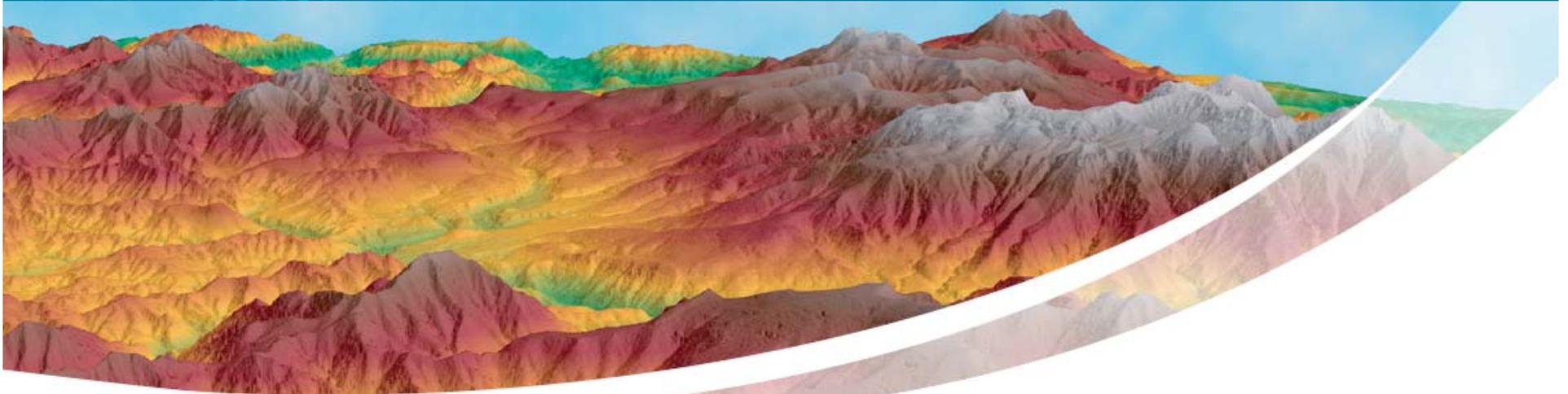


WorldDEM™

Acquisition and Processing Status

March 2014



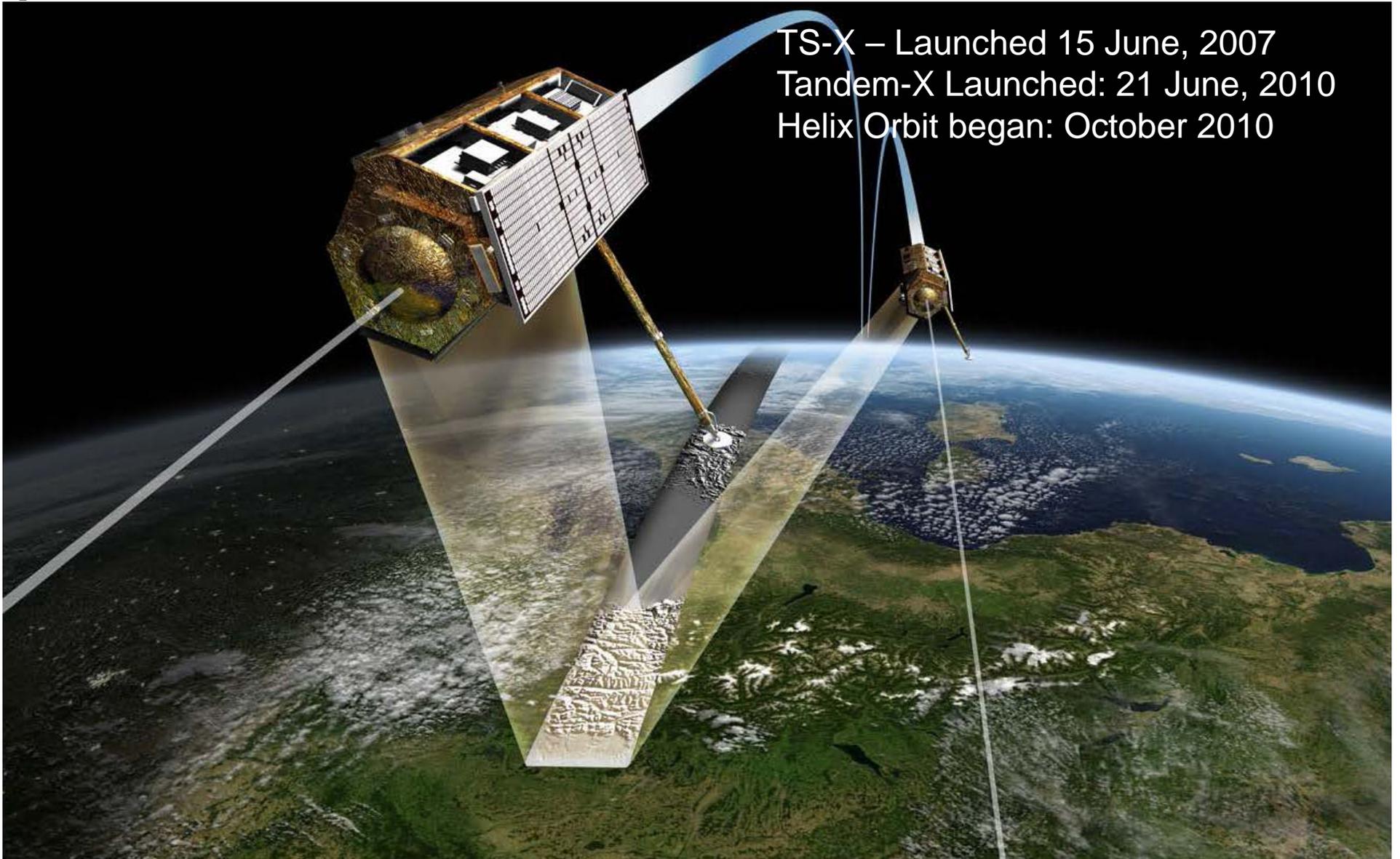
Brian Cutler/ Program Director
Jon Collins/ Managing Director

