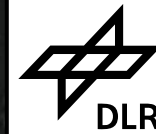


TanDEM-X Science Products – Land Ice

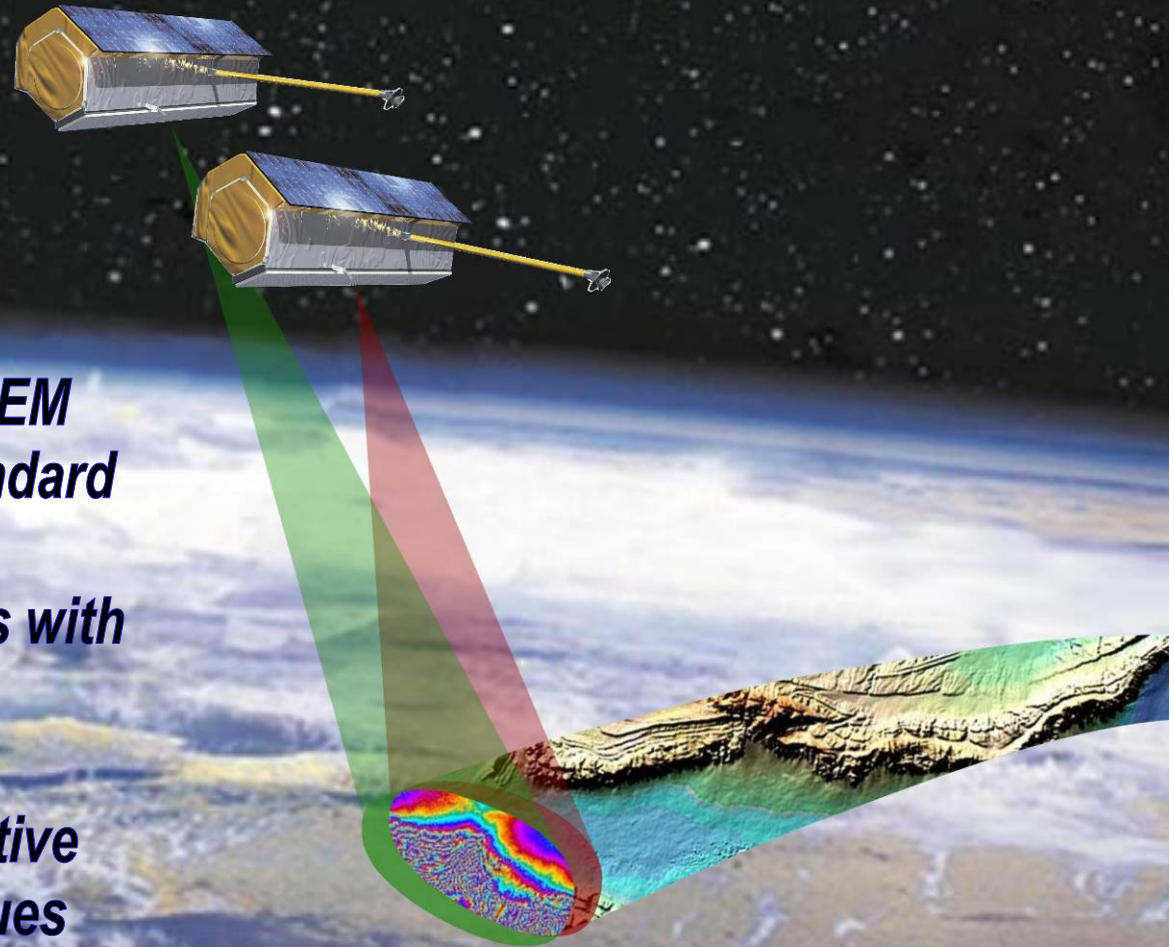
Irena Hajnsek, Thomas Busche, Alberto Moreira

