

German Space Agency Report: DLR

Manfred Zink, DLR

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Knowledge for Tomorrow



The German Earth Observation Programme

1. **Germany largest participant in European EO Programmes**
 - ESA EO Envelope Programme, Copernicus and EUMETSAT Programmes
2. **Complementary German national EO Programme**
 - Missions, Technology, Data Exploitation

Activities in the national Earth Observation Programme

Missions

- TerraSAR-X, TanDEM-X, RapidEye, EnMAP, MET*image*, MERLIN, GRACE FO

Scientific and technical Mission Preparation

- HRWS, Lidar, IR Detectors, TerraSAR-X HD, Tandem-L

Mission Support & Development of Applications

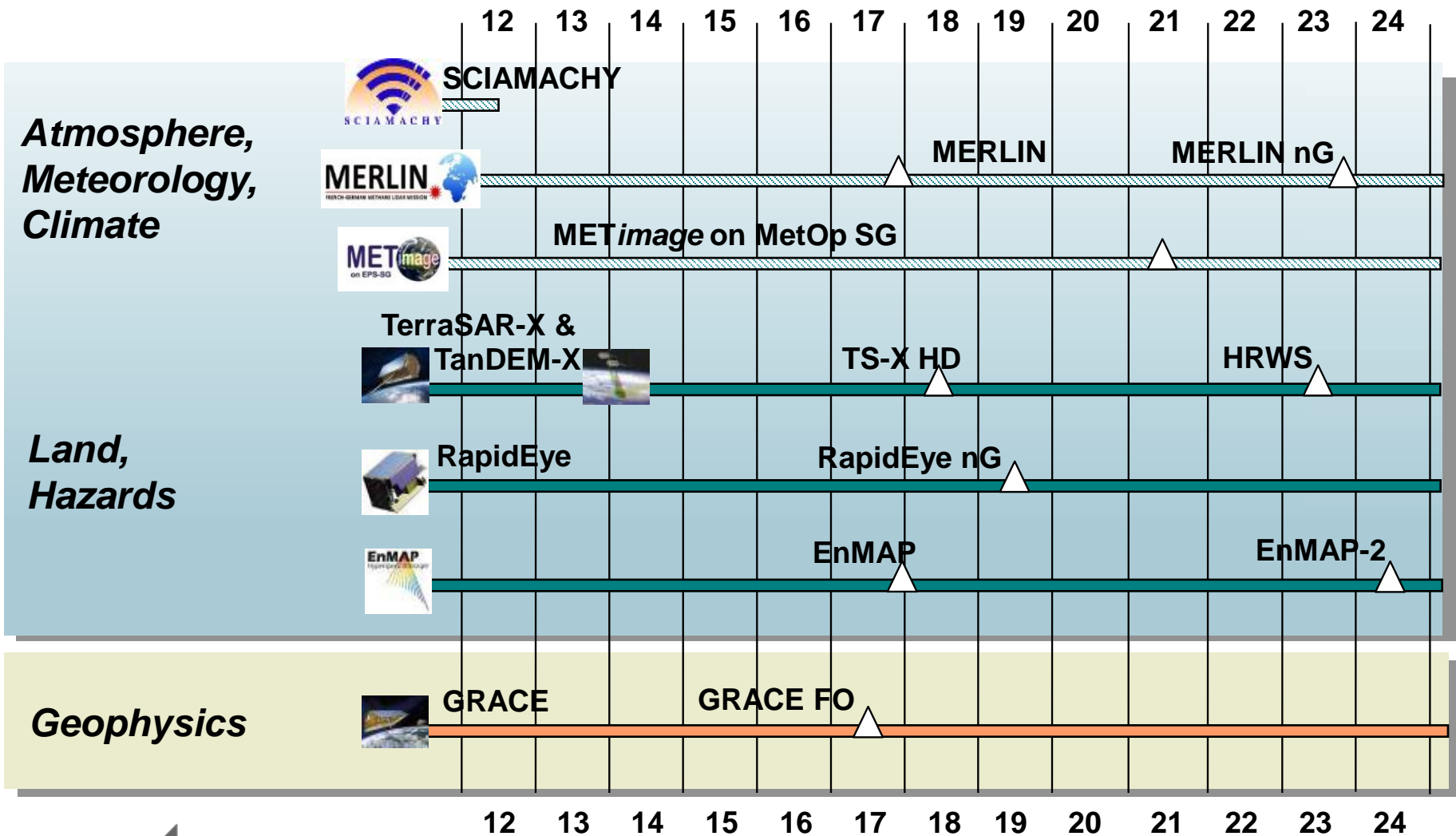
- TerraSAR-X, TanDEM-X and EnMAP algorithms,
- Synergy between national missions + Sentinels, new Applications for national missions

