SRTM *Shuttle Radar Topography Mission*

Mission

- *Partnership between NASA and NIMA*
- *C-band single pass ScanSAR interferometry*
- *X-band radar from Italian and German space agencies*
- *Mission duration: February 11, 2000 - February 22, 2000; 11 days, 5 hours, 38 minutes*
- *Topographic data delivery from July 2002 to December 2002*

Objective

To produce DEM (Digital Elevation Model) of 80% of the Earth's surface

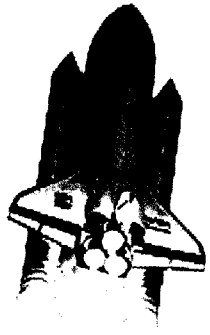
- *60 degrees north and 56 degrees south latitude*
- *WGS84 geoid datum*
- *Data products available through the EROS Data Center*
- *Absolute accuracy*
  - *20 m horizontal*
  - *16 m vertical*

Shuttle Radar Topography Mission

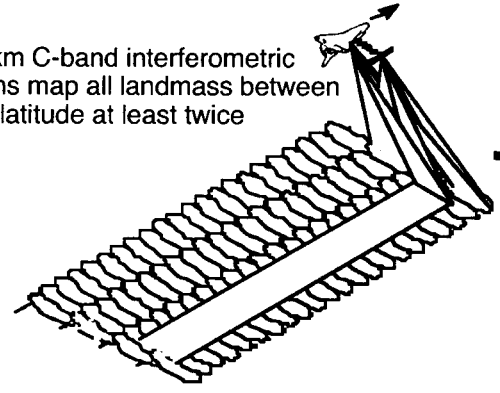
Mission Overview

Launch

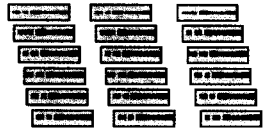
Feb 11, 2000 - STS99



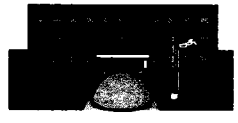
225 km C-band interferometric swaths map all landmass between ±60° latitude at least twice



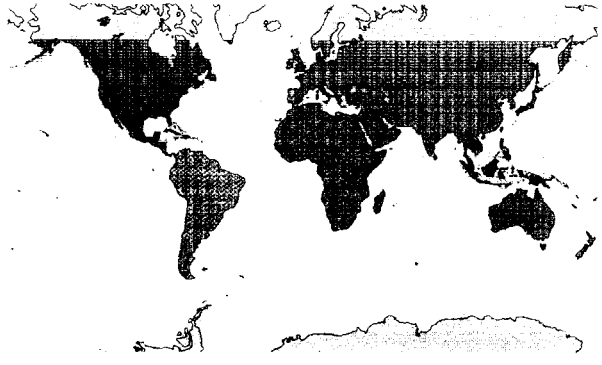
12 Tbytes data recorded on-board on 330 tape cassettes