Microwaves and Radar Institute, German Aerospace Center

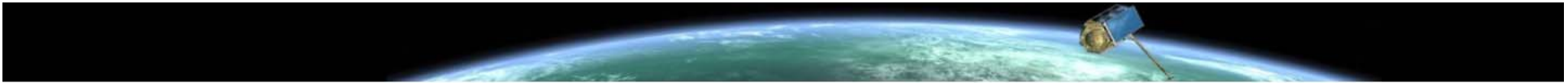
TanDEM-X Mission Goals



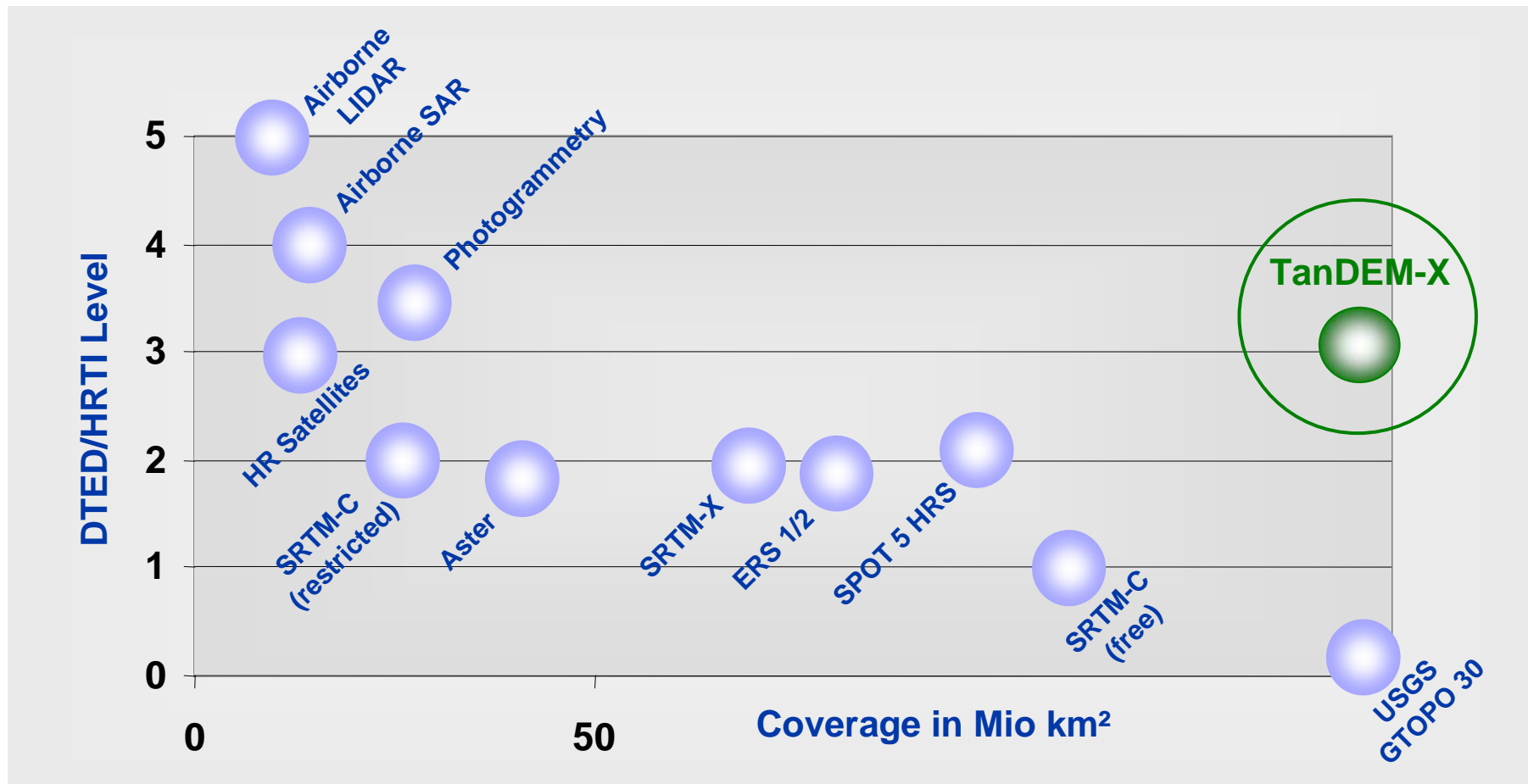
- ***acquisition of a global DEM according to HRTI-3 standard***
- ***generation of local DEMs with HRTI-4 like quality***
- ***demonstration of innovative bistatic imaging techniques and applications***



