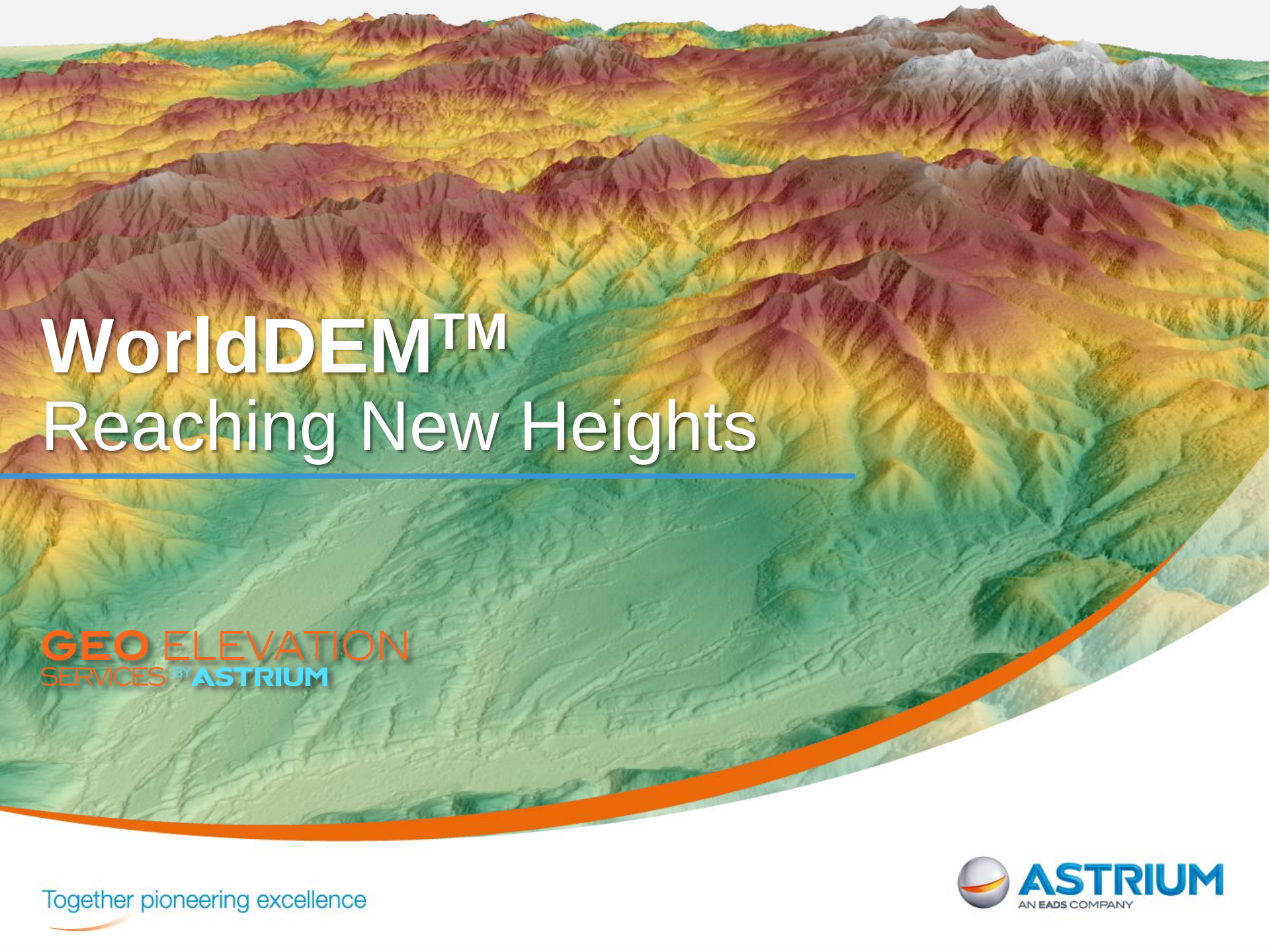
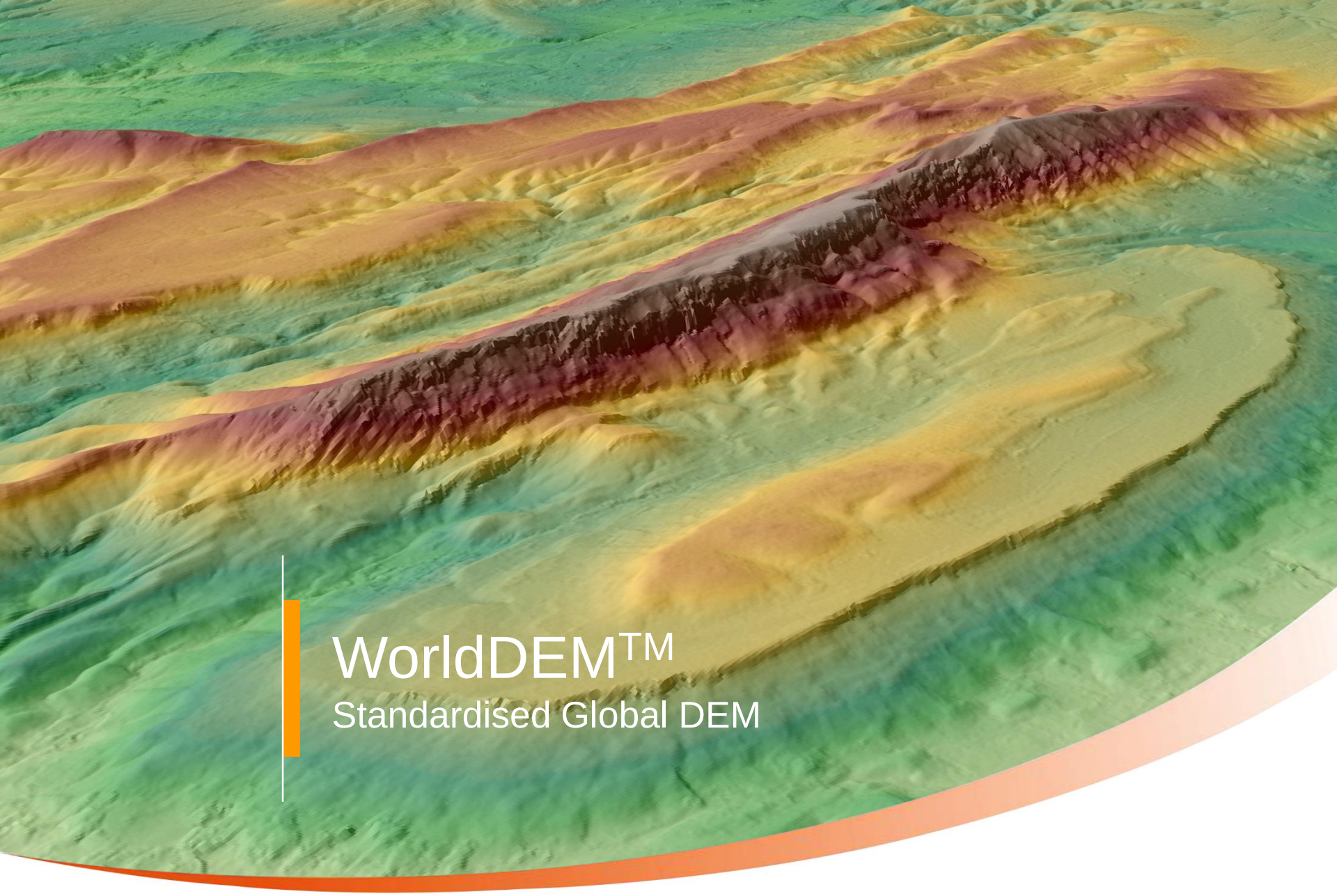


