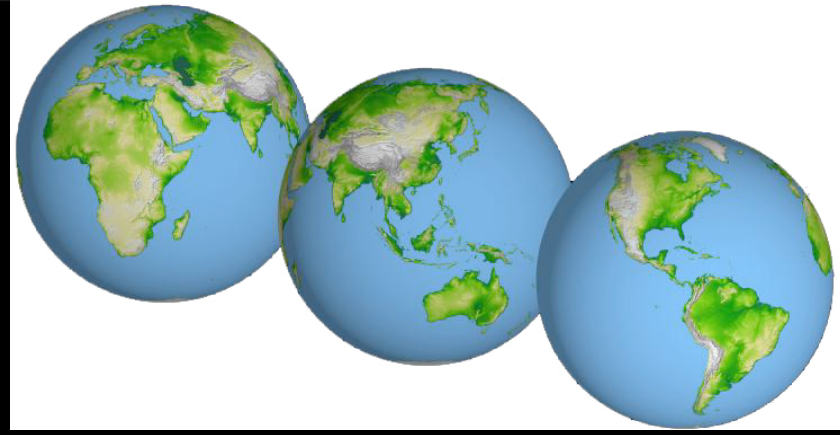
Shuttle Radar Topography Mission



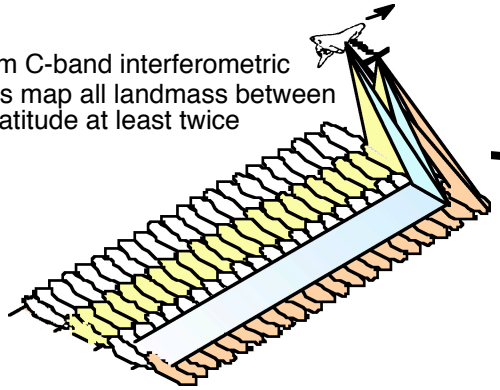
This research was carried out at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration

Mission Overview

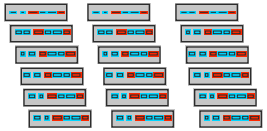
Launch

Feb 11, 2000 - STS99

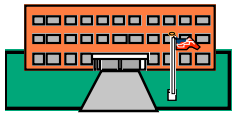
225 km C-band interferometric swaths map all landmass between ±60° latitude at least twice



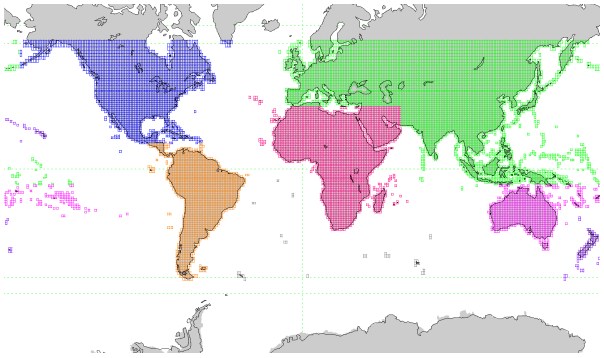
12 Tbytes data recorded on-board on 330 tape cassettes