TerraSAR add-on for Digital Elevation Measurements



Available DEM Data Products



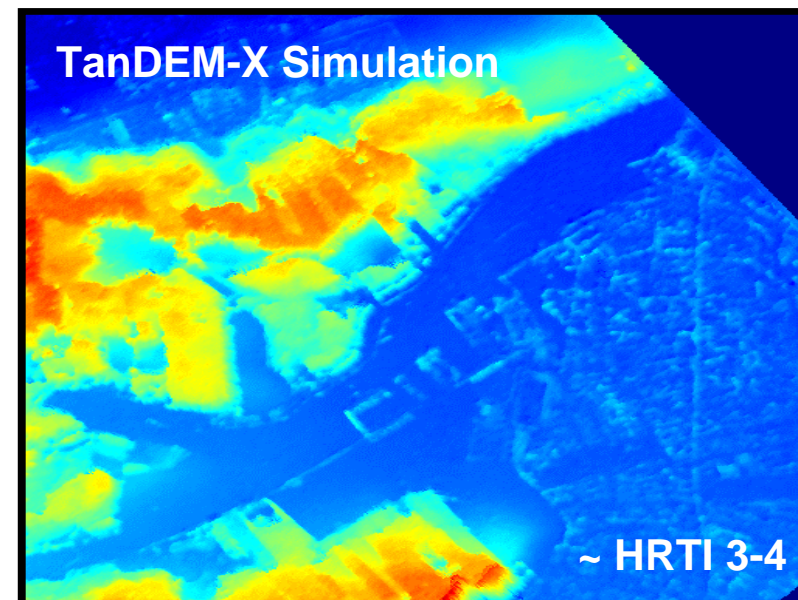
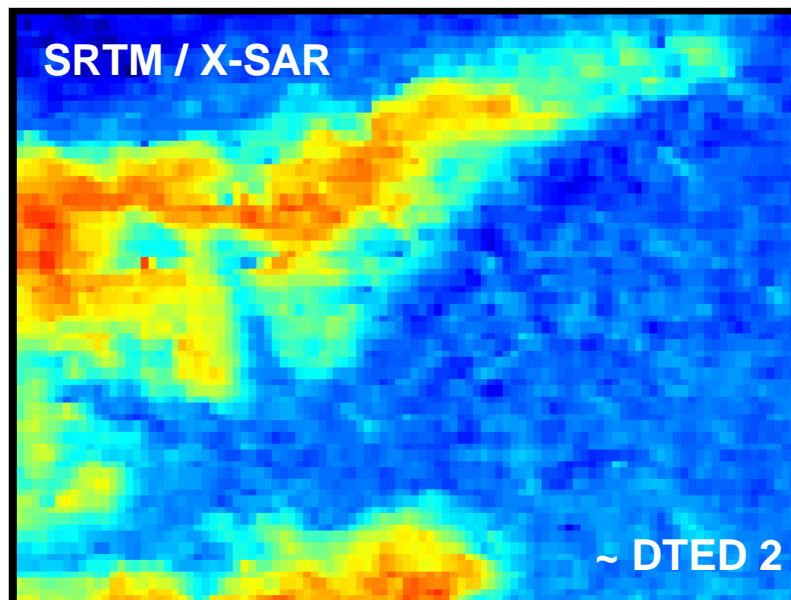
→ global HRTI-3 DEM is a unique data product at a competitive price