JACIE 2014 (Louisville 03/27/2014)



TerraSAR-X and Tandem-X

TS-X – Launched 15 June, 2007
Tandem-X Launched: 21 June, 2010
Helix Orbit began: October 2010



Public – Private Partnership

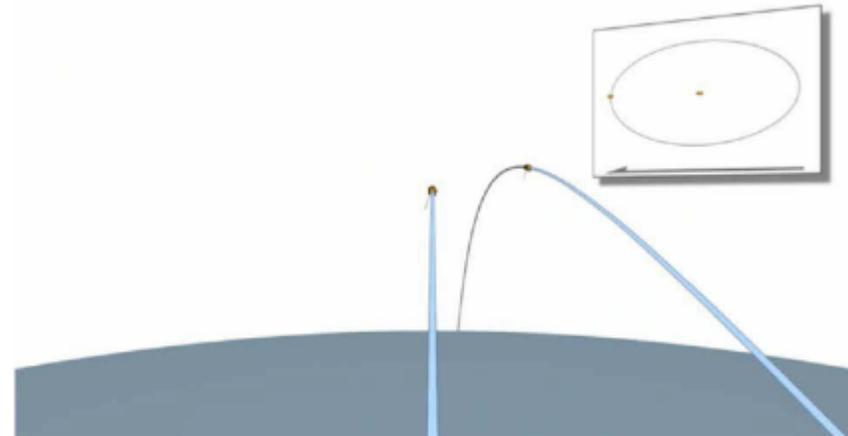
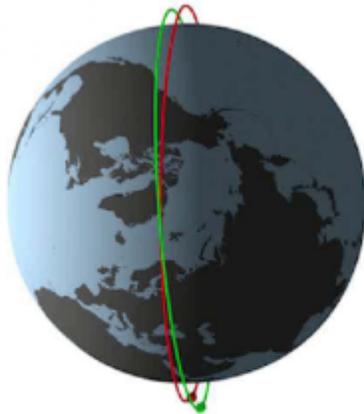
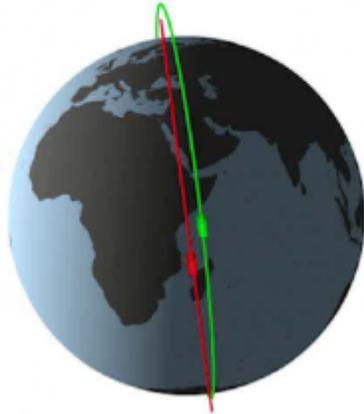
- German Aerospace Center, DLR
 - Mission Planning & Implementation
 - Satellite Control, Radar Operation and Calibration
 - Generation of DEM and production facility



- Airbus Defence and Space (formally InfoTerra, GmbH)

- Built satellites
- Shares cost of development & use
- Marketing & Commercial Rights
- Producing the commercial product

Helix Formation



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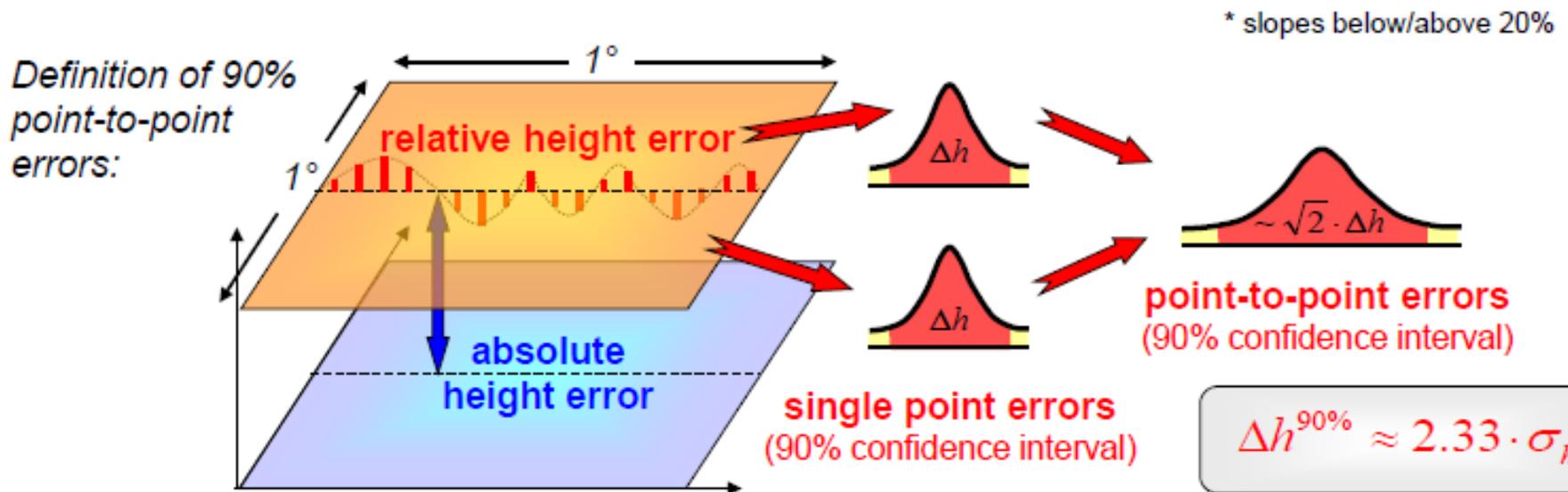
WorldDEM Overview

