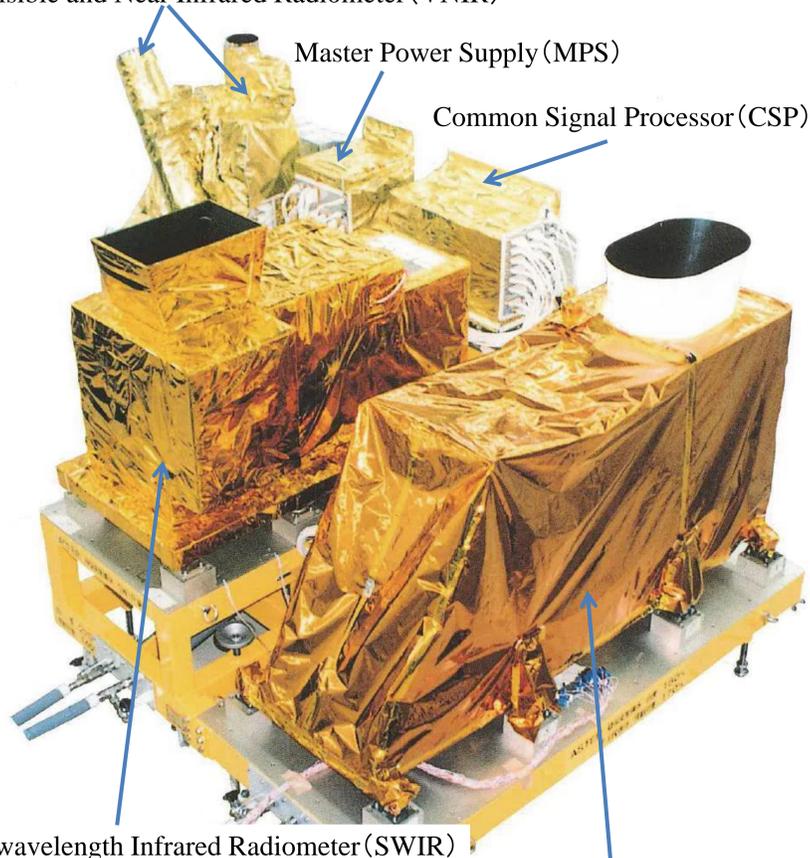
Spectral bands	VNIR	3bands 0.52 ~ 0.86 $\mu$ m
	SWIR	6bands 1.60 ~ 2.43 $\mu$ m
	TIR	5bands 8.125 ~ 11.65 $\mu$ m
Ground resolution	VNIR	15m
	SWIR	30m
	TIR	90m
Ground width		60km
Radiometric resolution	VNIR	$\leq 0.5\%$ NE $\Delta\rho$
	SWIR	$\leq 0.5\% \sim 1.3\%$ NE $\Delta\rho$
	TIR	$\leq 0.3K$ NE $\Delta T$
Pointing range		$\pm 8.55$ degrees
Data rate		89.2Mbps
Mass		450kg
Power consumption		388W (nominal)
Design life		5 years



Mt. Fuji (Elevation 3,776 meters)

- ASTER Level 3A01 Product (a set of orthographic image and DEM) is used.
- The height of the mountain is exaggerated by 2 times.
- The Pseudo Natural Color is used, because ASTER does not have any blue band.

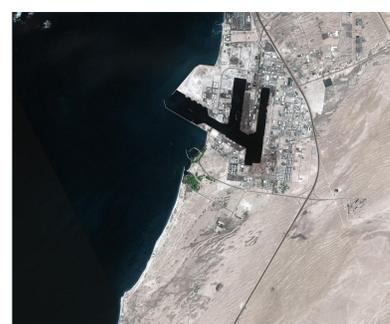
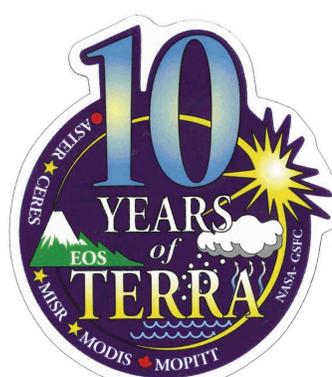
Visible and Near Infrared Radiometer (VNIR)



Short-wavelength Infrared Radiometer (SWIR)

Thermal Infrared Radiometer (TIR)

ASTER Instrument Photograph

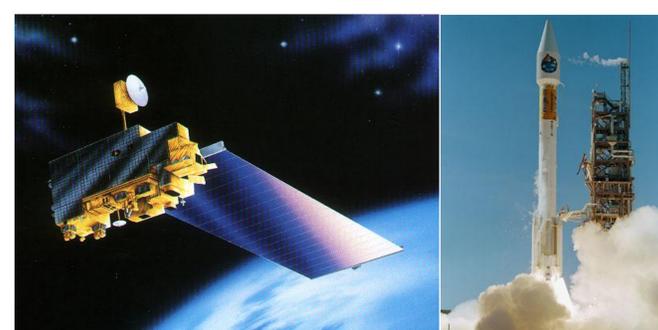


NOV. 11, 2000



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10-year records of Dubai city



NASA TERRA Satellite (provided by NASA)

TERRA launch (DEC. 18., 1999, provided by NASA)