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

USGS science for a changing world

EDC for public distribution

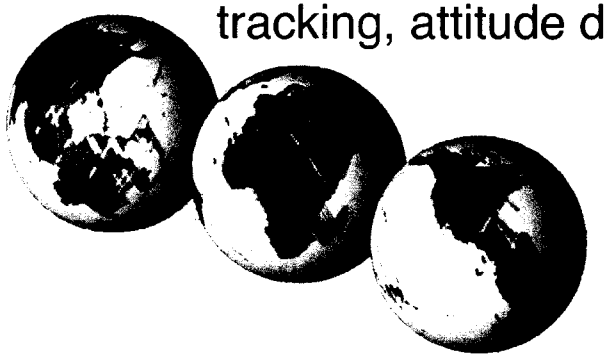
Coverage

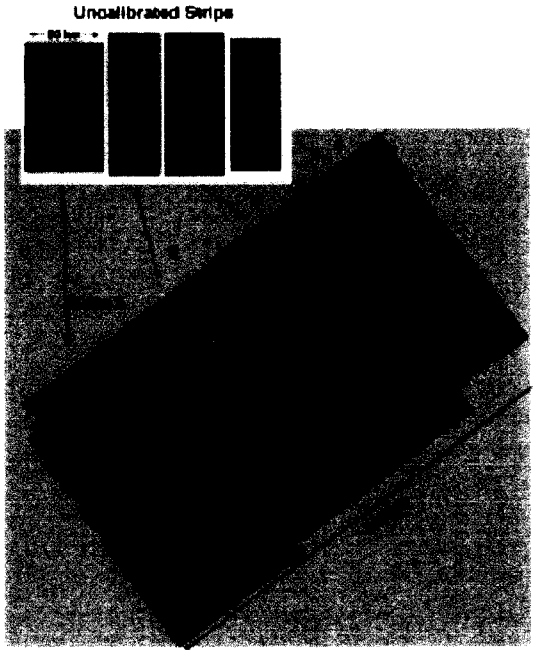
Successfully mapped 99.96% of targeted landmass

- 80% of total land plus ocean calibration -

Processing

Raw radar data plus tracking, attitude data





Processed as individual strips

DEMs plus derived products

Mosaiced to 1°x1° cells

>14,000 total

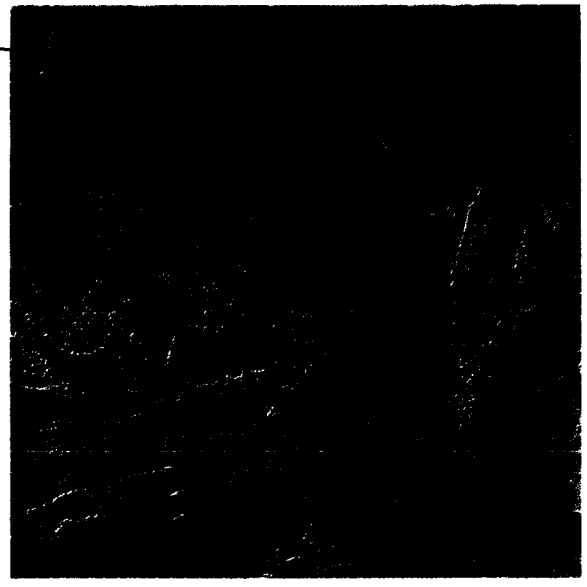
Results

Accuracy tests

- NIMA verification with DTED, other data sources
- USGS comparisons to National Elevations Data sets
- Comparison to static and dynamic GPS elevations

All show data exceed 16 m vertical, 20 m horizontal accuracy specs by factor of 2 - 4

Elevations clearly show patterns of tropical forest clear-cutting with height differences of 4-5 meters



Rondonia, southwest Brazil

Processing Schedule

- Ground Data Processing System generating data continent-by-continent
- NIMA will perform final editing and return finished data to NASA for distribution through USGS
- Cells being produced on interim basis for Principal Investigator team, with some publicly available