Data returned with Shuttle to Ground Data Processing Facility



Three year processing

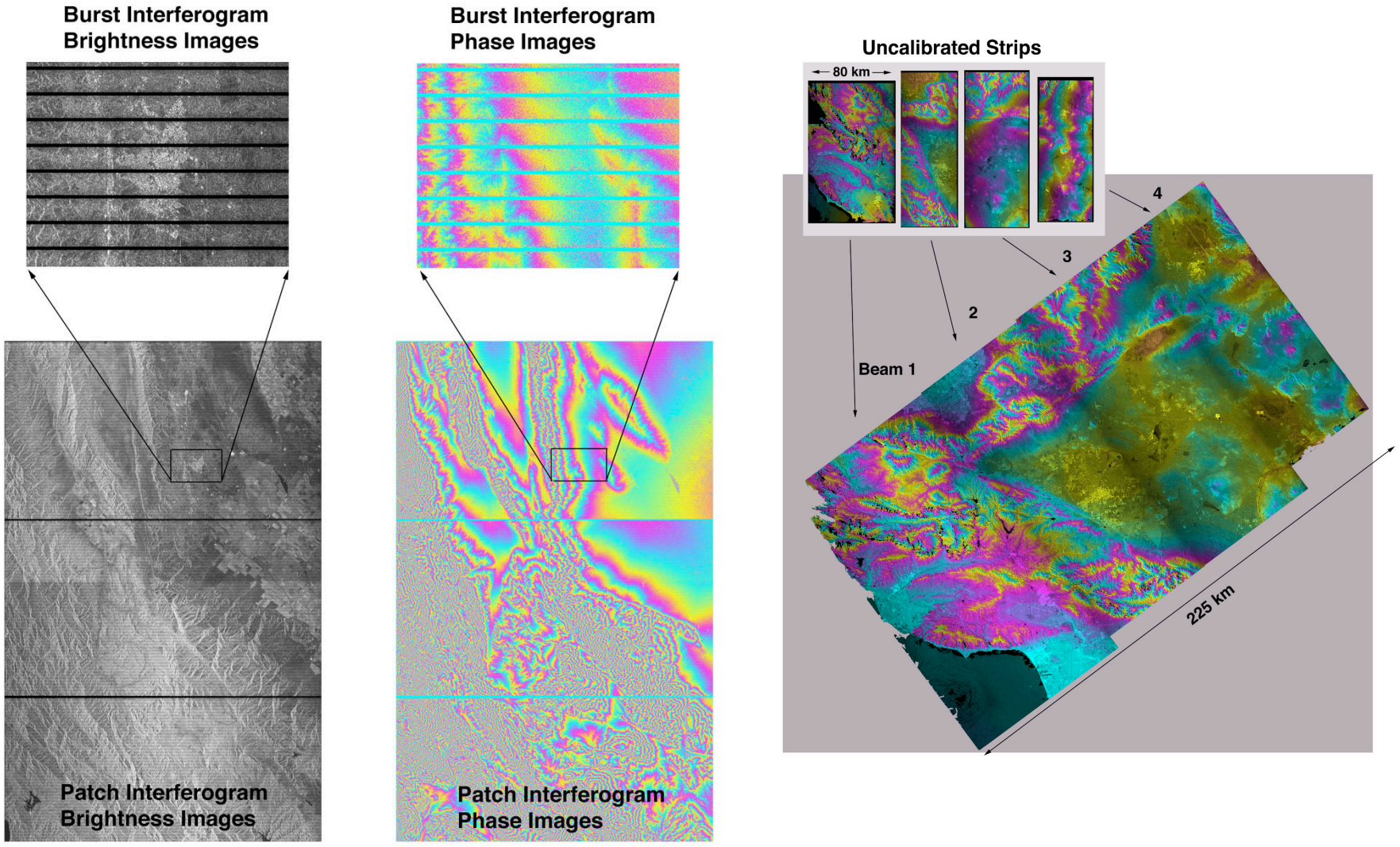