- Global DEM -- pole to pole
- Homogeneous
- Accurate



Standard Elevation Models

	Spatial Resolution	Absolute Vertical Accuracy (90%)	Relative Vertical Accuracy (point-to-point in 1° cell, 90%)
DTED-1	90 m x 90 m	< 30 m	< 20 m
DTED-2	30 m x 30 m	< 18 m	< 12 m
TanDEM-X	12 m x 12 m	< 10 m	< 2 m / 4 m *
Level-4	6 m x 6 m	< 5 m	< 0.8 m



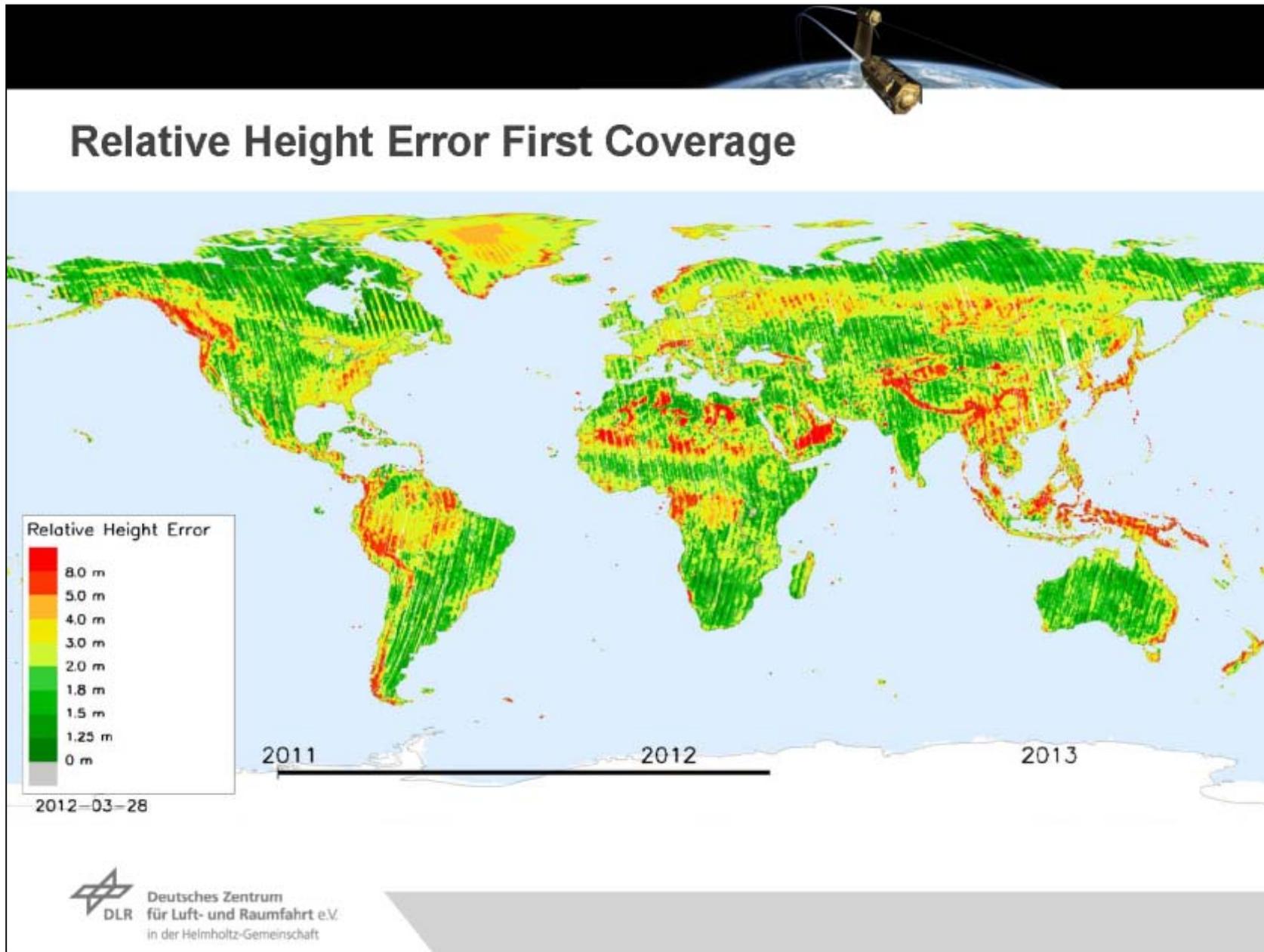
Update from DLR on Acquisition & Processing