NGA (NIMA) Standards for Digital Elevation Models

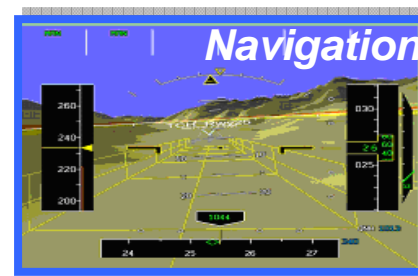
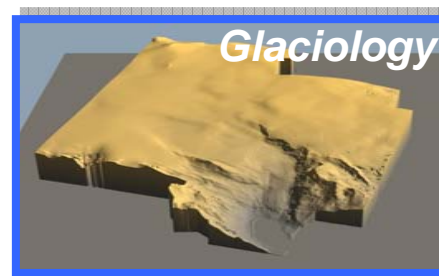
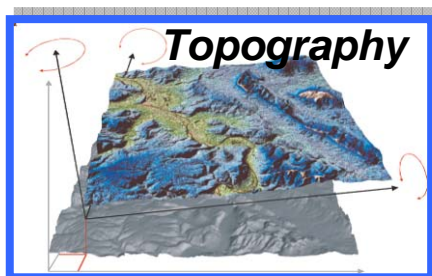
	Spatial Resolution	Absolute Vertical Accuracy (90%)	Relative Vertical Accuracy (point-to-point in 1° cell, 90%)
DTED-1	90 m x 90 m	< 30 m	< 20 m
DTED-2	30 m x 30 m	< 18 m	< 12 m
HRTI-3	12 m x 12 m	< 10 m	< 2 m
HRTI-4	6 m x 6 m	< 5 m	< 0.8 m





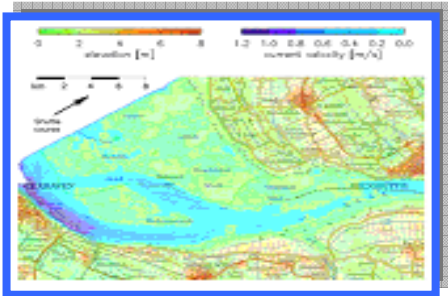
TanDEM-X Radar Techniques and Application Areas

TanDEM-X Application		
Across-track	Along-track	New Techniques
<p>Oceanography</p> <p>Land Cover & Vegetation</p> <p>Geology</p> <p>Glaciology/Hydrology</p> <p>Land Environment</p>	<p>Hydrology/Glaciology</p> <p>Oceanography</p> <p>Traffic</p>	<p>InSAR Processing</p> <p>Formation Flying</p> <p>Super Resolution</p> <p>Digital Beamforming</p> <p>Pol-InSAR</p> <p>Bistatic Processing</p>

