



# Technical sheet

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## PlanetDEM 30

PlanetObserver  
02/09/2013 - Update

## 1. Introduction

PlanetObserver presents PlanetDEM 30, a global Digital Elevation Model (DEM) that offers seamless and voidfree coverage with 30-meter resolution for the Earth’s entire land surface.

PlanetDEM 30 is based on 30-meter ASTER Global DEM v2.0 entirely corrected and completed with PlanetDEM 90, PlanetObserver high quality 90-meter global DEM product (see PlanetDEM 90 technical sheet in App I).

### Background information

#### **On ASTER Global DEM v2.0**

The Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Global Digital Elevation Model (GDEM) was developed jointly by the U.S. National Aeronautics and Space Administration (NASA) and Japan’s Ministry of Economy, Trade, and Industry (METI). ASTER GDEM coverage is limited to land surfaces between 83 degrees north and 83 degrees south.

ASTER GDEM v2.0 was released in October 2011. While benefiting from substantial improvements over GDEM v1, experts pointed out that the product still may contain anomalies and artifacts.

#### **On PlanetDEM 90**

The NASA Shuttle Radar Topographic Mission (SRTM) has provided digital elevation data for over 80% of the globe. The latest SRTM data version (version 4) has been improved using new interpolation algorithms and better auxiliary data. However, SRTM data coverage is limited up to 60 degrees north and south, and despite void-filling processes used for producing SRTM data version 4, accuracy still remains an issue in many areas specially in relief and desert areas.

PlanetObserver has developed PlanetDEM 90, a new high quality elevation dataset, processed from SRTM data combined with other source data. Elevation data have been compiled and extensively reprocessed in order to offer a comprehensive global DEM with precise, corrected and detailed information for the entire Earth.

## 2. Product features

### 2.1 Coverage

PlanetDEM 30 product covers all emerged lands (at 99%).

### 2.2 Data sources and processing

PlanetDEM 30 is processed from one major source data for the main Earth coverage which is ASTER GDEM version v2.0. That dataset which presents many accuracy issues covers the Earth from 83°N to 83°S.

ASTER GDEM v2.0 anomalies and artifacts have been comprehensively and seamlessly replaced by totally accurate PlanetDEM 90 data. Exclusive proprietary algorithms have been developed in-house further to an extensive R&D programme.

Differentiated processing techniques have been applied depending on relief types in order to offer the best adapted corrections of ASTER GDEM accuracy problems.

Water bodies have been flattened on the entire dataset.

The end-result is a 100% global product, free of ASTER GDEM residual anomalies, artifacts and voids that highly affected overall data quality.

[PlanetDEM 90 data sources and processing features are detailed in App. I]

### 2.3 Data specifications

PlanetDEM 30 specifications in terms of vertical and horizontal accuracy are similar to GDEM specs which are reported to be as follows:

- Vertical accuracy (LE95): 20 meters
- Horizontal accuracy (CE95): 30 meters

Ocean value is 0.

Negative values are present in areas under the sea level.

### 2.4 Data structure and format

#### ▪ Resolution :

PlanetDEM 30 is available with a resolution of 1-arc second (approx. 30-meter resolution).

#### ▪ File format :

The product is available in the following formats :

- GEOTIFF, 16 bit-format, divided in 1° x 1° tiles (3,600 x 3,600 pixels), for a total of 25,518 tiles ; total dataset size : 616 GB.
- DTED 2, divided in 1° x 1° tiles, for a total of 25,518 tiles ; total dataset size : 397 GB.

Both file formats are supplied without tiles containing water only.

- **Tile naming :**

For GeoTiff format, tiles are named as follows : PlanetDEM\_30\_(N or S)(yy)(W or E)(xxx).tif

N or S = tile upper latitude

W or E = tile left longitude

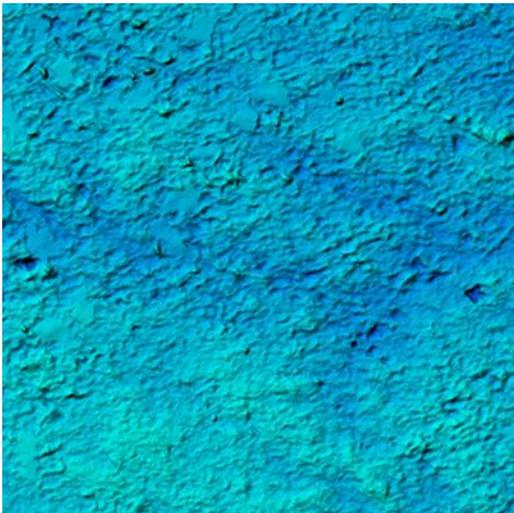
- **Projection :**

The product comes in Geographic (latitude-longitude) projection, WGS84.