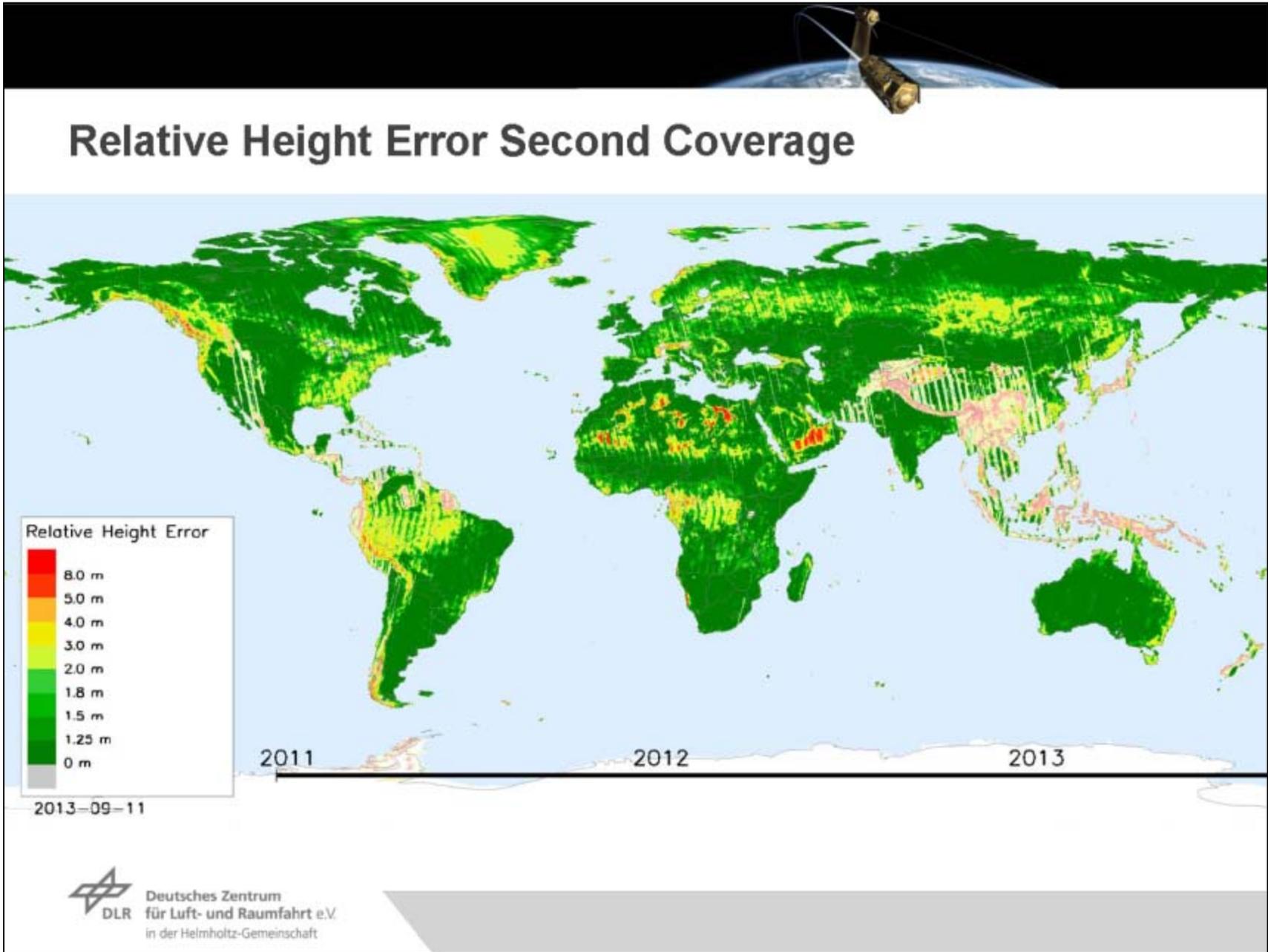
- Second Acquisition is complete
 - Virtually everything planned is complete
 - Trouble areas being acquired as part of 3rd and 4th acquisitions
- Antarctica (first acquisition) is now complete
 - Second Antarctica acquisition on-going
- Trouble areas being acquired as part of 3rd and 4th acquisitions
 - Ascending/Descending changes
 - Baseline varying constantly to support improved collections

WorldDEM Acquisition Timeline



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Global Relative Height Error from Quicklook Mosaicks

Coverage	p-to-p 90% RHE < 2 m (slope < 20%)	p-to-p 90% RHE < 4 m (slope > 20%)
1 st Global DEM	66.40%	79.40%
2 nd Global DEM*	75.42%	84.91%
Combination of 1 st and 2 nd Global DEM*	90.30%	95.64%