Digital elevation data delivered in 1°x1° mosaiced cells

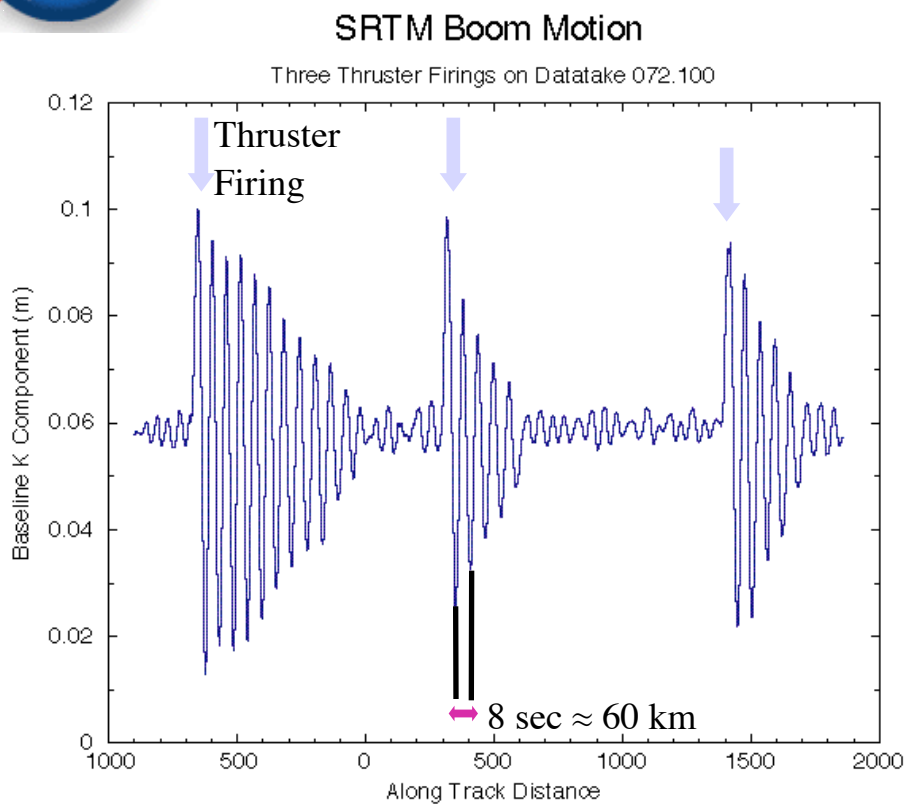
NIMA data validation, editing and distribution to military users