Market Development and Copernicus

- Sentinel services, Copernicus Pilot programme, Copernicus



National Missions

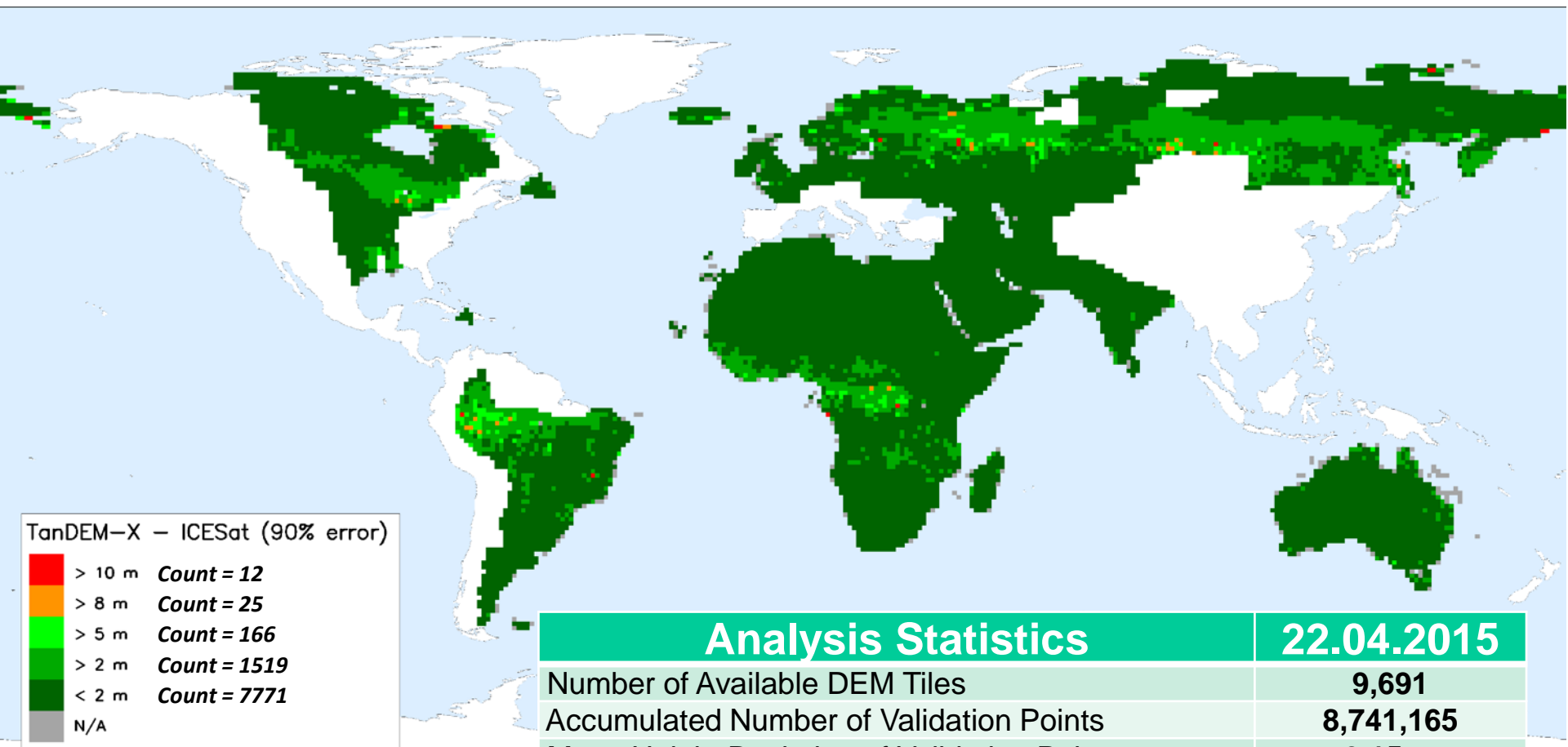


TerraSar-X and TanDEM-X Status

Manfred Zink, DLR-HR



Final DEM Tiles – 90% Absolute Difference to ICESat

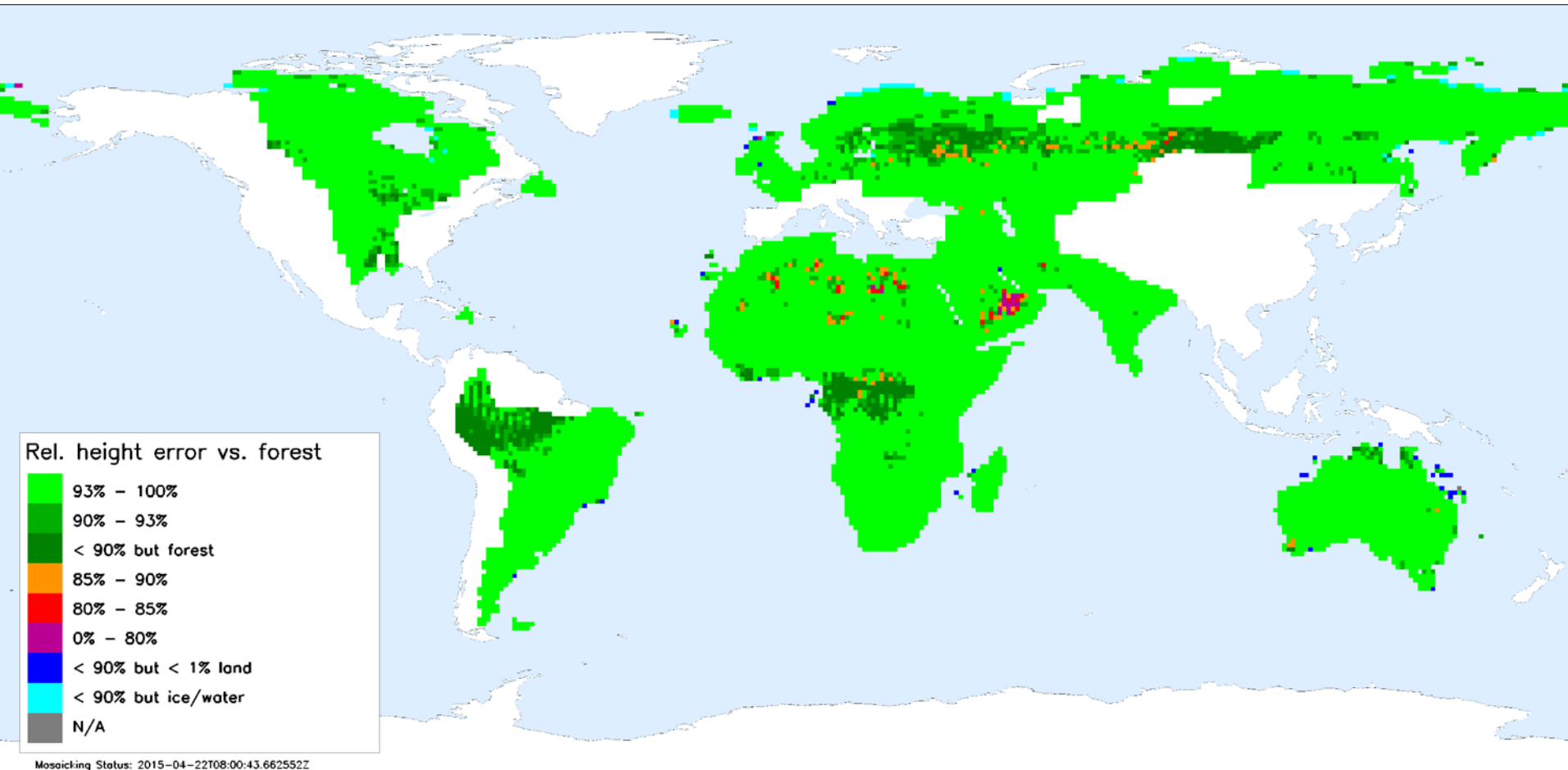


Mosaicking Status: 2015-04-22T08:00:52.165792Z

Analysis Statistics		22.04.2015
Number of Available DEM Tiles		9,691
Accumulated Number of Validation Points		8,741,165
Mean Height Deviation of Validation Points		0.15 m
Linear Error for Absolute Height Accuracy of 10 m		99.77%
Accumulated Absolute Height Accuracy with 90% LE		1.07 m