WorldDEM™
Reaching New Heights

GEO ELEVATION SERVICES BY ASTRIUM

Together pioneering excellence

ASTRIUM
AN EADS COMPANY



WorldDEM™

Standardised Global DEM

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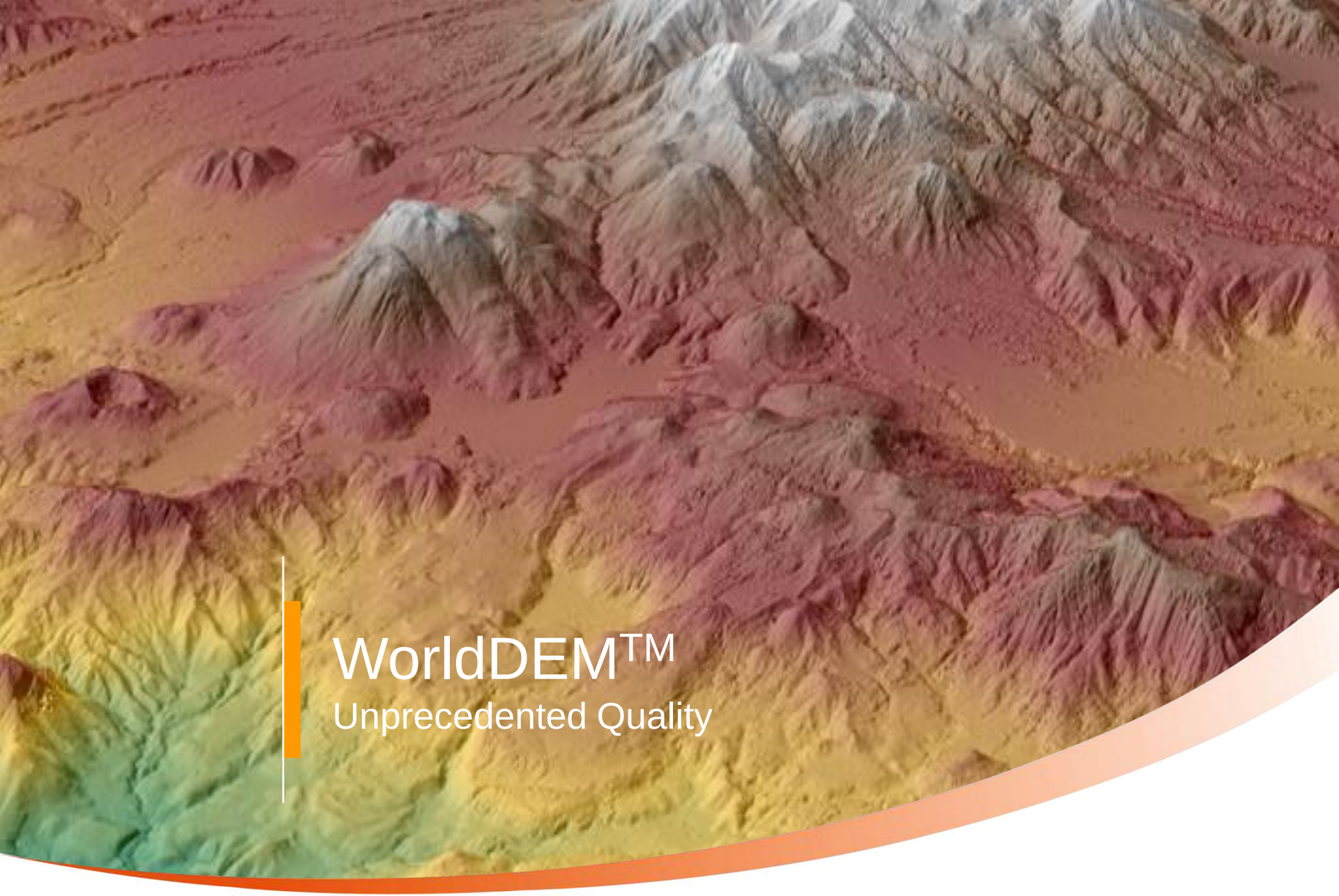