- More than 300,000 bistatic scenes analyzed (until mid July)
- 3rd & 4th coverage for difficult terrain necessary

* For second coverage only "easier / good quality" regions have been processed so far

Typical Scene Positioning



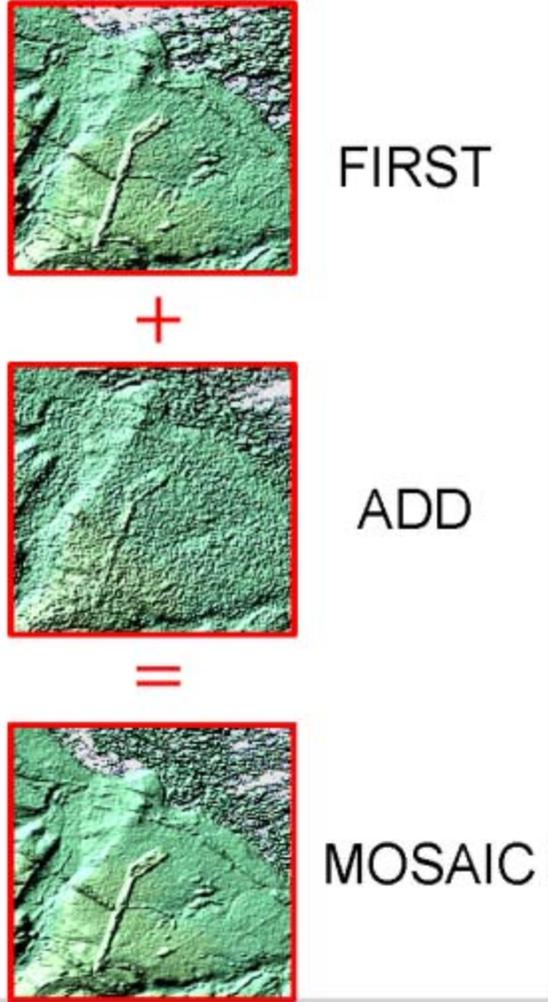
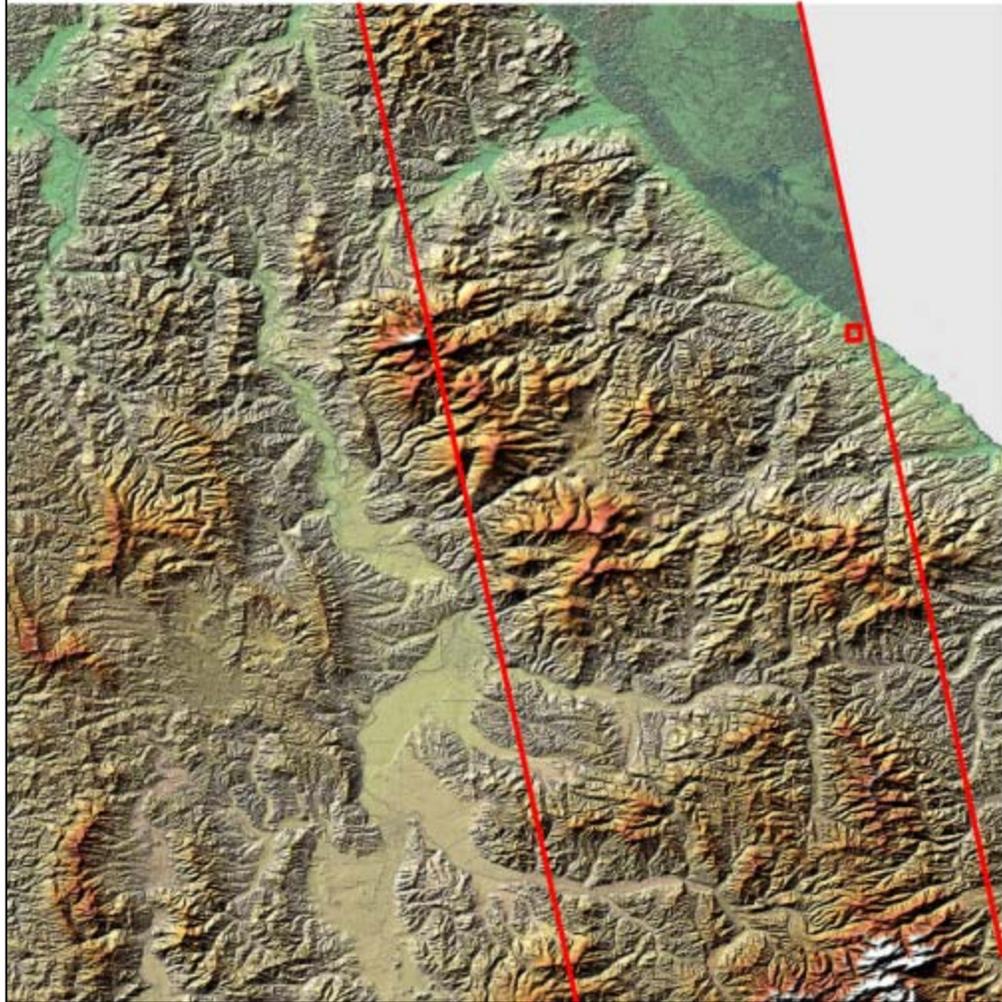
Scene from
2nd year