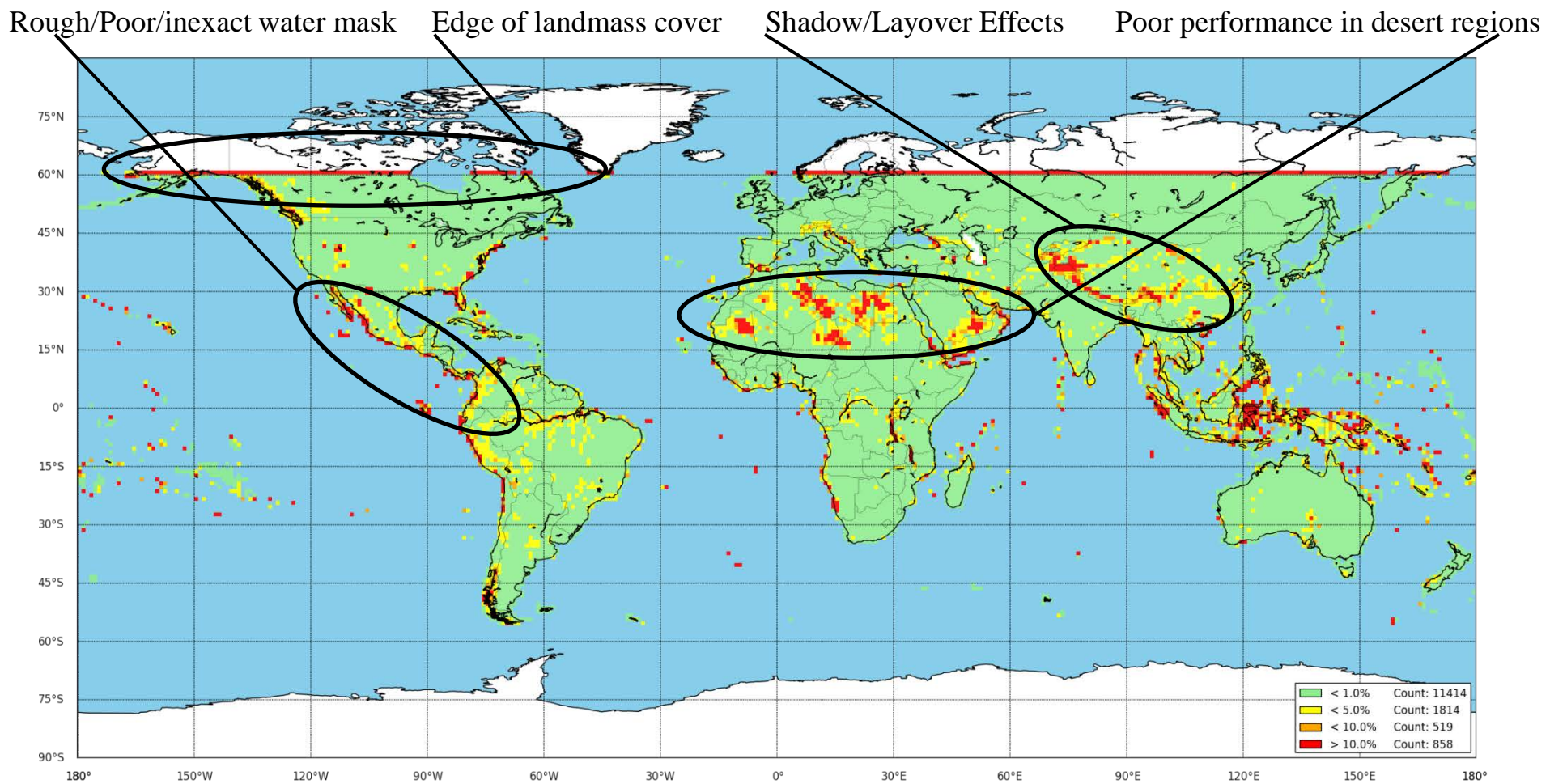
Final DEM Tiles – Relative Height Error



➤ Actual status of final DEM: 98.4% of all data achieve relative height error specification (2m/4m)