WorldDEM™

Unprecedented Quality

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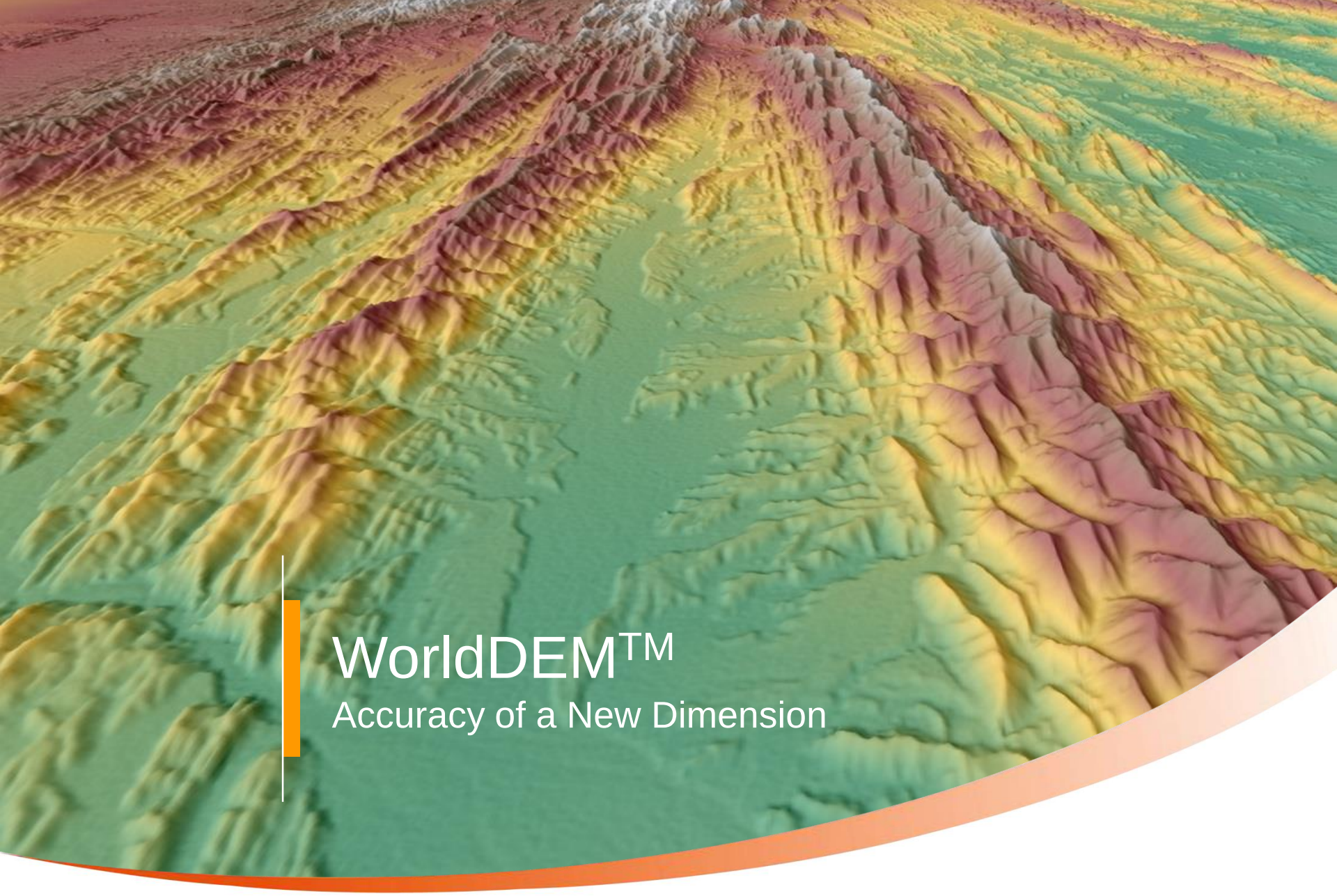

WorldDEM™

Accuracy of a New Dimension

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TanDEM-X WorldDEM Mission

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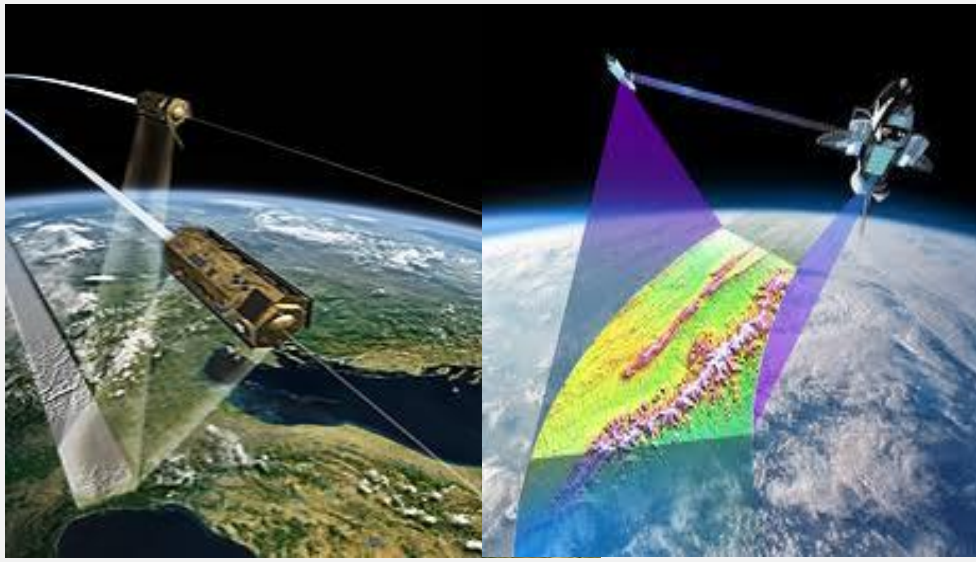
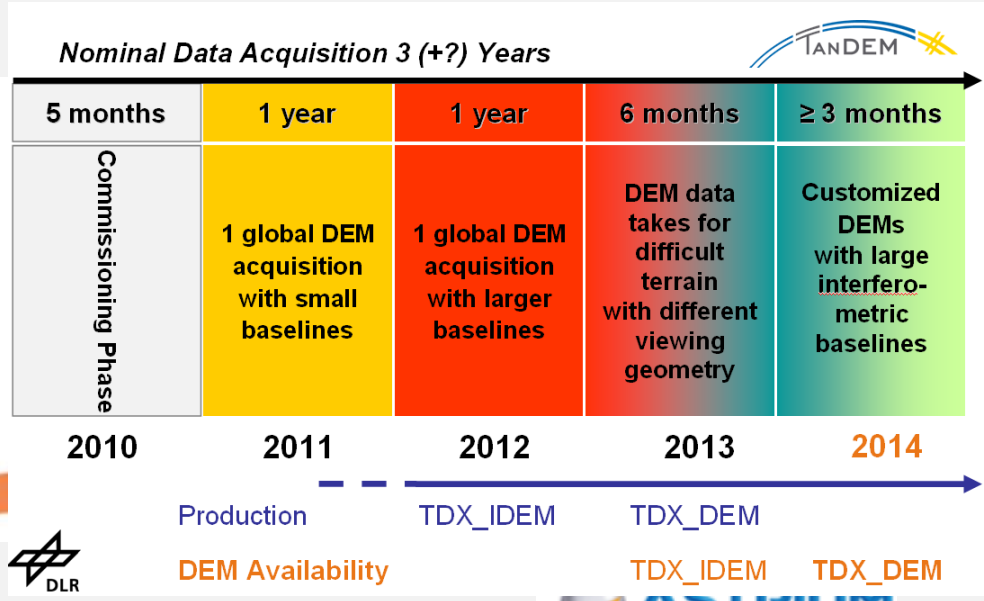
- TanDEM Mission
  - First configurable SAR interferometer in space
  - Bi-static operation: one of the two satellites emits radar signal, backscatter by both
  - Double-helix formation flying (DLR innovation): 200 meters distance between satellites – at a speed of 28,000 kilometers per hour
- WorldDEM
  - **3 years to cover entire globe** (specific time windows – otherwise standard imaging requests performed by both satellites)
  - **DTED/HRTI Level 3 (global)**
  - Consistent, seamless global coverage
- Secondary Mission Goals
  - HRTI Level 4 DEM acquisition (local)
  - Further scientific experiments