EDC for public distribution

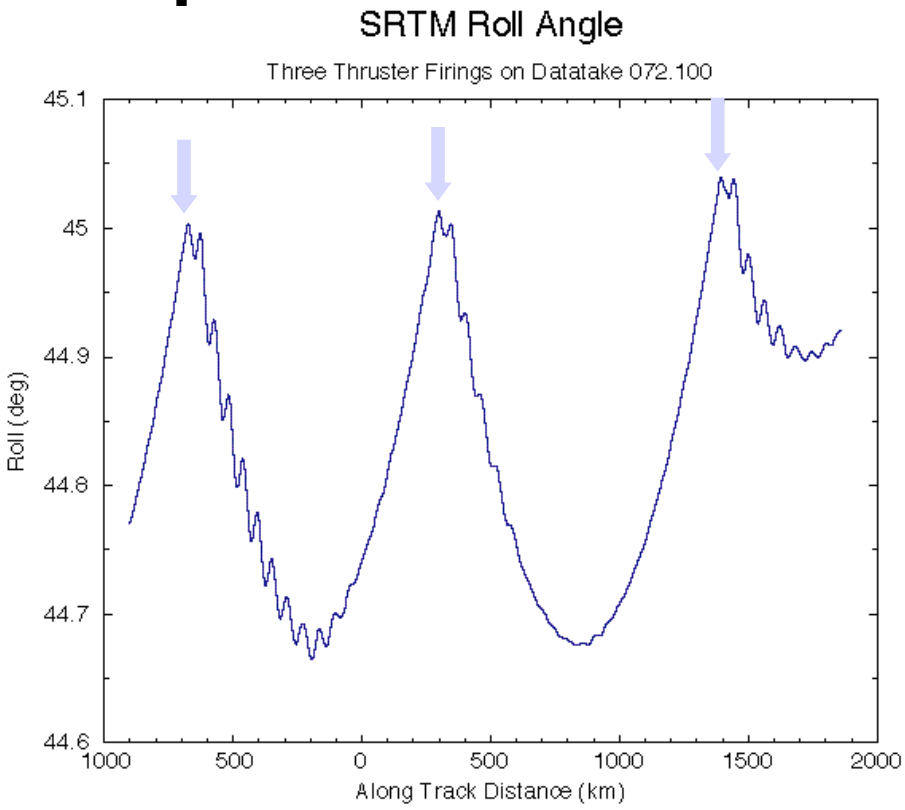
SRTM Patch Processing Example



Need for Motion Compensation



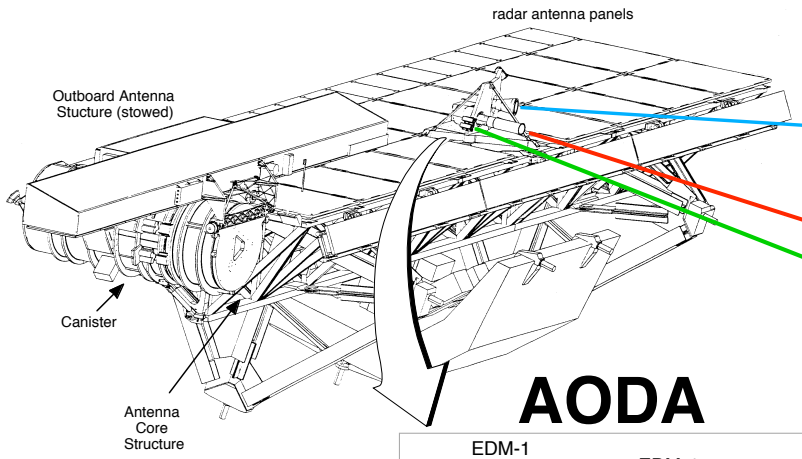
Plot of Baseline K Component



Plot of Roll Angle

- Motion compensation is required to account for boom dynamics as well as shuttle attitude changes. Left uncompensated these motions would generate hundreds of meters of height error.

SRTM Hardware Configuration



STA looks at stars

ATT looks at OTA

EDMs look at corner reflector array

OTA

Mast

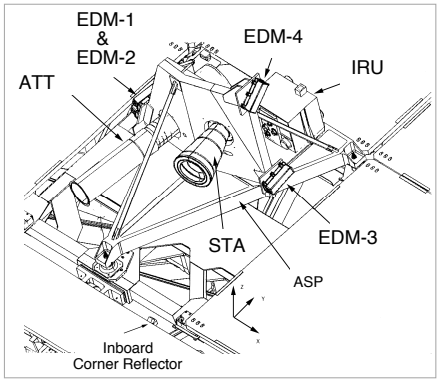
Outboard Antenna Stucture (deployed)

GPS antenna (1 of 2)

flight segment

ground segment

AODA



GPSR-1

GPSR-2

to GPS antennas

SIU

to ASP sensors & OTA

commands & data

APC-1

APC-2

commands & data

global GPS ground receiver network (accessible via Internet)