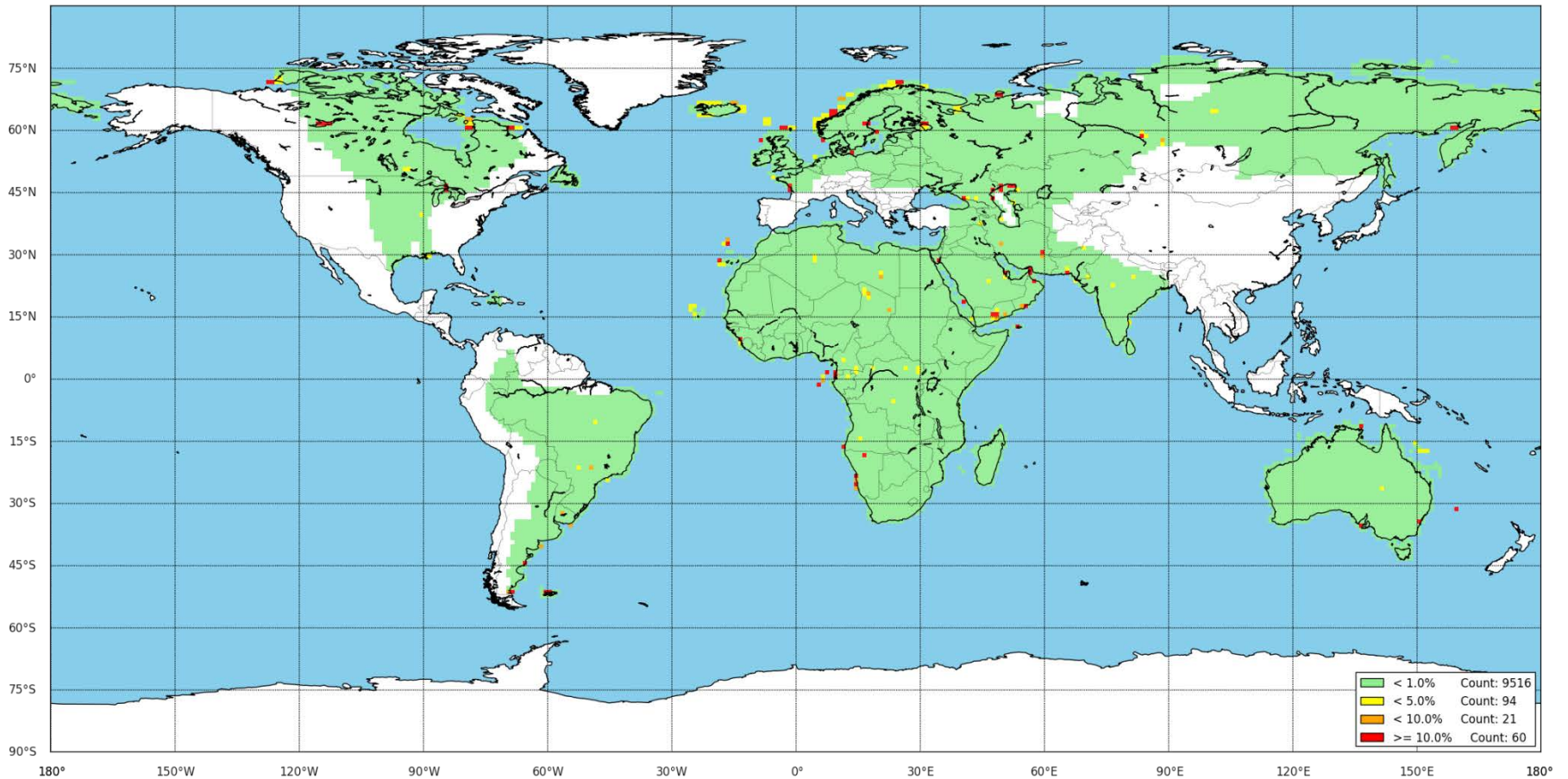
Voids/Invalid Data in SRTM



Approx. 20% of SRTM tiles have > 1% Void Density



Voids/Invalid Data TanDEM-X



Less than 2% of TanDEM-X tiles have > 1% Void Density



TanDEM-X DEM Status

- Stable operations in close formation since Oct-2010
- Outstanding calibration of the interferometric system
- Data acquisition for global DEM completed