Continent definitions and 1° x 1° cells

Data Distribution

Memorandum of Understanding 7/8/96

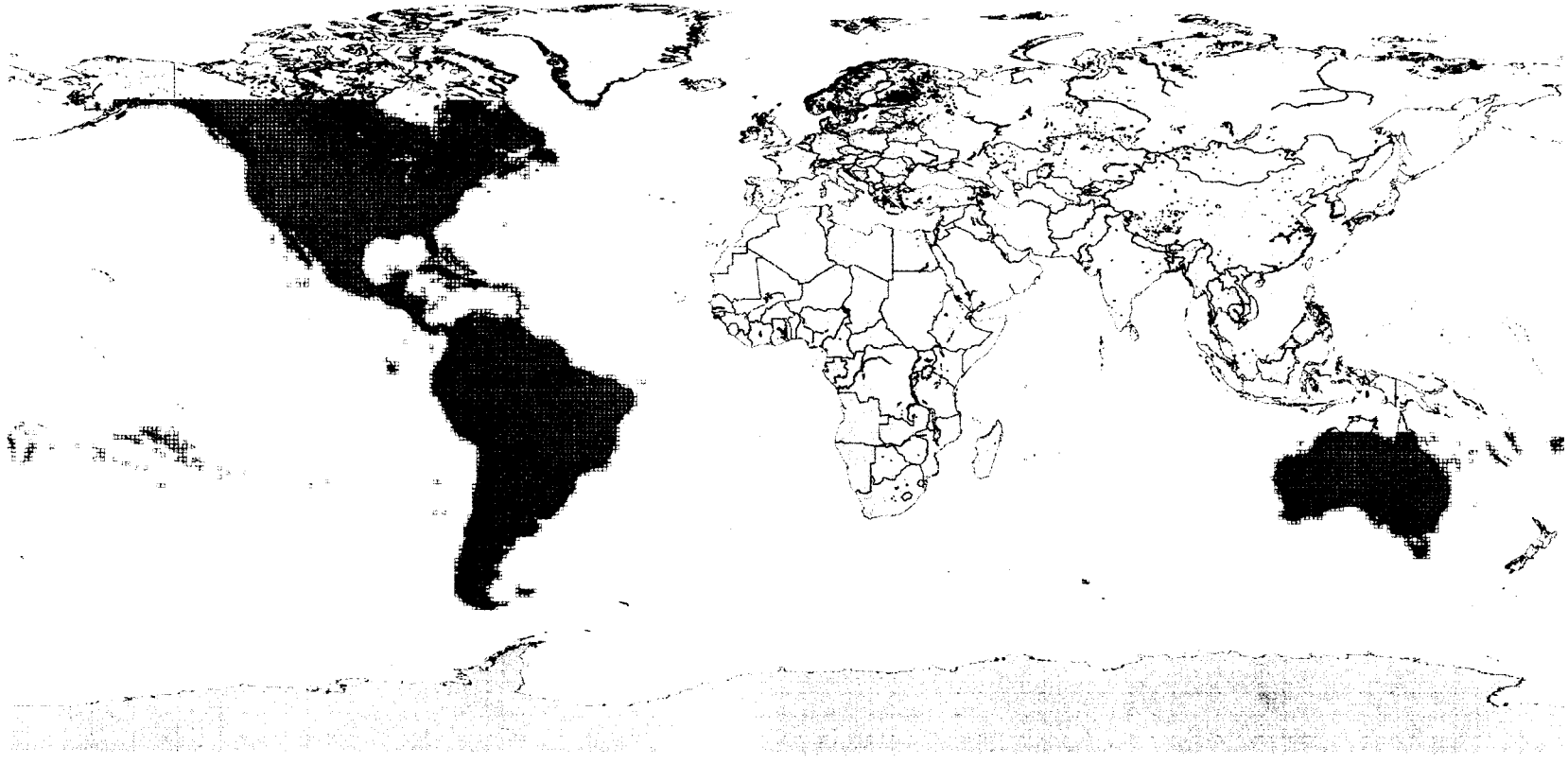
- All SRTM data are unclassified
- DEMs at 1 arc-sec (~30m) sampling for U.S., and 3 arc-sec (~90m) sampling for on-U.S. will be *Broad Public Access* data and freely available
- DEMs at 1 arc-sec sampling for non-U.S. sites under control of NIMA

Policy and Procedures Agreement 7/2/02

- Non-U.S. 3 arc-sec DEMs will fall under *Limited Distribution* until 5 months after start of NIMA editing process, or 24 months after agreement date
- Limited Distribution data can be provided to investigators by NASA during this period following
  - Completion of questionnaire outlining requirements, data use and security plans
  - Signing of Terms and Conditions statement
- Following NIMA editing process improved version will be returned to NASA for public distribution
- Current unedited data contain voids, ill-defined coastlines and non-flat water bodies