Supporting
scenes
from 1st year

Every 2nd year
scene is checked
operationally in a
fully automated
approach



Mosaicking: Standard Case



FIRST

+

ADD

=

MOSAIC

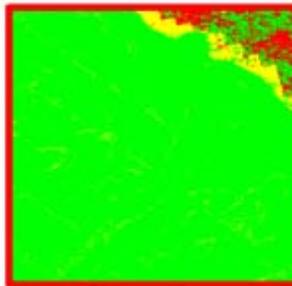
Slide 33

Mosaicking: Standard Case

Red: Large inconsistency: in the order of phase unwrapping errors -> select height level with best priority (here additional)

Yellow: Small inconsistency: height error bars do not overlap -> average all heights

COM



Deutsches Zentrum
für Luft- und Raumfahrt e.V.
in der Helmholtz-Gemeinschaft



FIRST

+



ADD

=



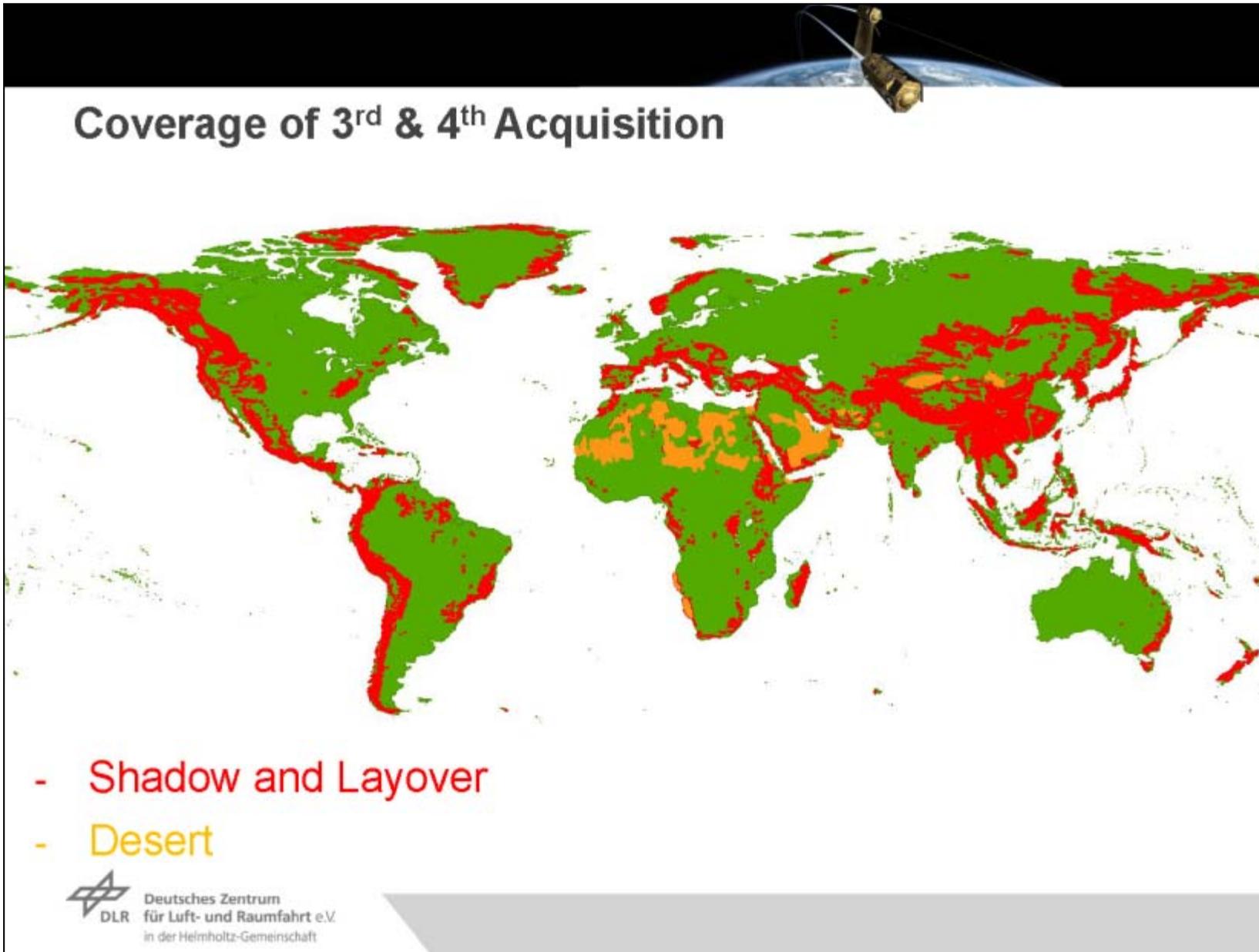
MOSAIC



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in der Helmholtz-Gemeinschaft