- 60% of the final TanDEM-X DEMs processed
- Available data well within specifications
- Global TanDEM-X DEM to be completed in Q3-2016



TanDEM-X Science Phase

<https://tandemx-science.dlr.de/>

Aug-Sept 14

Oct 2014 –Feb 2015

Mar – Aug 2015

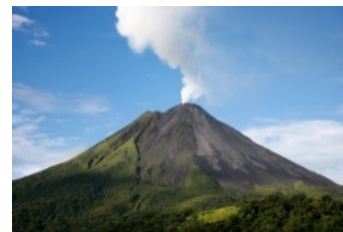
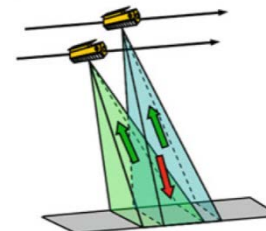
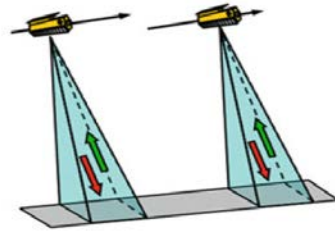
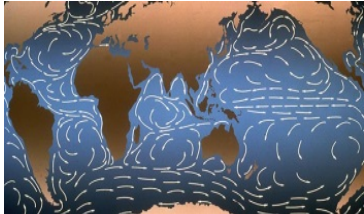
Sept –Dec 2015