WorldDEM™ Global Coverage - Unprecedented Quality - Unique Accuracy

Coverage

A standardised DEM for any spot on Earth at the same quality

Quality

Allows you to close gaps in areas where no adequate DEM exists to date and extend to areas missing so far (cf. SRTM) with high accuracy

Accuracy

Improve the performance of today's globally operating navigation systems and applications

Availability

Offers you easy and instant access to DSM basic due to an automatic order process and the global dataset being available, ensuring immediate delivery

The unique and unrivaled combination of **Coverage**, **Quality**, **Accuracy**, and **Availability**, setting a new standard in global elevation modeling

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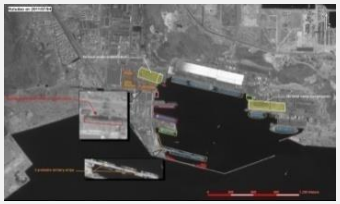
What can the WorldDEM™ be used for?

- National and thematic mapping
- Air and surface based system navigation
- Airport landing approach mapping (ICAO)
- Air Traffic Management (ATM)
- Engineering and infrastructure design
- Flight planning in 3D and simulation
- Improved crisis intervention planning
- Insolation and surface runoff mapping
- Intelligent Transportation Systems (ITS)
- Management of oil and gas fields
- Mission planning
- Mobile telecommunications engineering
- Orthorectification of aerial or satellite imagery
- Modeling water flow or mass movement
- 3D visualisation
- Terrain and target analysis, line-of-sight analysis



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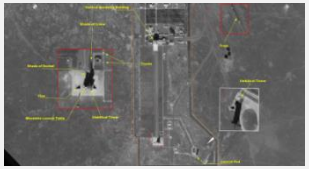
Detailed and Precise Terrain Knowledge for Military Operations



WorldDEM™ is the perfect foundation layer for all intelligence data and products

- Aviation security
- Aircraft and cruise missile mission planning and navigation (low-altitude flight, line-of-sight analysis)
- Landing approach planning
- Training and simulation operations (flight simulation)
- Accurate geo-referenced base for ‘’Intelligence Dossier’’
- 3D picture of terrain
- Planning and assessment of operations in the field: threat evaluation, target detection and location, damage assessment
- Accurate and uniform geospatial reference data for headquarters and joint forces

ASTRIUM
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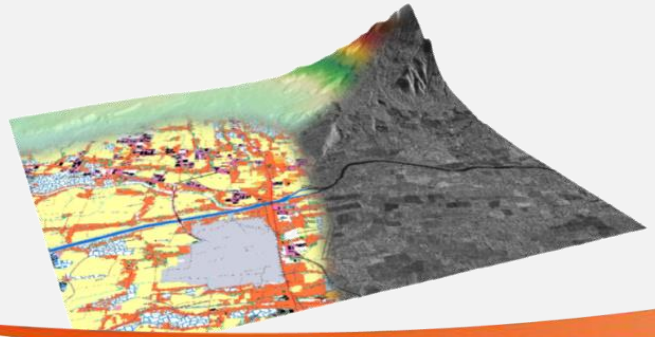
Accurate Height Information for Topographic Mapping

WorldDEM™ provides standardised homogenous seamless large-area coverage

- Multi-scale mapping: topographic maps
- Orthorectification of any other imagery (VHR optical data)
- Maps as basis for prevention measures (e.g. flood modelling) or post-event activities (e.g. flood maps, damage assessment maps)
- Standardised quality control and validation on the basis of a consistent dataset like WorldDEM™



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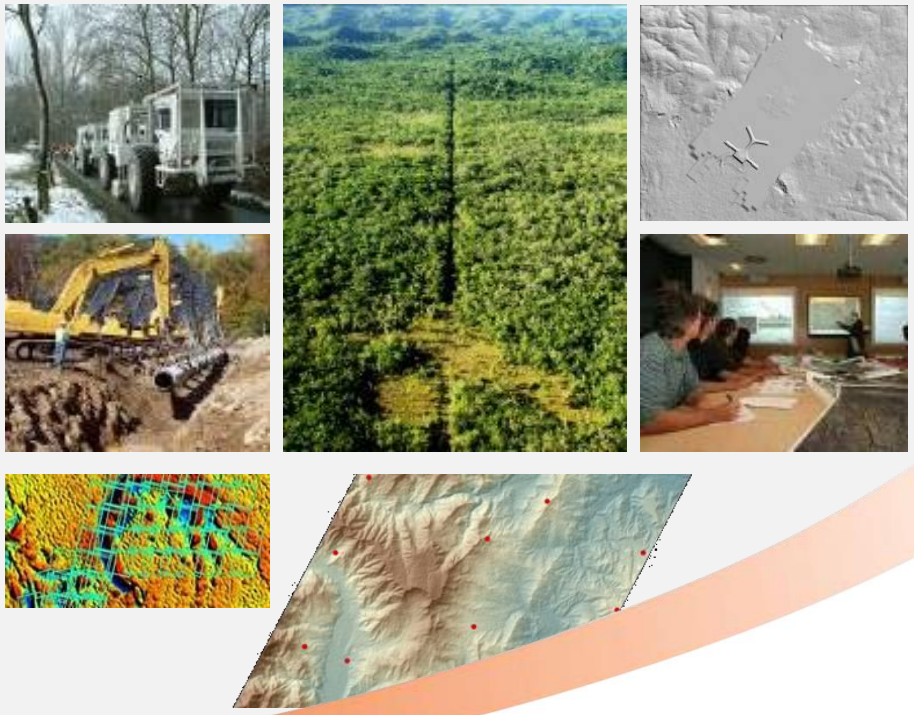
Worldwide Elevation Information for Geological Prospection

WorldDEM™ is a homogeneous global DEM for any location - no matter how remote or difficult

- Feasibility Studies
  - Scouting
- Exploration
  - Scouting
  - Input into geophysical processing / modelling
  - Orthorectification of multi-source geodata
  - Integration into topographic mapping
- Development
  - Airport planning (terrain, flight approaches)
  - Infrastructure planning
    - Roads, supply units, accommodation
    - Pipelines
    - Oil- and gas processing facilities
- Preparation of seismic measurements