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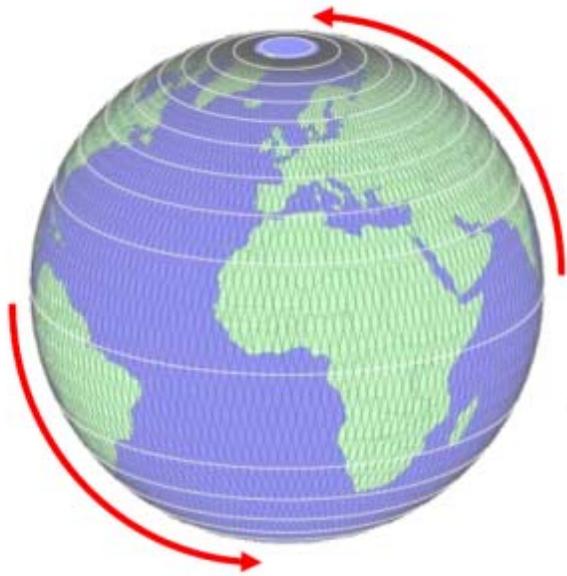


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Formation Change for 3rd & 4th Coverage

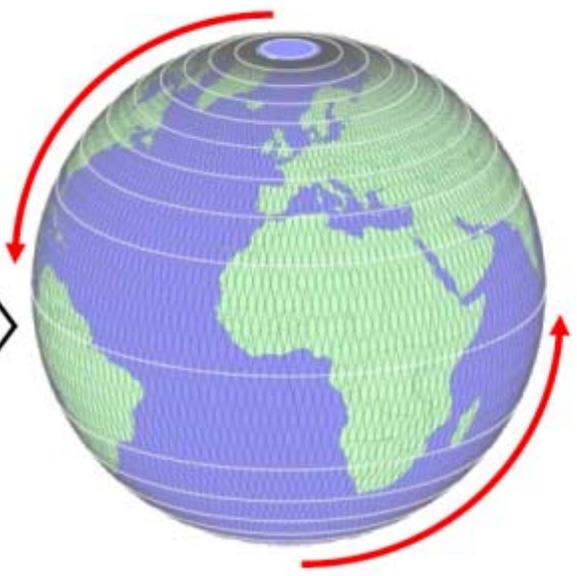
1st & 2nd coverage



Useful cross-track baselines on northern (southern) hemisphere in ascending (descending) orbit

3rd & 4th coverage

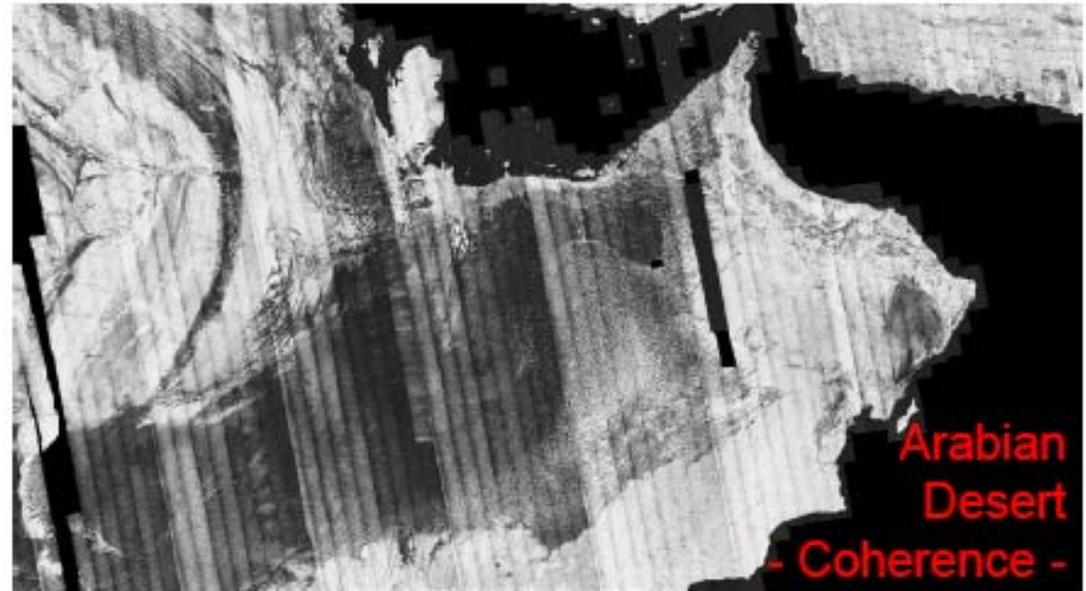
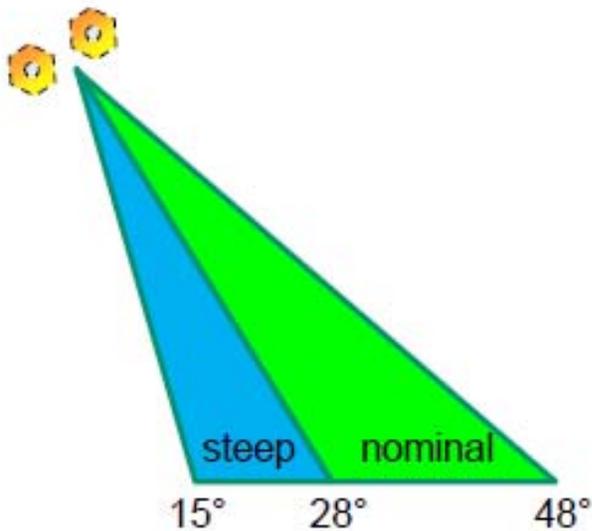
August 2013 for 8 month