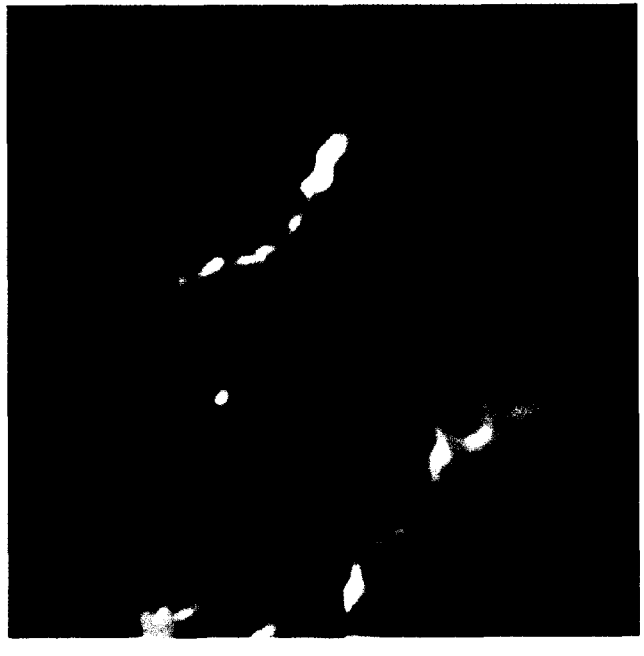
Processing Status 10/1/02

- North and South America, Australia complete
- Rest due by end of 2002 (currently ahead of schedule)