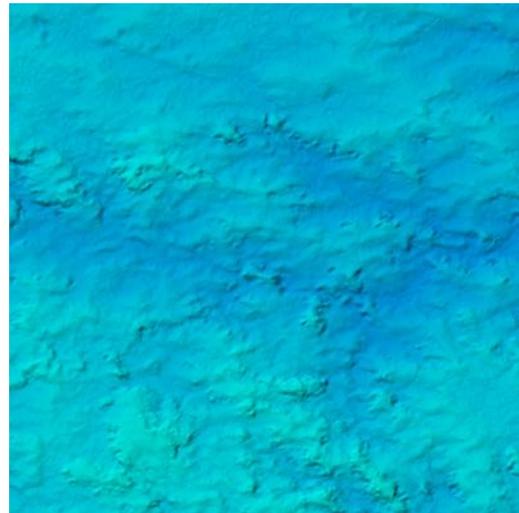
Other projections can be provided on demand for specific AOIs.

### 3. Summary of PlanetDEM 30 benefits

- **Homogeneous and seamless product**



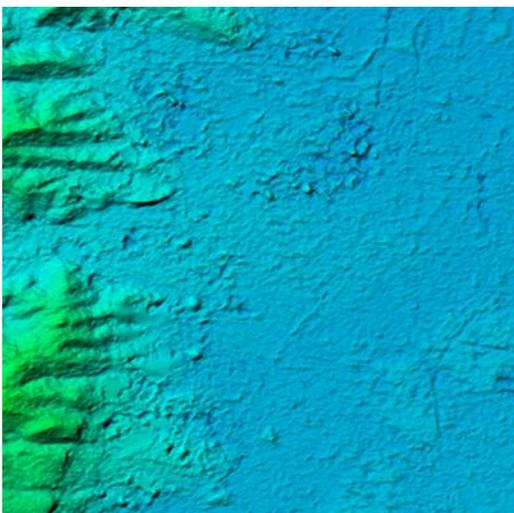
ASTER GDEM v2.0



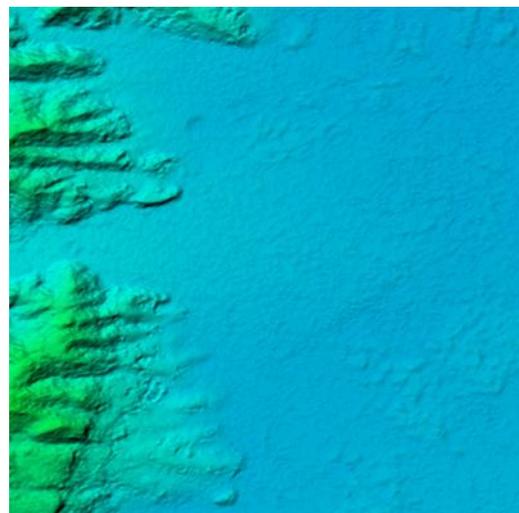
PlanetDEM 30

Brittany, France

- **Free of all anomalies and artifacts**



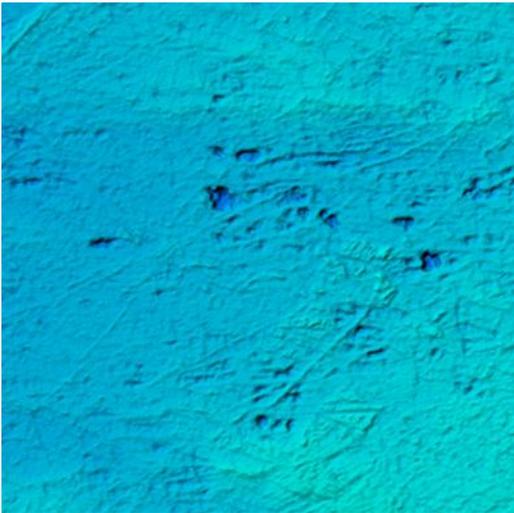
ASTER GDEM v2.0



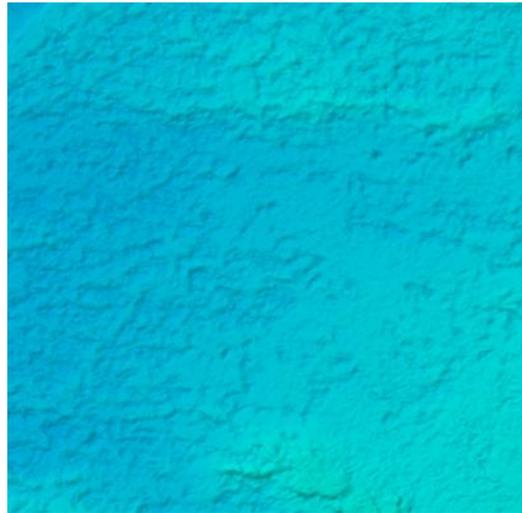
PlanetDEM 30

Colmar, France

- Entirely voidfree

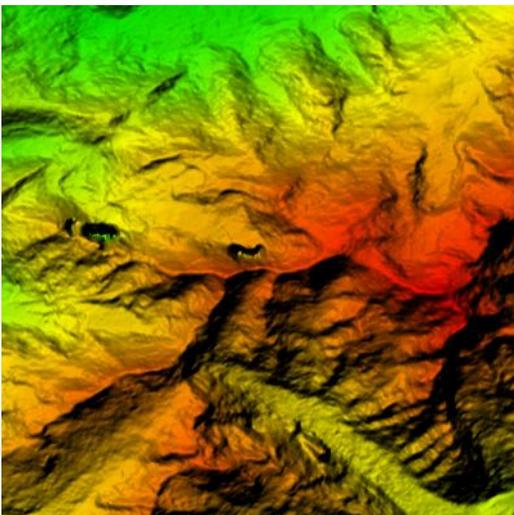