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WorldDEM™
Offering

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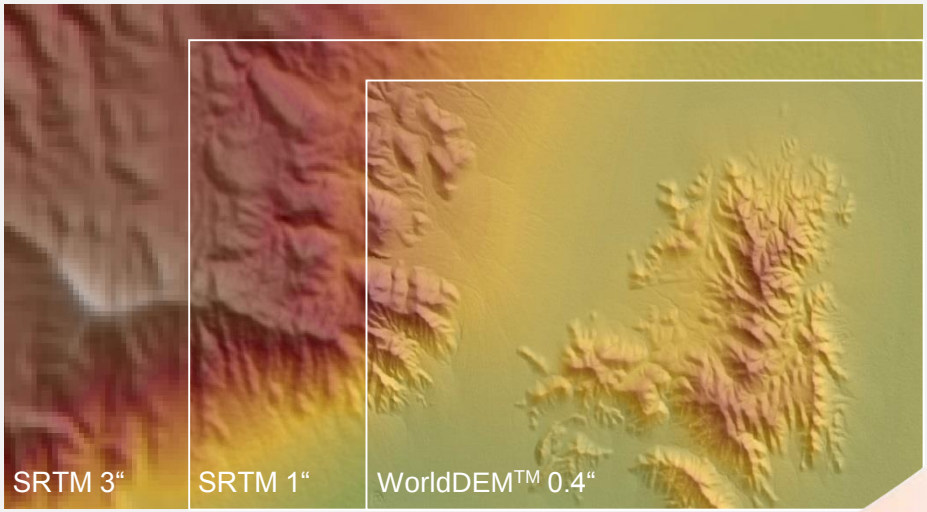
WorldDEM™ - Reaching New Heights

- First worldwide available DEM product at HRTE3 level
- Homogeneous, seamless DEM covering the entire Earth's land mass (150 Mio km² pole-to-pole)
  - Data acquisition within 3 years only (one unique source)
  - Acquired by TerraSAR-X and TanDEM-X flying in a very close and precise formation
  - Based on radar interferometric technology
- WorldDEM™ will be available commercially from 2014
- WorldDEM™ will be part of the GEO Elevation product suite



GEO ELEVATION SERVICES BY ASTRIUM

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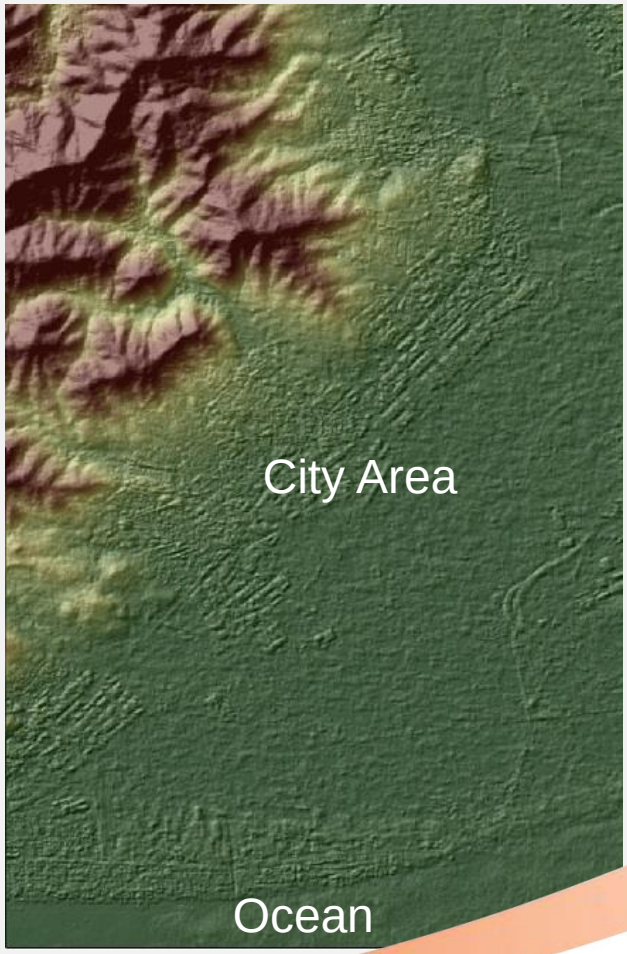
WorldDEM™ DSM basic

Digital Surface Model includes heights of all objects (natural and man-made)

Editing steps and rules:

- Removal of radar-typical artefacts (single pixel: “spikes” and “wells”)
- Interpolation of small voids (smaller or equal 8 pixels)