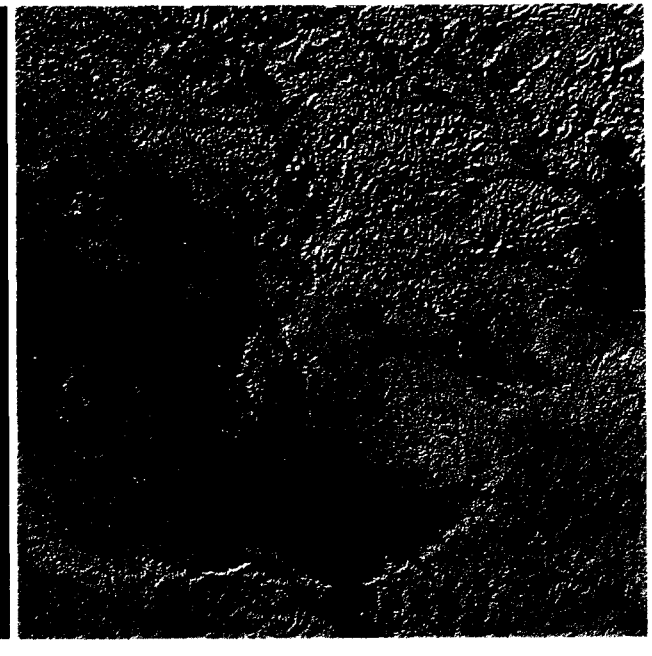


Improvement over GTOPO30

GTOPO30



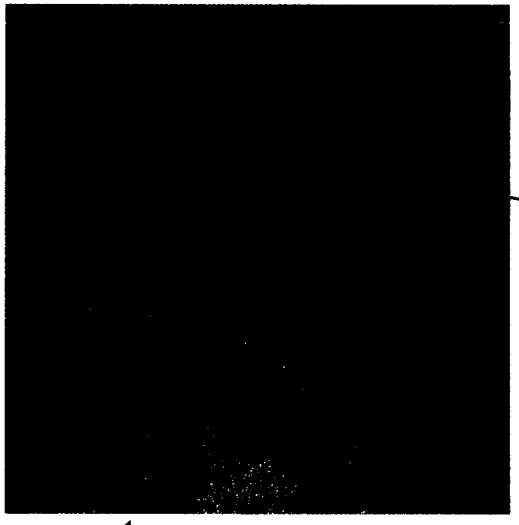
SRTM

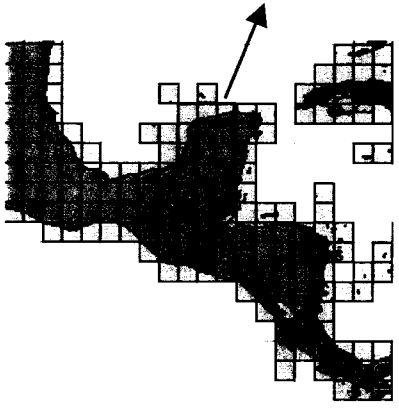


Lake Balbina Reservoir, 125 km northeast of Manaus, Brazil

Scenes rendered at same scale and color-coding

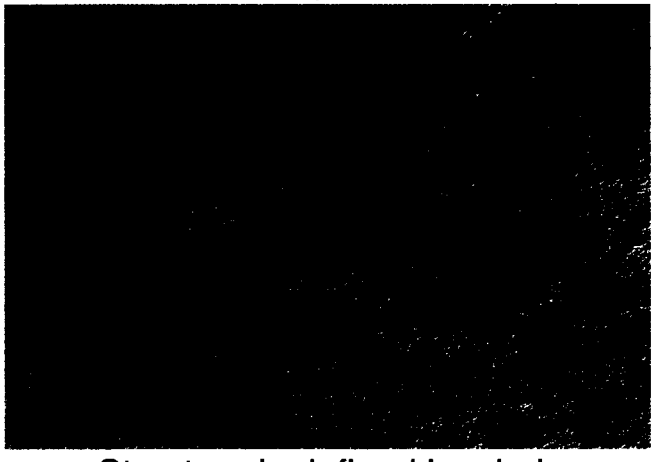
Chicxulub Crater





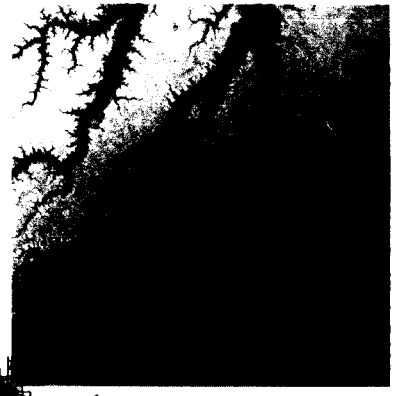
Yucatan Peninsula

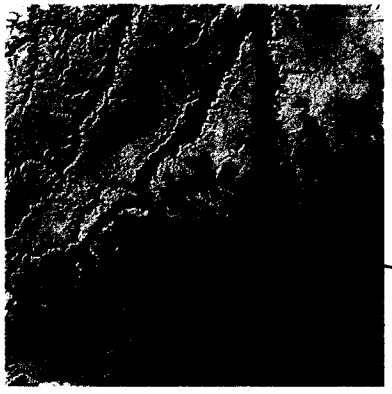
May be first remotely-sensed image of Chicxulub structure



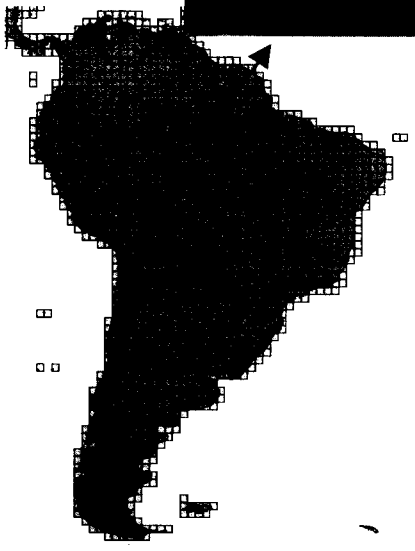
Structure is defined by chain of 5-10 meter deep sinkholes