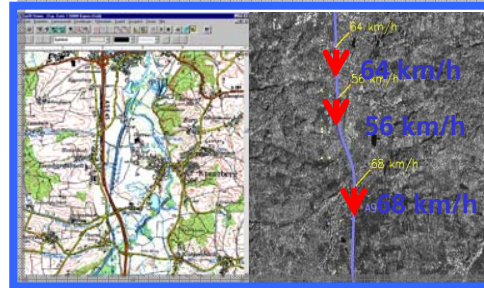


Applications ATI & New Techniques

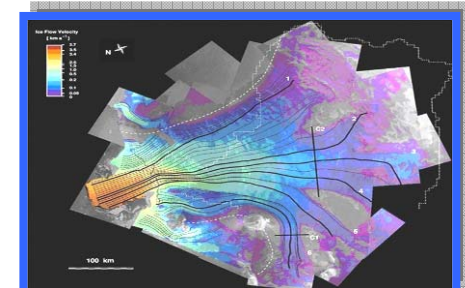
Along-Track Interferometry



Ocean Currents

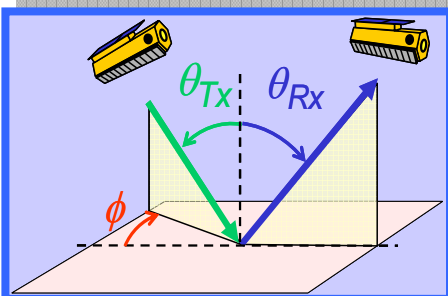


Traffic Monitoring

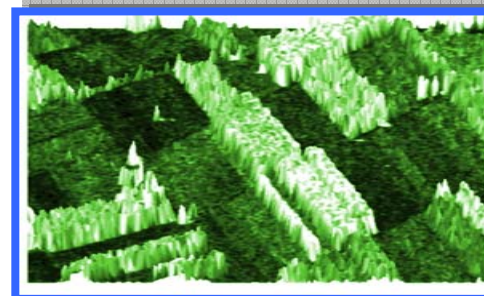


Glacier Mass Balance

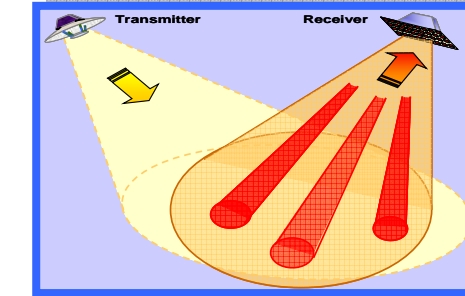