Sample figure: Elevation10 DSM basic

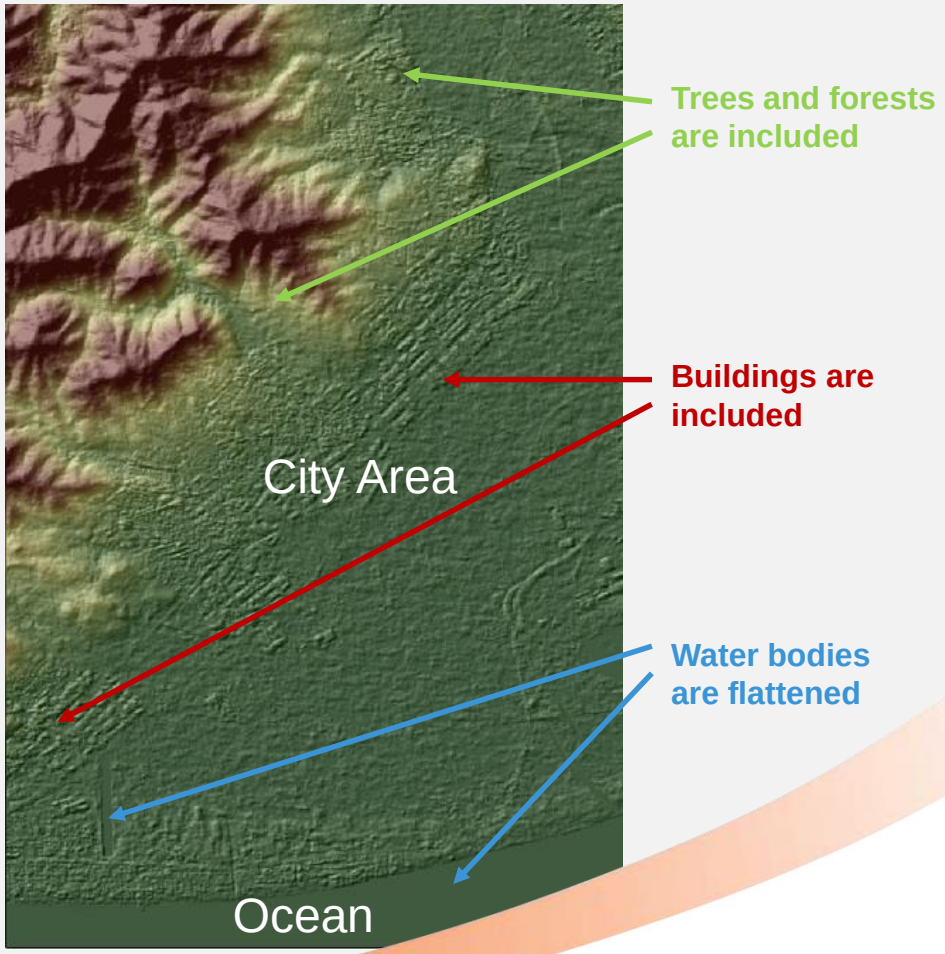
WorldDEM™ DSM hydro

Digital Surface Model includes heights of all objects (natural and man-made)

Extraction of water body features derived from radar image

Editing steps and rules:

- Lakes & reservoirs are set to a single elevation
  - Water bodies: width: >50m, length: >150m
- Rivers & canals are flattened with monotonic flow
  - Water bodies: width: >50m, length: >300m
- Ocean elevation is set to 0m
- Coastal infrastructure features and bridges are removed



Sample figure: Elevation10 DSM hydro

WorldDEM™ DTM

Digital Terrain Model represents bare earth

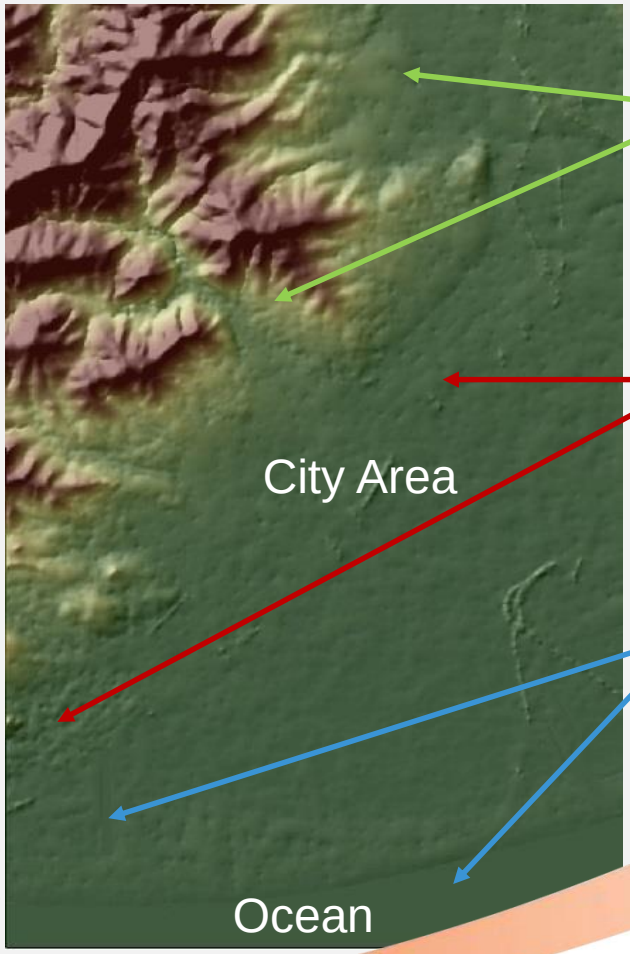
Editing steps and rules:

Based on radar image and DSM hydro

- Trees & forests are removed
- Man-made objects (e.g. buildings) are removed

Procedure: measurement of object‘s height

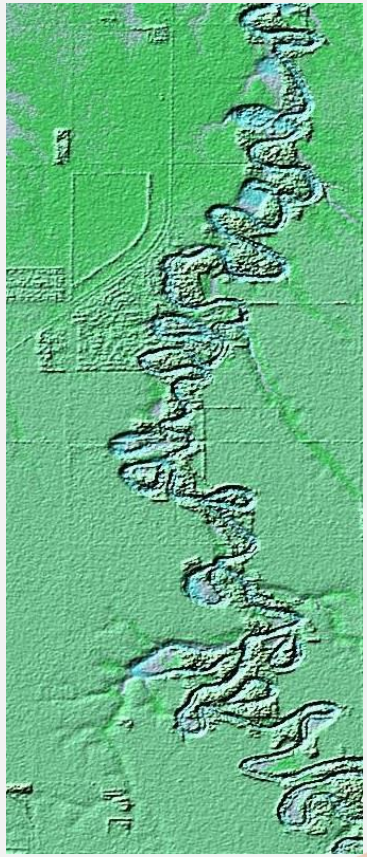
- Detailed terrain information
- Revealing small-scale terrain structures covered by vegetation



Sample figure: Elevation10 DTM

WorldDEM™ Specifications

Products		DSM basic, DSM hydro, DTM
Vertical Accuracy	**Abs.**	<10m (LE90)
	Rel.	<2m (slope ≤20%) (LE90) <4m (slope >20%) (LE90)
Horizontal Accuracy	**Abs.**	<10m (CE90)
Grid Spacing		Latitude: 0.4” (~ 12m) Longitude: depending on Latitude (~12m)
File Format		GeoTIFF
Data Type		32-bit floating
Vertical Unit		Meter
Projection Information		Geographic Coordinates; UTM Other projections on customer’s request
Coordinate Reference System		• Horizontal reference datum: WGS84 • Vertical reference datum: EGM2008 Other reference systems on customer’s request
Auxiliary Metadata		XML-Format, ISO 19115 compliant
Quality Layers		Data Acquisition Mask, Interpolation Mask, Filling Mask, Editing Mask, Water Body Mask
Image Mosaic Layer		Amplitude Mosaic Image



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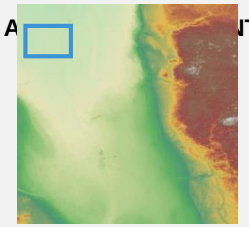
Close-Up