ASTER GDEM v2.0

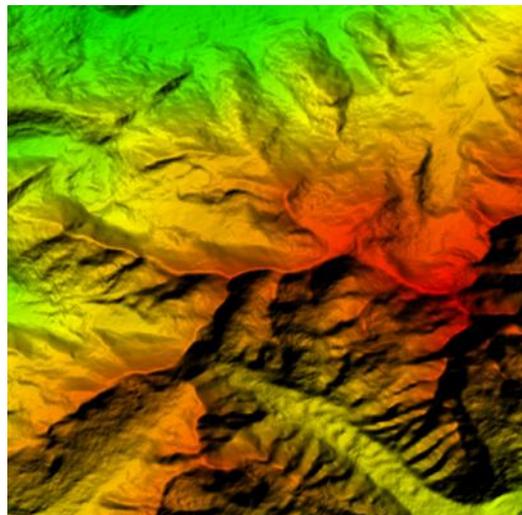


PlanetDEM 30

Catalonia, Spain



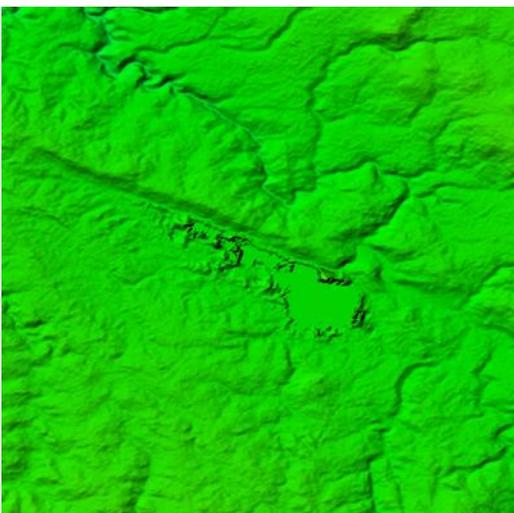
ASTER GDEM v2.0



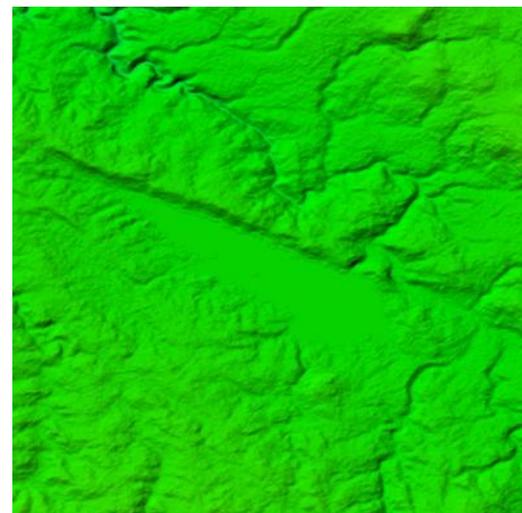
PlanetDEM 30

Mont-Blanc

- Flattened water body surfaces worldwide



ASTER GDEM v2.0



PlanetDEM 30

Lake Naussac, France

## Appendix I

### Technical sheet PlanetDEM 90

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#### 1. Introduction

PlanetObserver presents PlanetDEM 90, a new Digital Elevation Model (DEM) entirely reprocessed and offering a global coverage, with 90-meter resolution.