New SAR Techniques



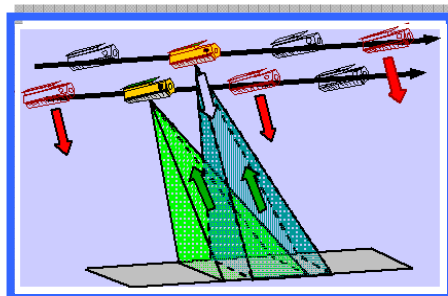
Bi-Static SAR



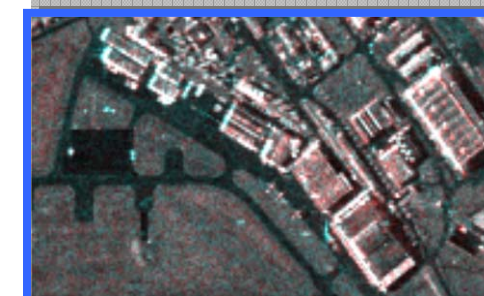
Polarimetric InSAR



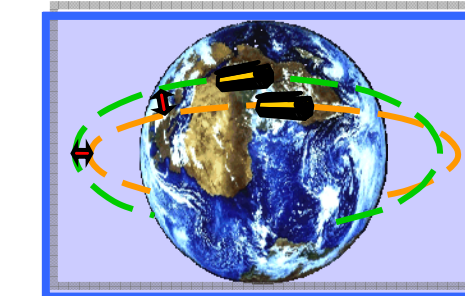
Digital Beamforming



InSAR Processing



Super Resolution

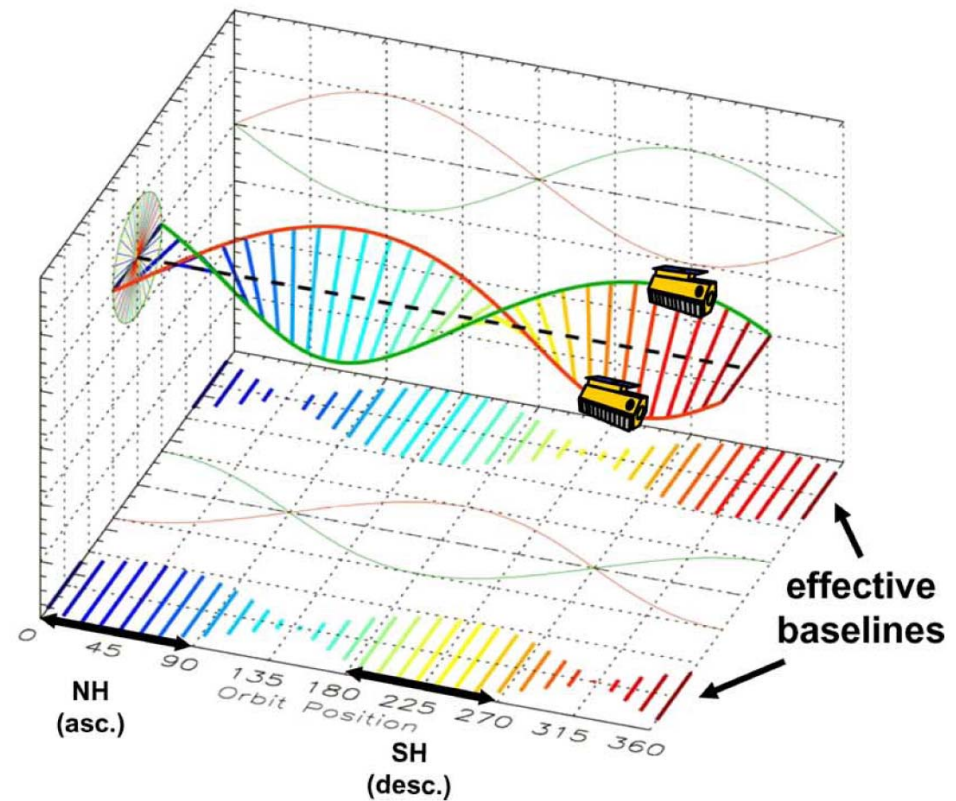
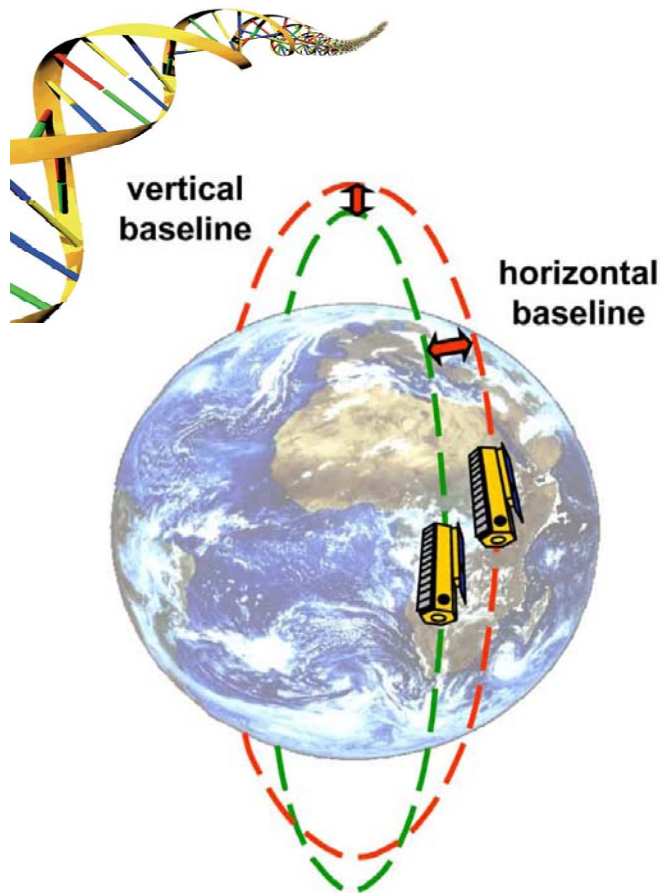