Close bistatic
Small along-track
Northern Hemisphere

Pursuit Monostatic
76 km along-track
Helix drift in 104 days

Large bistatic
~ 3.6 km cross-track
at the equator

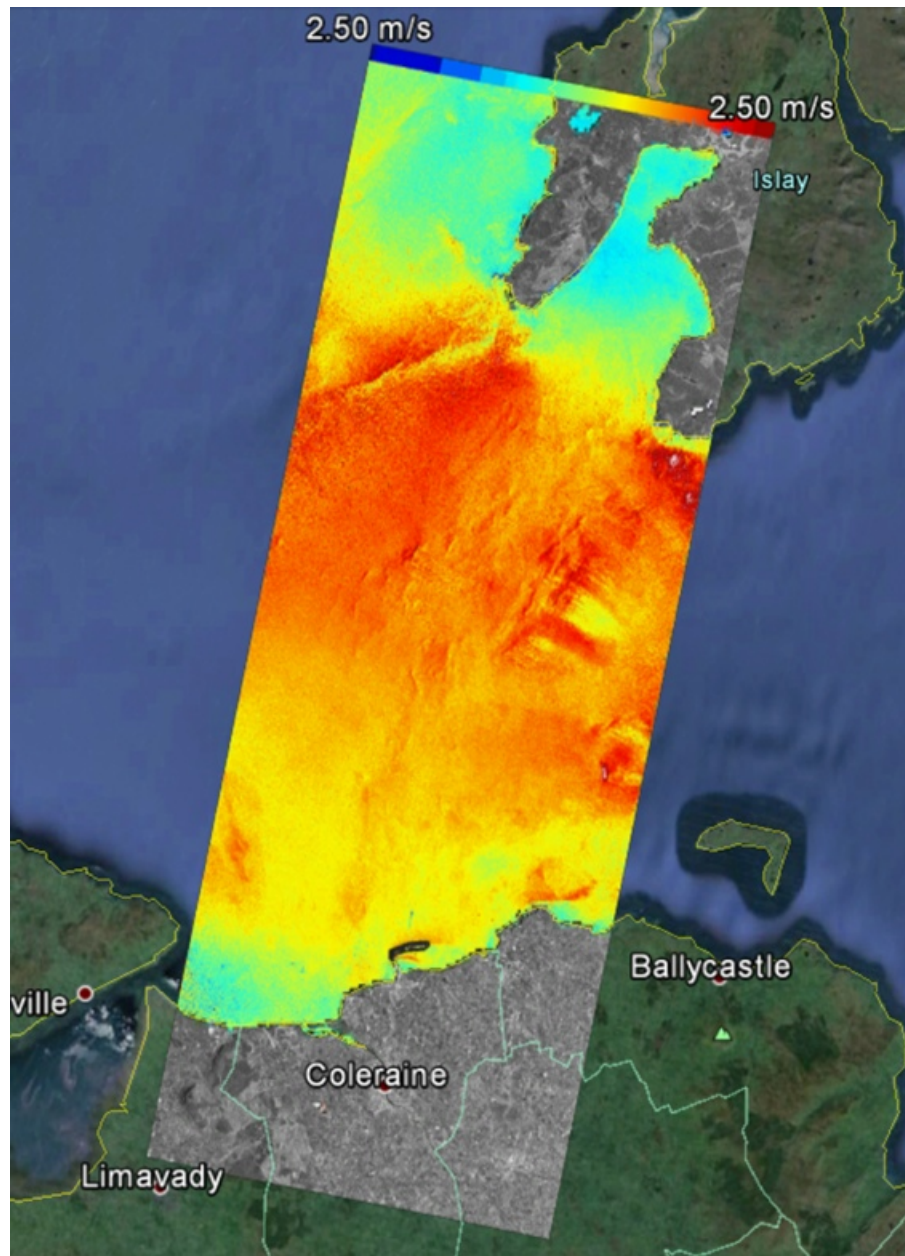
Close bistatic
Small along-track
Southern Hemisphere



from Dec. 2014: Dual Receive Antenna Mode



Tidal Currents, Islay, U.K., 10.08.2014



$\vartheta = 32.4^\circ$
 $B_{ATL_{eff}} = 17 \text{ m}$
 $B_{\perp} = 21 \text{ m}$
 $VOA = 7.4 \text{ m/s}$
 $HOA = 239 \text{ m}$