##### Background information

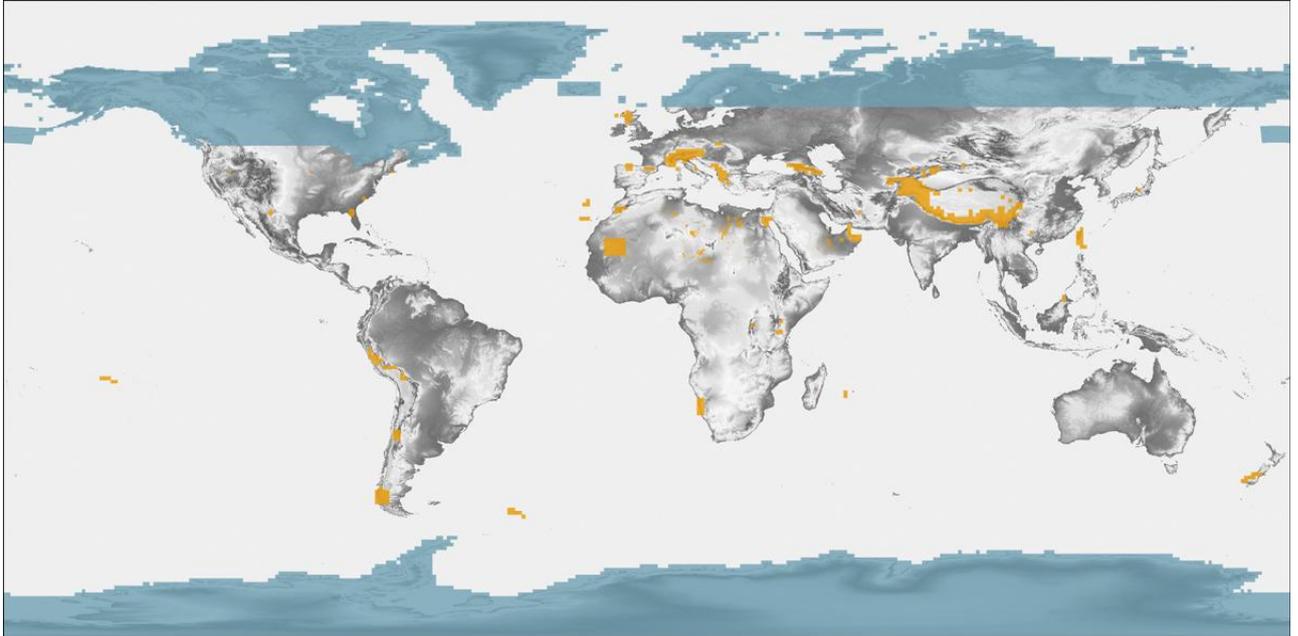
The NASA Shuttle Radar Topographic Mission (SRTM) has provided digital elevation data for over 80% of the globe. The latest SRTM data version (version 4) has been improved using new interpolation algorithms and better auxiliary data. However, SRTM data coverage is limited up to 60 degrees north and south, and despite void-filling processes used for producing SRTM data version 4, accuracy still remains an issue in many areas specially in relief and desert areas.