Formation Flying



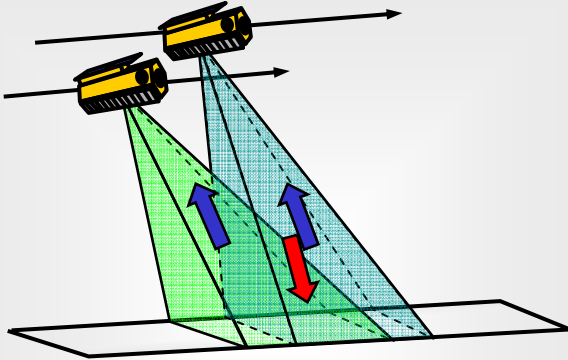
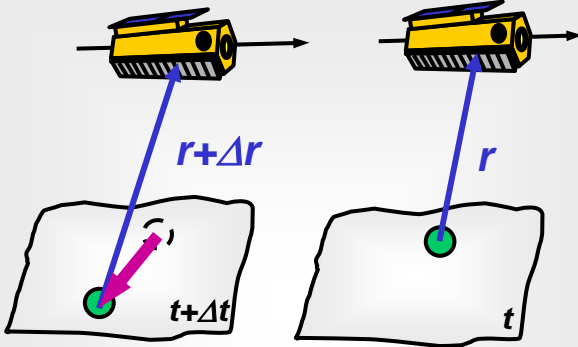
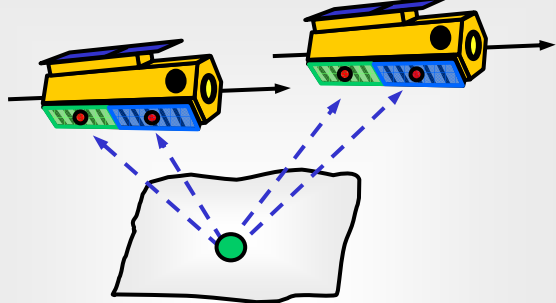


Collision Avoidance - Helix Formation





Capabilities of TanDEM-X

Cross-Track Interferometry	Along-Track Interferometry	New Techniques
 <ul style="list-style-type: none"> → Digital Elevation Models → Spatial Coherence (forest, ...) → Double DInSAR (change maps, ..) → High Resolution SAR Images 	 <ul style="list-style-type: none"> → Large Scale Velocity Fields (ocean currents, ice drift, ...) → Moving Object Detection → Temporal Coherence Maps 	 <ul style="list-style-type: none"> → 4 Phase Center MTI (traffic, ...) → PolInSAR (vegetation height, ...) → Digital Beamforming (HRWS, ...) → Bistatic Imaging (classification, ..)



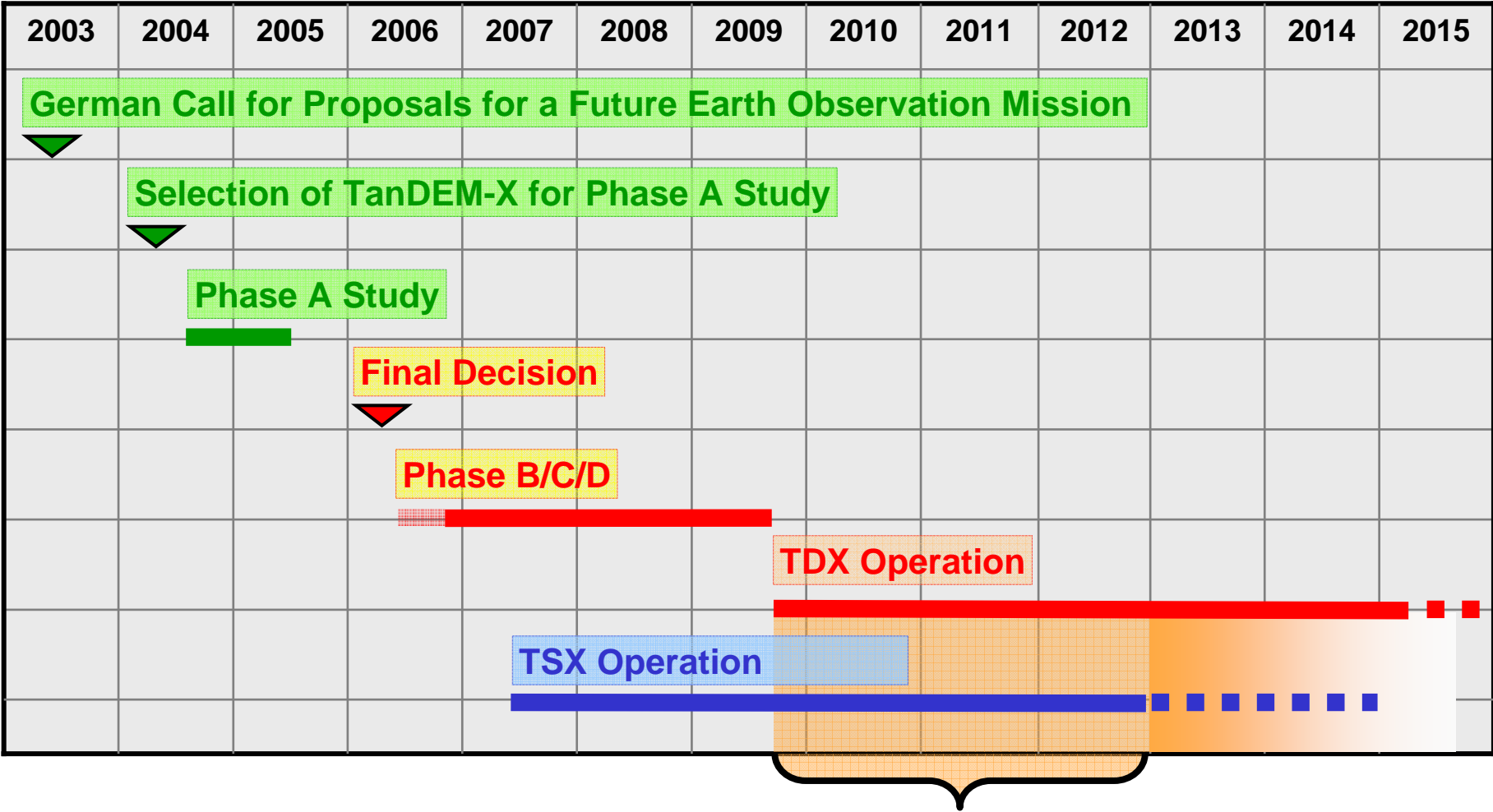
TanDEM-X is a highly flexible sensor which enables multiple powerful imaging modes