Iturralde Structure

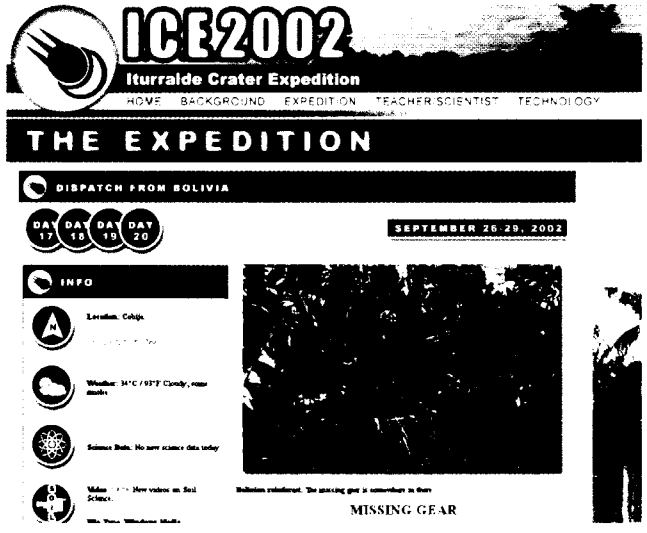




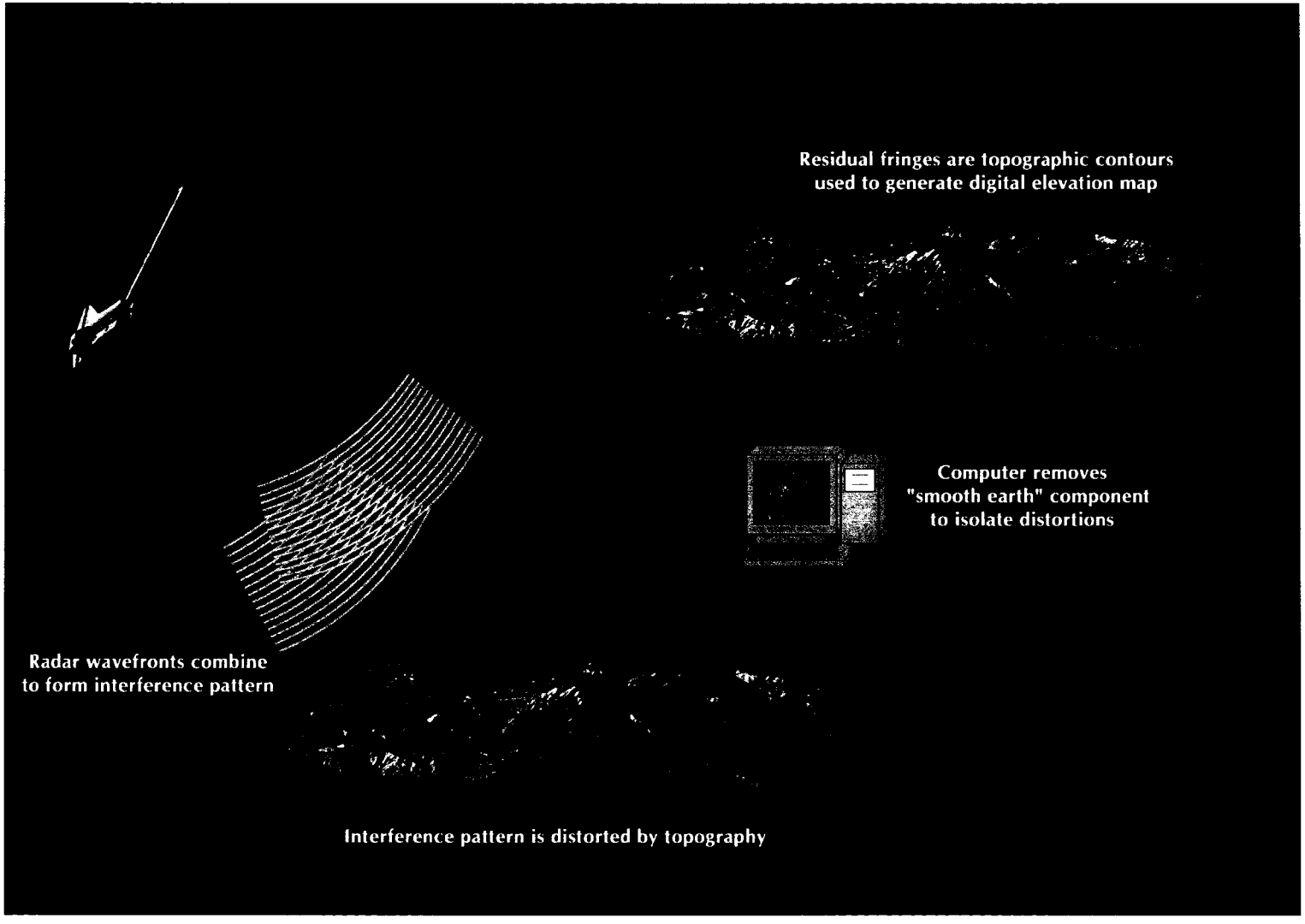
Total relief in structure is 10-20 meters



South America



http://www.blueiceonline.org/

- Suspected 8 km impact crater in Bolivia discovered on Landsat image in 1985, has only been visited twice
- May be youngest (5-10 kyrs) large impact crater
- Goddard team currently on site

Interferometry Principle