PlanetObserver has developed a new high quality elevation dataset, processed from SRTM data combined with other source data. Elevation data have been compiled and extensively reprocessed in order to offer a comprehensive global DEM with precise, corrected and detailed information for the entire Earth.

## 2. Product features

### 2.1 Coverage

PlanetDEM 90 product covers all emerged lands (at 99%).



The above map shows SRTM data coverage in grey colour, and in orange, areas that have been corrected within the SRTM dataset by using other source data. In blue, the map shows data that have been added beyond 60° North latitude and 60° South latitude.

### 2.2 Data sources

PlanetDEM 90 is developed from different source data :

- SRTM version 4 (from 60°N to 60°S), which has been corrected in several places :
  - Mountain areas : Andes, African Mountains, Alps, Caucasus, Himalaya, Karakorum, Hindu Kush, Pamir and others have been corrected with different sources, particularly different local maps and Russian maps at scales 1:25,000, 1:50,000, 1:100,000 and 1:200,000.
  - Desert : in Mauritania, Algeria, Libya, Egypt, Iran and others, GDEM (ASTER Global Digital Elevation Map) at 1s has been used to fill and correct SRTM bad values.
  - USA : Problems have been corrected by using GDEM and NED (National Elevation Dataset) at 1s in the following US States : Florida, Iowa, Massachusetts, Nevada, South Carolina and Texas.

- High Latitudes : Instead of GTOPO30 with 30-arc second resolution, more precise and accurate sources have been used :
  - Antarctica : NSIDC (National Snow and Ice Data Center), at 200m resolution.
  - Alaska : AGDC (Alaska Geospatial Data Clearinghouse), at 3s resolution, corrected with GDEM at 1s.
  - Canada : CDED (Canadian Digital Elevation Data) from Geobase, completed with GDEM at 1s.
  - Greenland : topographic maps at 1:250,000 and 1:500,000.
  - Iceland and Svalbard : topographic maps at 1:100,000.
  - North Atlantic Islands : Russian maps at 1:100,000 and 1:200,000.
  - North Scandinavia, North Russia and North Siberia : Russian maps at 1:100,000 and 1:200,000.

See more details on data sources in App I.

### 2.3 Data processing

PlanetDEM 90 has been processed by compiling different source data. Specific processing methods have been developed and applied, with a particular focus on edge smoothing processing.

### 2.4 Data specifications

PlanetDEM 90 specifications in terms of vertical and horizontal accuracy are similar to SRTM specs which are reported to be as follows:

- Vertical accuracy (LE95): 14 meters
- Horizontal accuracy (CE95): 10 meters

Ocean value is 0.

Negative values are present in areas under the sea level.

### 2.5 Data structure and format

- **Resolution :**

PlanetDEM 90 is available with a resolution of 3-arc second (approx. 90m resolution).

- **File format :**

The product is available in the following format :

- GEOTIFF, 16 bit-format, divided in 5° x 5° tiles (6,000 x 6,000 pixels), for a total of 2,592 tiles (72 tiles width x 36 tiles height) ; total data size : 173 GB.

- DTED 1, divided in 1° x 1° tiles, for a total of 64,800 tiles ; total data size : 125 GB. See tiling structure below.

Zone	Latitude	Latitude resolution	Longitude resolution	Tile size (in pixel)
I	0° - 50° North-South	3 seconds x	3 seconds	1201 x 1201
II	50° - 70° North-South	3 seconds x	6 seconds	601 x1201
III	70° - 75° North-South	3 seconds x	9 seconds	401 x 1201
IV	75° - 80° North-South	3 seconds x	12 seconds	301 x 1201
V	80° - 90° North-South	3 seconds x	18 seconds	201 x 1201

Both file formats are supplied with tiles containing water only.