<ul style="list-style-type: none"> ▪ cross-track baselines (0 km to several km) ▪ along-track baselines (0 km to several 100 km) 	<ul style="list-style-type: none"> ▪ interferometric modes (bistatic, alternating, monostatic) ▪ SAR modes (ScanSAR, Stripmap, ...) 	<ul style="list-style-type: none"> ▪ bandwidth / resolution (0 ... 150/300 MHz) ▪ incident angles (20° ... 55°) 	<ul style="list-style-type: none"> ▪ polarisations (single, dual, quad) ▪ ...
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TanDEM-X Timeline



At least 3 years of joint operation



Relevance to STG-IPY SAR Data Coordination

- Planned X-band SAR data acquisition over the Earth land mass (including Antarctica and land regions at the Arctic)
- Generation of a global DEM's (covering also the whole Antarctic region)
- DEM products will be available for PI's (TanDEM-X User-Web-Interface)

- **Definition of requirements for a DEM over Arctic land and Antarctic regions:**
 - Data acquisition at which time of the year requested ?
 - whole coverage @ short time (3-4 month) of land masses (right-looking nominal / whole coverage left-looking needed)
 - different baselines ~ different height of ambiguities (in time) over pole regions
 - data storage constraints (download stations distributed @ north & south lat.)
 - Are there special requests for a 'super test site', where data should be acquired ?
 - Is a concentration over marginal regions (coastal zones) requested?
 - What is the swath of a coastal zone (100 km)?
 - Is a seasonal observation of a defined area of importance?
 - Observation with 2 years difference over a defined area?



Announcement: TanDEM-X Science Meeting

November 24, 2008 (Monday) @

DLR, Oberpfaffenhofen Germany

<http://www.dlr.de/HR/tdmx>

Topics to be covered during the Pre-Launch Science Meeting:

- TanDEM-X system capabilities
- Performance Analysis
- Calibration activities
- Science & commercial activities
- Scientific proposal submission
- Commercial proposal submission
- Data ordering procedures
- Status of the ground segment
- Status of space segment

TerraSAR-X Science Meeting

November 25-26, 2008 (Tue-Wed) @ DLR

CEOS Cal/Val Meeting

November 27-28, 2009 (Thu-Fri) @ DLR