Visual assessment - Minnesota

SRTM 3“ SRTM 1“ TanDEM-X 0.4“

TanDEM-X SAR amplitude

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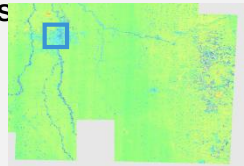
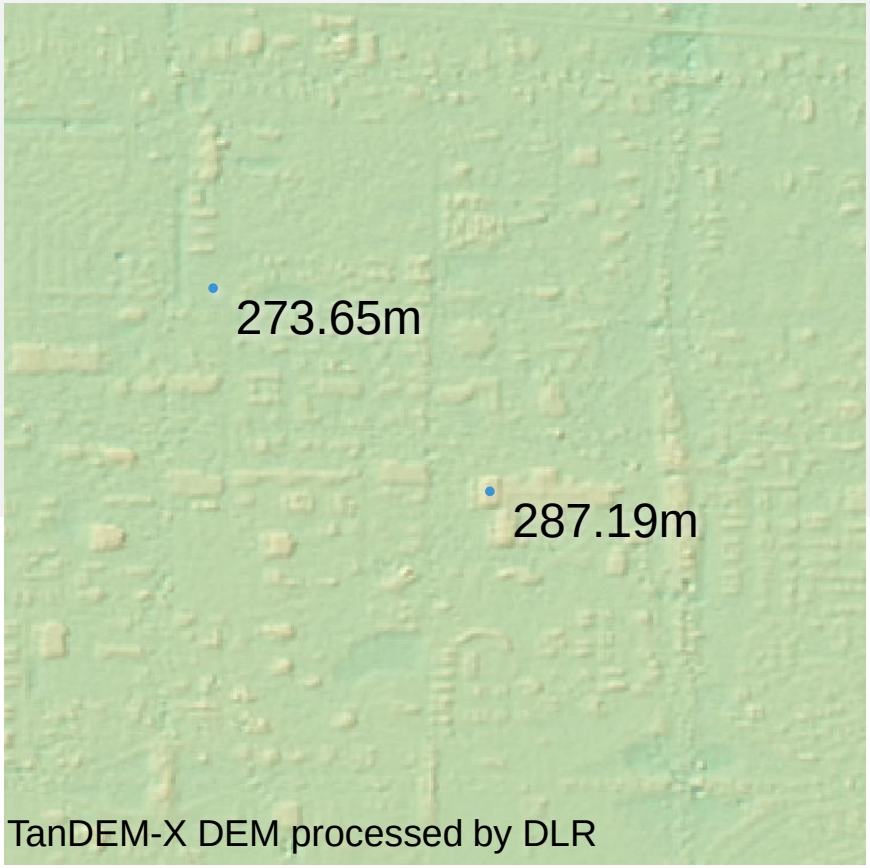
Statistical assessment vs. LiDAR - Minnesota