- **Tile naming :**

For GeoTiff format, tiles are named as follows : PlanetDEM\_90(N or S)(yy)(W or E)(xxx).tif

N or S = tile upper latitude

W or E = tile left longitude

- **Projection :**

The product comes in Geographic (latitude-longitude) projection, WGS84.

Other projections can be provided on demand for specific AOIs.

## 2.6 Geometric accuracy

PlanetDEM 90 accuracy specifications vary from data sources.

See details in the PDF : Sources\_DEM\_3s\_PlanetObserver\_190411.pdf.

## 2.7 Source shape

The different sources used to create PlanetDEM 90 are detailed in the ZIP file : Shapefiles\_DEM\_3s\_PlanetObserver\_190411.zip.

## 3. Comparative examples

PlanetDEM 90 presents many improvements compared to data from SRTM version 4 and GTOPO30 for regions where SRTM data are not available.

Check comparative views here : <http://fr.calameo.com/read/00010867740494c15643f>

Shapefile	Source	Resolution	Scale	Vertical Accuracy	SRTM corrected
African Mountains	Local maps				Yes
Alaska	AGDC	3s		7 to 15m	No
Aleutian Islands	AGDC	300m		7 to 15m	No
Algeria	GDEM	1s		7 to 14m	Yes
Alps	Local, Russian maps		25k, 50k, 100k		No
Andes	Local maps		50k, 100k		Yes
Balkans	Russian maps		50k		Yes
BearIsland	Russian maps		100k, 200k		No
Canada	CDED	3s			No
Canary Islands	Local, Russian maps		50k, 200k		Yes
Caucasus	Russian maps		50k		Yes
ChinaS	GDEM	1s		7 to 14m	Yes
Corsica Monte Cinto	Local maps		25k		Yes
Egypt	GDEM	1s		7 to 14m	Yes
Egyptian Mountains	Local maps				Yes
Faeroe Islands	Russian maps		100k, 200k		No
Florida	GDEM, NED, local maps	1s			Yes
Gdem Alaska Canada	GDEM	1s		7 to 14m	No
Greenland	Greenland maps		250k, 500k		No
GTopo30	GTOPO30	30s			No
Himalaya Karakorum Hindu Kush Pamir	Nepal, Russian, other maps		25k, 100k, 200k		Yes
Iceland	Iceland maps		100k		No
Iowa	NED	1s			Yes
Iran	GDEM	1s		7 to 14m	Yes
Italy Alpi Apuane	Local, Russian maps		25k, 100k		Yes
Italy Corno Grande	Local, Russian maps		50k, 100k		Yes
Jan Mayen	Russian maps		100k, 200k		No
Japanese Alps N	Russian maps		100k		Yes
Kinabalu	Local maps				Yes
Libya SW	Local maps		200k		Yes
Madeira	Local maps		25k, 50k		Yes
Massachusetts	NED	1s			Yes
Mauritania	GDEM	1s		7 to 14m	Yes
Morocco	Russian maps		100k		Yes
Namibia	GDEM	1s		7 to 14m	Yes
Nevada	NED	1s			Yes
New Zealand	Local maps		50k		Yes
North Scandinavia and Russia	Russian maps		100k, 200k		No
Oman	Russian maps		200k		Yes
Patagonia	GDEM, various maps	1s			Yes
Pyrenees	Local, Russian maps		25k, 100k		No
Reunion	Local, Russian maps		25k, 200k		Yes
Sahara Arabia	GDEM	1s		7 to 14m	Yes
Scotland	Local maps		50k		Yes
Shetland Islands	Russian maps		100k, 200k		No
South Carolina	NED	1s			Yes
South Georgia	Local maps		250k		Yes
Spain Picos de Europa	Local maps		25k, 50k		Yes
Tahiti	Local maps		100k		Yes
Taiwan	Local maps		50k		Yes
Tatra	Local maps		25k		Yes
Texas	GDEM, NED	1s			Yes
<b>Acronyms</b>					
AGDC	Alaska Geospatial Data Clearinghouse				
CDED	Canadian Digital Elevation Data				
GDEM	ASTER Global Digital Elevation Map				
NED	National Elevation Dataset				
NSIDC	National Snow and Ice Data Center				
SRTM	Shuttle Radar Topographic Mission				