JSC-Houston

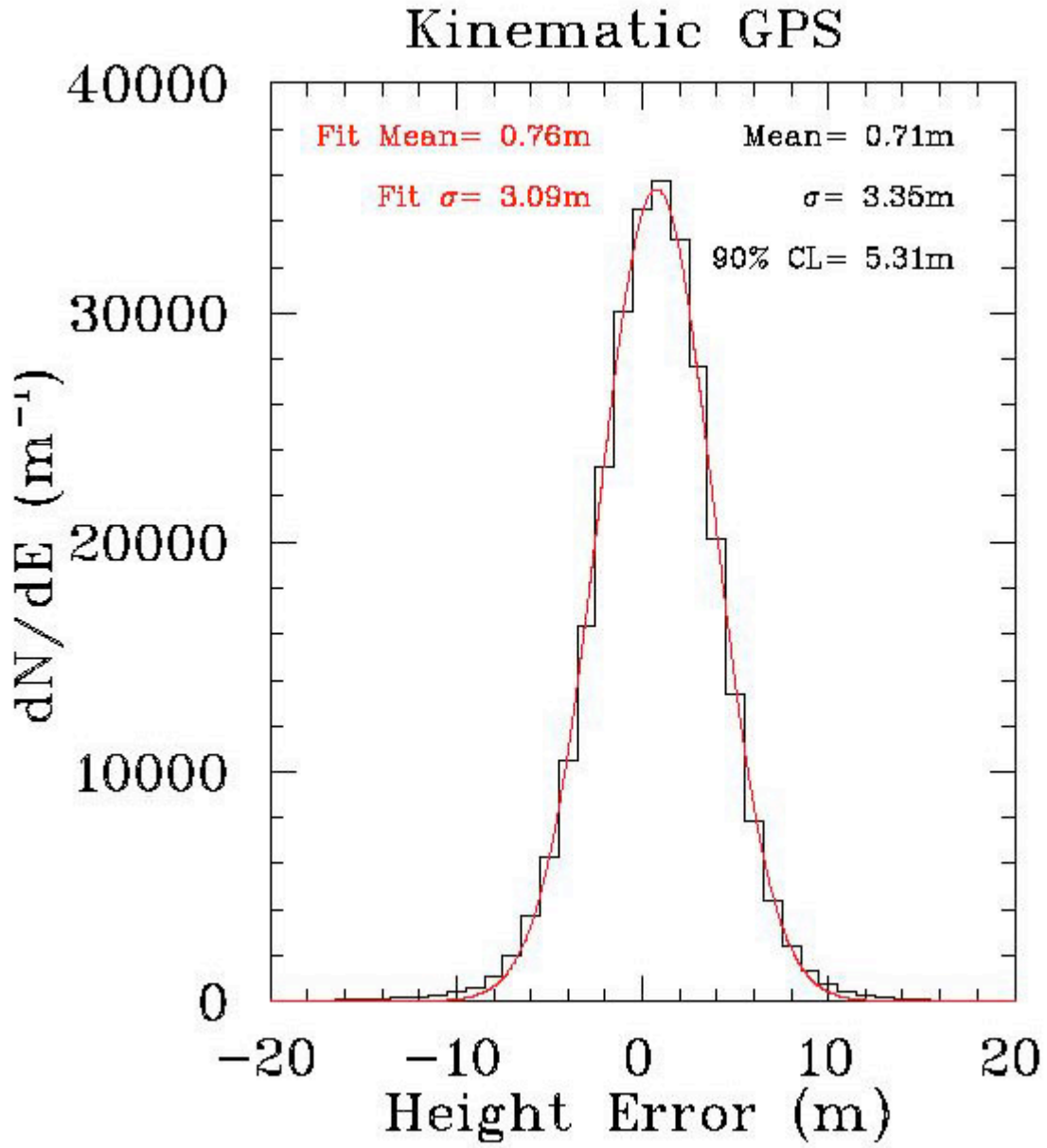
ATMA

data

JPL-Pasadena

AGDP

GIPSY


Kinematic GPS
Fit Mean= 0.76m
Fit σ= 3.09m
Mean= 0.71m
σ= 3.35m
90% CL= 5.31m
40000
30000
20000
10000
0
dN/dE (m⁻¹)
−20
−10
0
10
20
Height Error (m)

SRTM Performance Summary

- Based on over hundreds of millions of comparisons, SRTM has a absolute height accuracy of 9.0m or better over a $1^{o}x1^{o}$ cell, at the 90% confidence level.

- Using the kinematic GPS data, probably the best ground truth data available, SRTM meets the absolute height requirement by a factor of 3.

