Sharpening for Object Analysis

> 20% improvement in resolution and noise reduction
Program Status – TanDEM-X

- TSX1/TDX formation operates
  - 50% in bistatic acquisition for global DEM
  - 50% in other imaging missions with identical product portfolio and identical performance

- Global bistatic data collects
  - initiated in Dec 2010
  - systematic acquisition plan (latitude belts)

- DLR DEM production operational since Aug ‘11
  - bistatic interferometric processing
  - calibration/mosaicing of DEMs

- Sample DEMs for evaluation available
- Editing software to finish the global DEM under development
- WorldDEM alliance forming
Visual Assessment of Initial Test Data

SRTM 3"

SRTM 1"

TanDEM-X 0.4"

TanDEM-X SAR amplitude
Statistical assessment vs. LiDAR - Minnesota

TanDEM-X „urban“

- 273.65m
- 287.19m

LiDAR DSM „urban“

- 274.42m
- 288.29m
Water Masking
Water Body Mapping

- automated generation (classification, change detection) of mono-/multi-temporal water mask vector data
- accurate flood extent map within 48h after weather independent TerraSAR acquisition
- separates
  - flooded areas
  - permanent water bodies
- monitoring of coast lines, tidal variations
Global Urban Footprint

- **TanDEM-X mission provides**
  - global digital elevation model
  - two global coverages (2011, 2012) at 12 m resolution

- **Derive a world-wide inventory of human settlements**

Courtesy: DLR
Coherence and Height Information
TerraSAR Geodesy

- DLR/TUM: Precise amplitude tracking
  - Precise orbit knowledge and high system stability
  - Error corrections (Ionosphere, Troposphere, Tides)

- Demonstrated accuracies: < 10 cm

- Example:
  - Displacements around Sendai after earthquake of March 11, 2011
  - Arrows indicate show ground displacement vectors

Courtesy: DLR, M. Eineder
Change Detection - Sendai, Japan

Legend:
- Red: Backscatter Increase
- Blue: Backscatter Decrease

Interpretation:
The map shows changes overlaid on the TanDEM-X image of March 12th, 2011. The change layers illustrate areas with increased and reduced backscatter intensity. A decrease of backscatter can be caused by flooded areas, damaged or destroyed buildings. An increase of backscatter can be caused by new objects present, such as depositing debris.

Scale: 1:45,000 for DIN A1 printing
Map Projection: Universal Transverse Mercator
Geographic:
- Ellipsoid: WGS 84
- Datum: WGS 84

Satellite Image Information:
- Acquistion date: 2010-10-20, 2011-05-12
- Satellite: TanDEM-X
- Imaging Mode: StripMap
- Ground Range Resolution: 1 m
- Polarisation: L
- Incidence Angle: 32.3° - 36.4°
- Pass Direction: West-Bound
- Acquisition time (UTC): 23:43:02, 23:43:39
- Product Type: Single Look Unwrapped Complex
- Resolution Mode: PDI-Reference ID: 00014900_0001, 00014900_0001
- BAP-Reference number: 1/03/888, 1/03/887

Credits & Copyright:
Map Production and Cartography by ASTRIUM GmbH, Information Services
All the space you need

TSX Background, Oslo