Close-Up

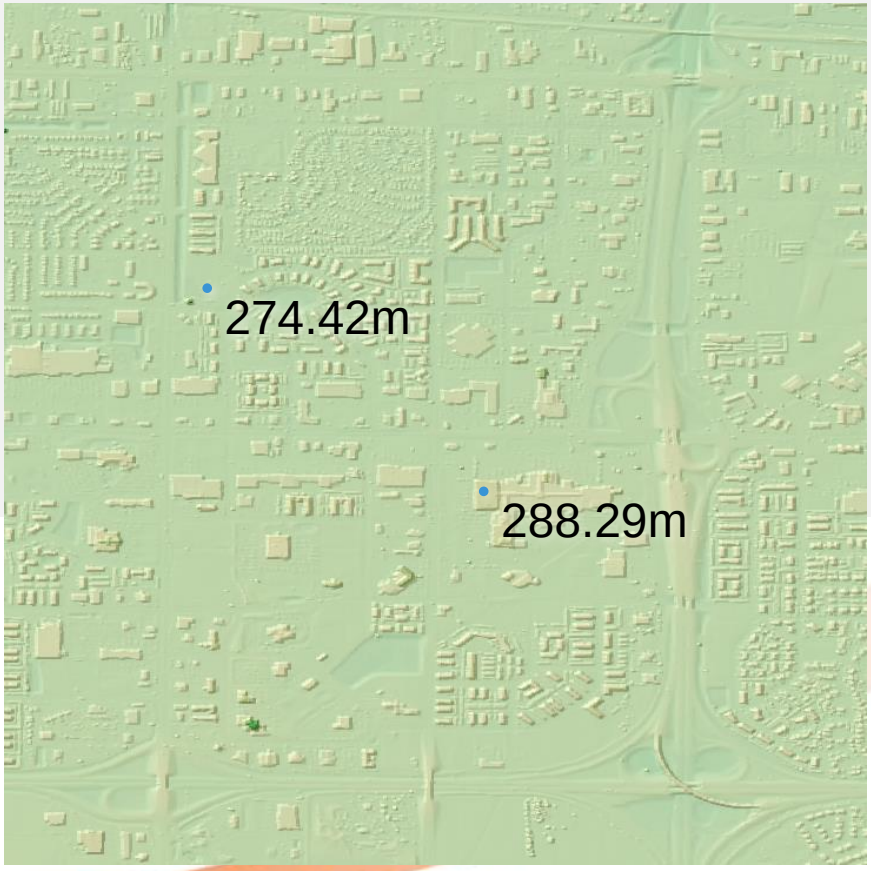


TanDEM-X „urban“



TanDEM-X DEM processed by DLR

LiDAR DSM „urban“



WorldDEM is extremely precise - Building structure is clearly visible

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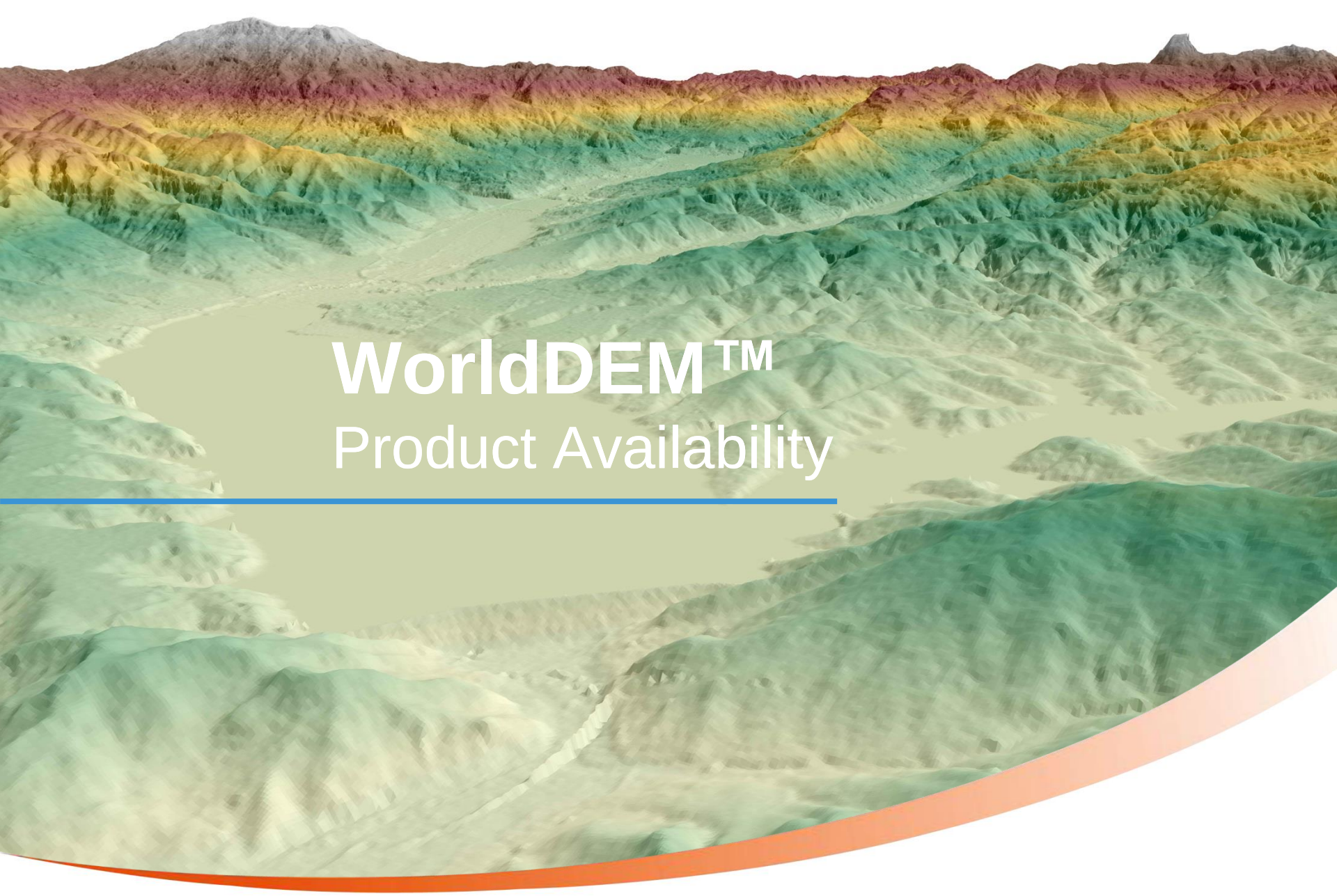

WorldDEM™

Product Availability

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WorldDEM™ Product Availability

	2013									2014								
	Q2			Q3			Q4			Q1			Q2			Q3		
	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep
Availability of:																		
- Sample Data				WorldDEM™ sample data														
- Final Product										Commercial launch of WorldDEM™ products								
Data Acquisition				Second coverage completed ★ Third and fourth coverage														

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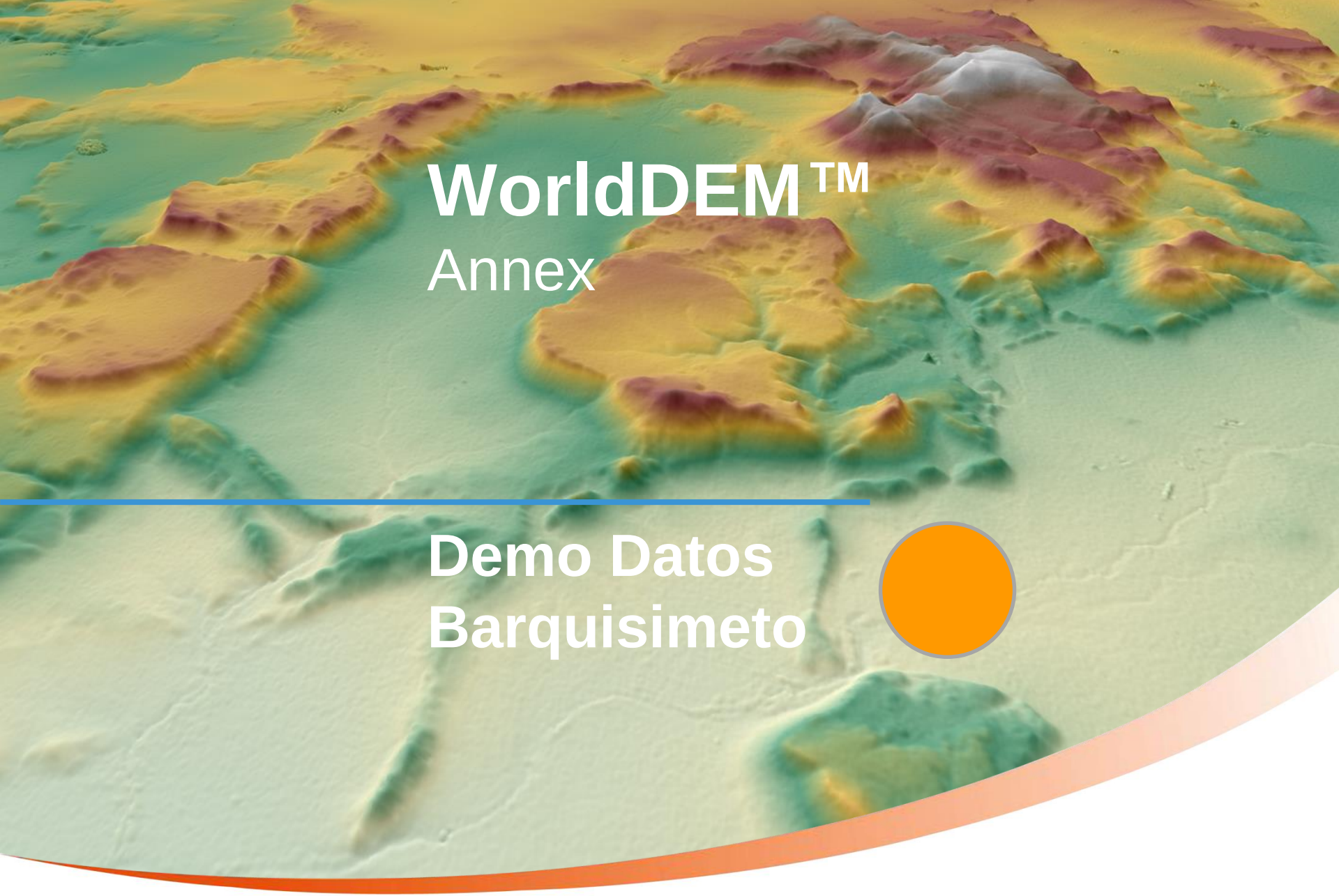

WorldDEM™
Annex

Demo Datos Barquisimeto

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Gracias por
su atención

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