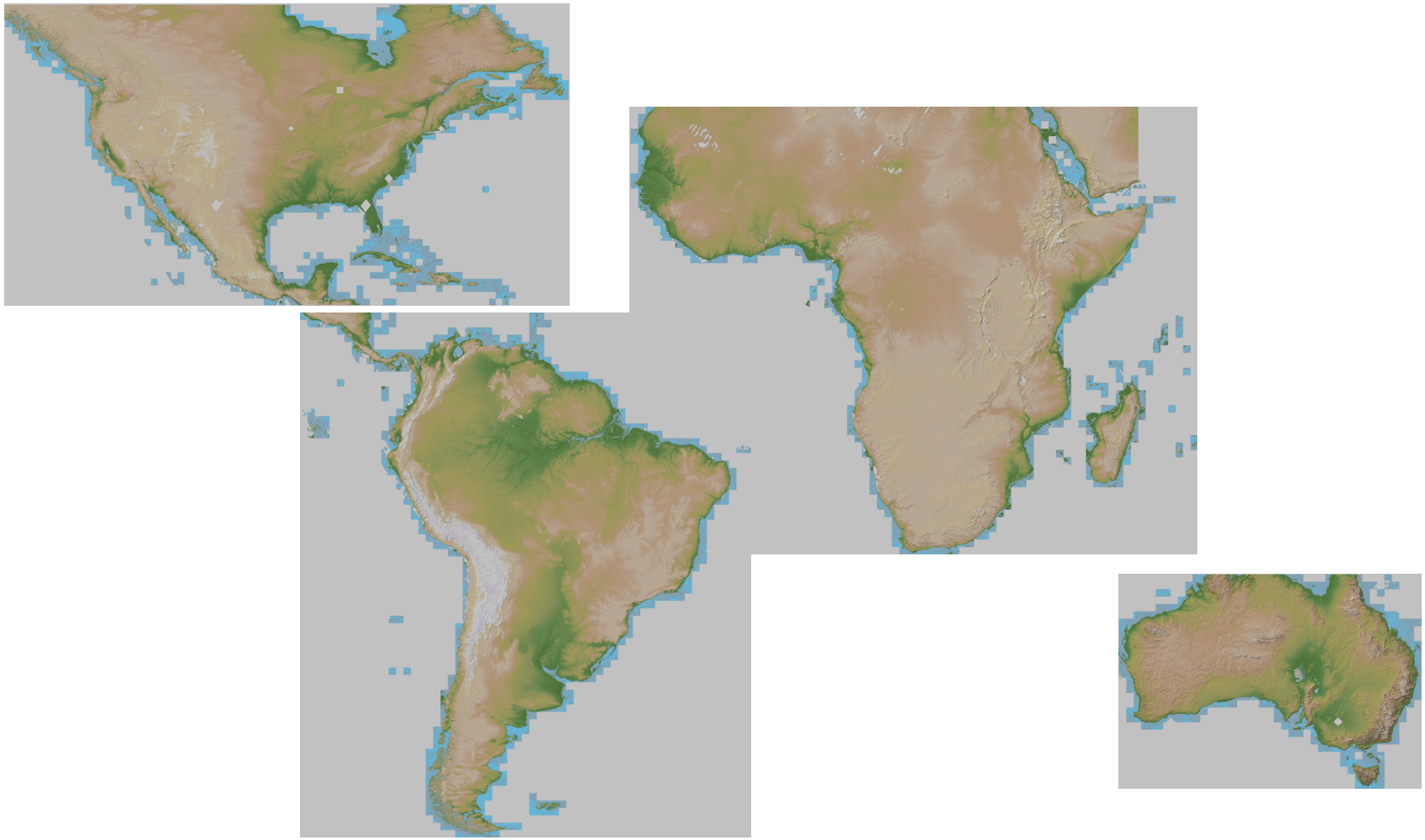
- **Both the absolute and relative SRTM height accuracy requirements are met.**

- Using the kinematic GPS data, SRTM's horizontal accuracy is better than 10 meters and we believe the results are consistent with no horizontal offset.