Useful cross-track baselines on northern (southern) hemisphere in descending (ascending) orbit

Change for 3rd and 4th coverage

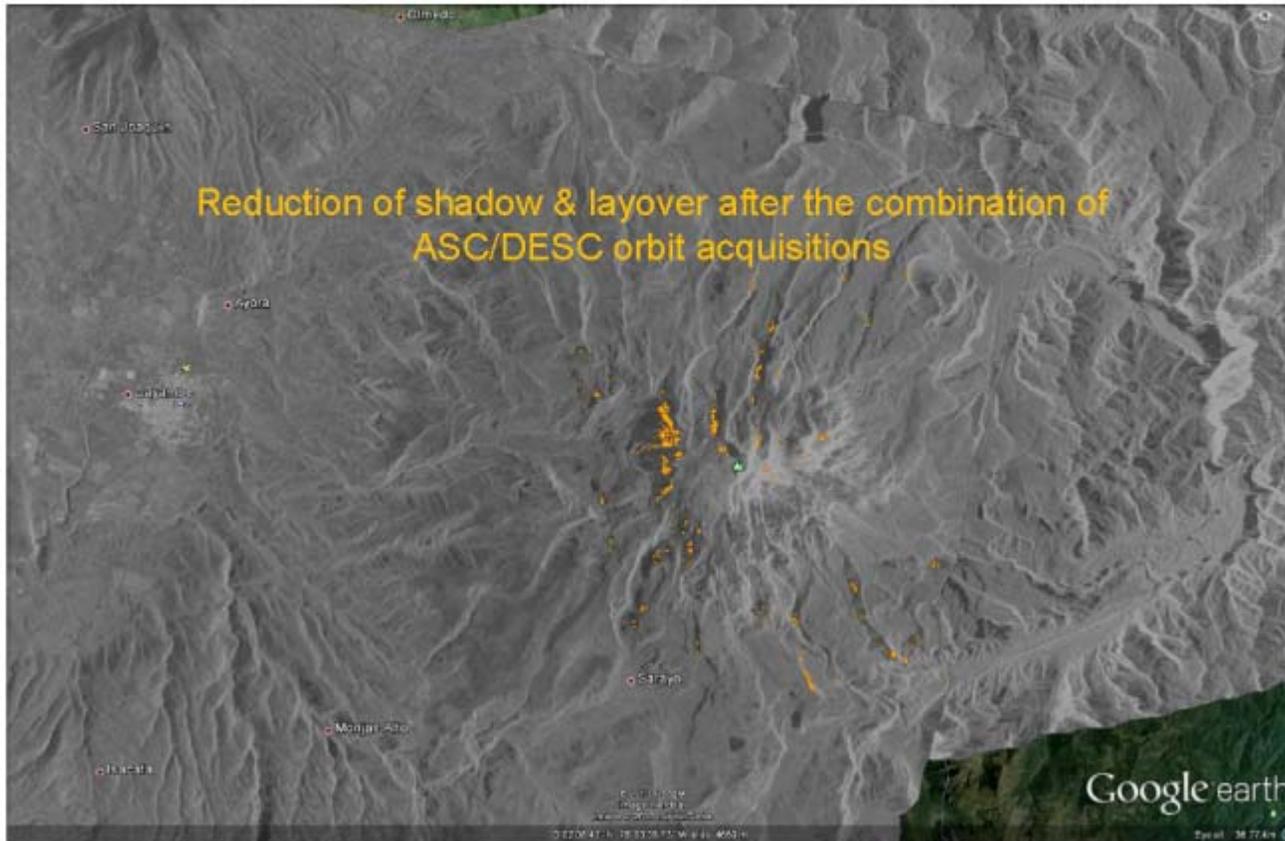
- Sandy deserts: low backscatter → low coherence
→ Smaller incidence angles: 15° – 28° (nominal 28° – 48°)
- Some deserts present rugged topography
→ Acquisition with different viewing geometry as for mountainous regions





Crossing Orbits over Andes

2 overlapping acquisitions available: ASCENDING + DESCENDING



Summary

- Very good progress has been made with the acquisition
 - Relative Height Error is well within specification
 - Ongoing third and fourth acquisitions will improve mountains and desert areas
- Mosaicking and Calibration also continues on schedule with good results so far
- WorldDEM launches at GEOINT next month



Preliminary Delivery Schedule

Q3-Q4/2013	Q1/2014	Q2/2014	Q3/2014	Q4/2014	Q1/2015	Q2/2015	...
CP first & second Coverage					} areas requiring 1 st & 2 nd coverage only		
	Australia						
		North America, Russia, North Africa					
			remaining areas requiring first & second coverage only (processing order tbd)				
			↓ data acquisition complete				
		Commissioning Phase Crossing Coverage					
	} difficult terrain requiring 3 rd & 4 th coverage			Alaska, North-Eastern Russia			
							90% of the global DEM processed ↓
					further processing order tbd		