- **Both the absolute and relative SRTM horizontal accuracy requirements are met.**

SRTM Global Production

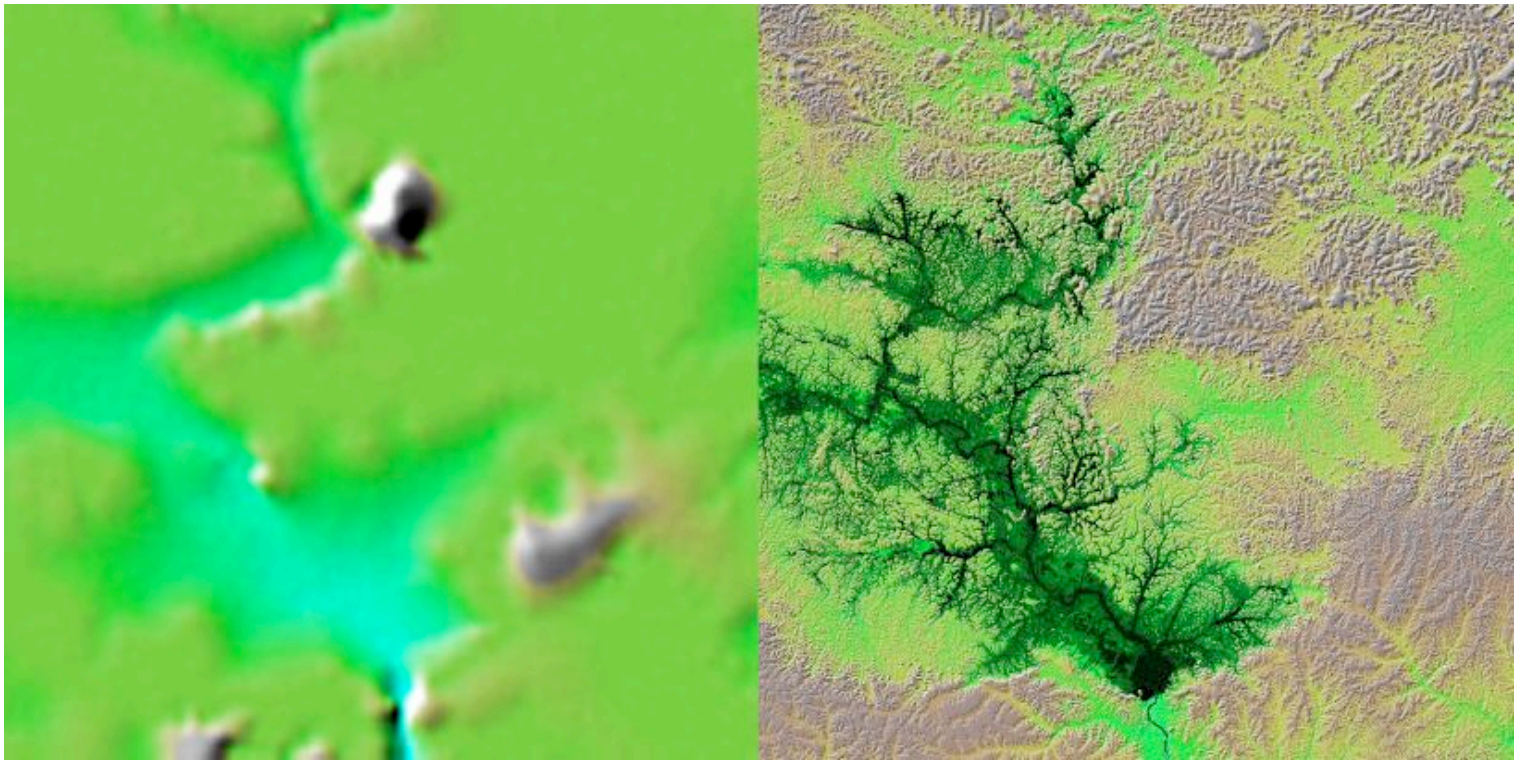
Continent by Continent*



* “Continent” defined by processing convention, not geography.

SRTM Look at Central America

SRTM Resolution Improvement



GTOPO30 DEM

SRTM DEM with radar image overlay

Lake Balbina,
Brazil