S. Suchandt, IMF Seminar, 29.10.2014



TerraSAR-X/TanDEM-X Mission beyond 2015

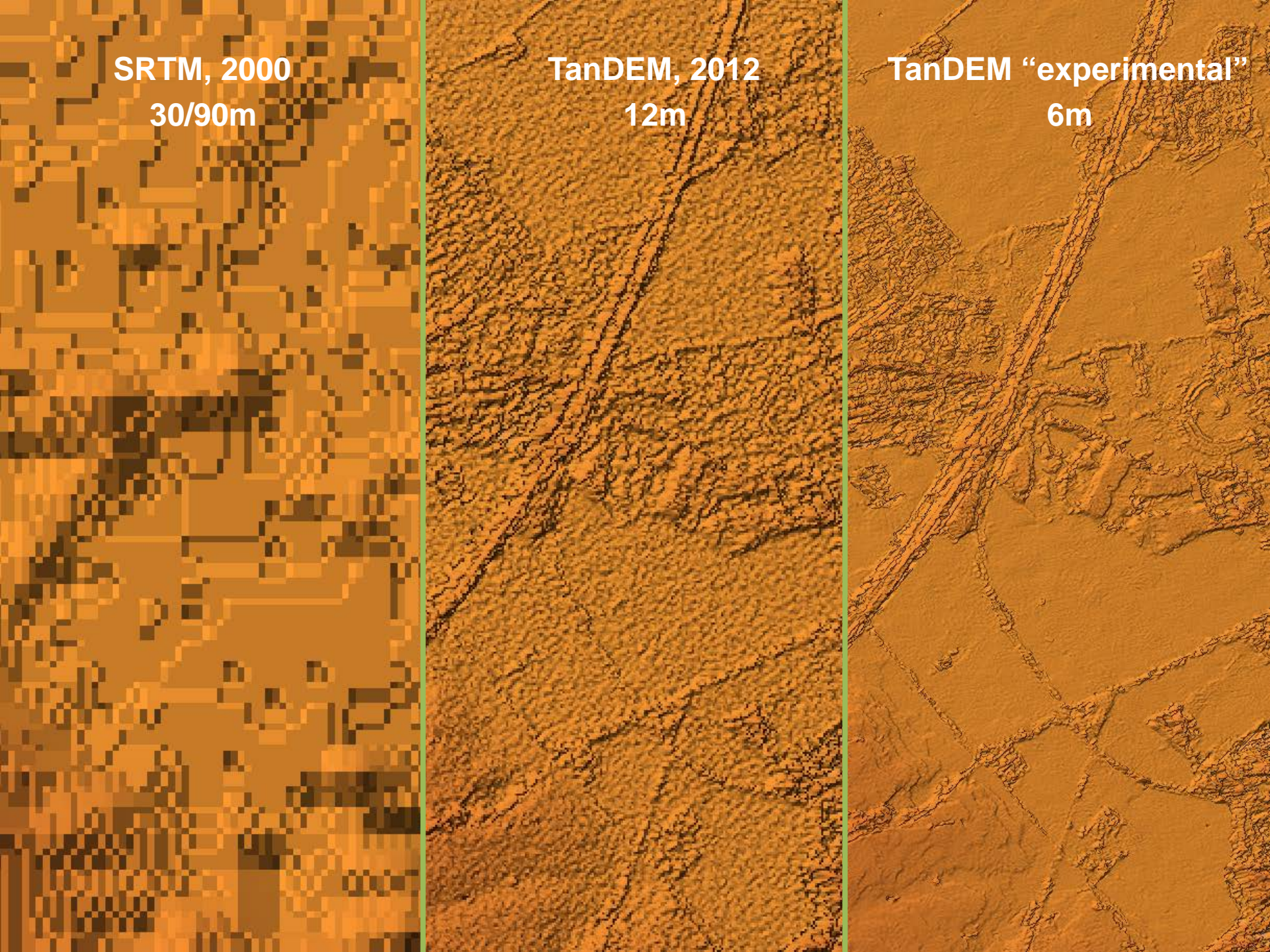
- Based on available onboard resources operation up to 2020 predicted for both satellites
- Unique feature of close formation flight and bistatic operation to be continued
- TanDEM-X Interferometer can do more:
 - local high resolution DEMs (HDEMs)
 - 6m posting, 0.8m (goal) rel. height error
- Agreement between DLR & AIRBUS for mission continuation in preparation

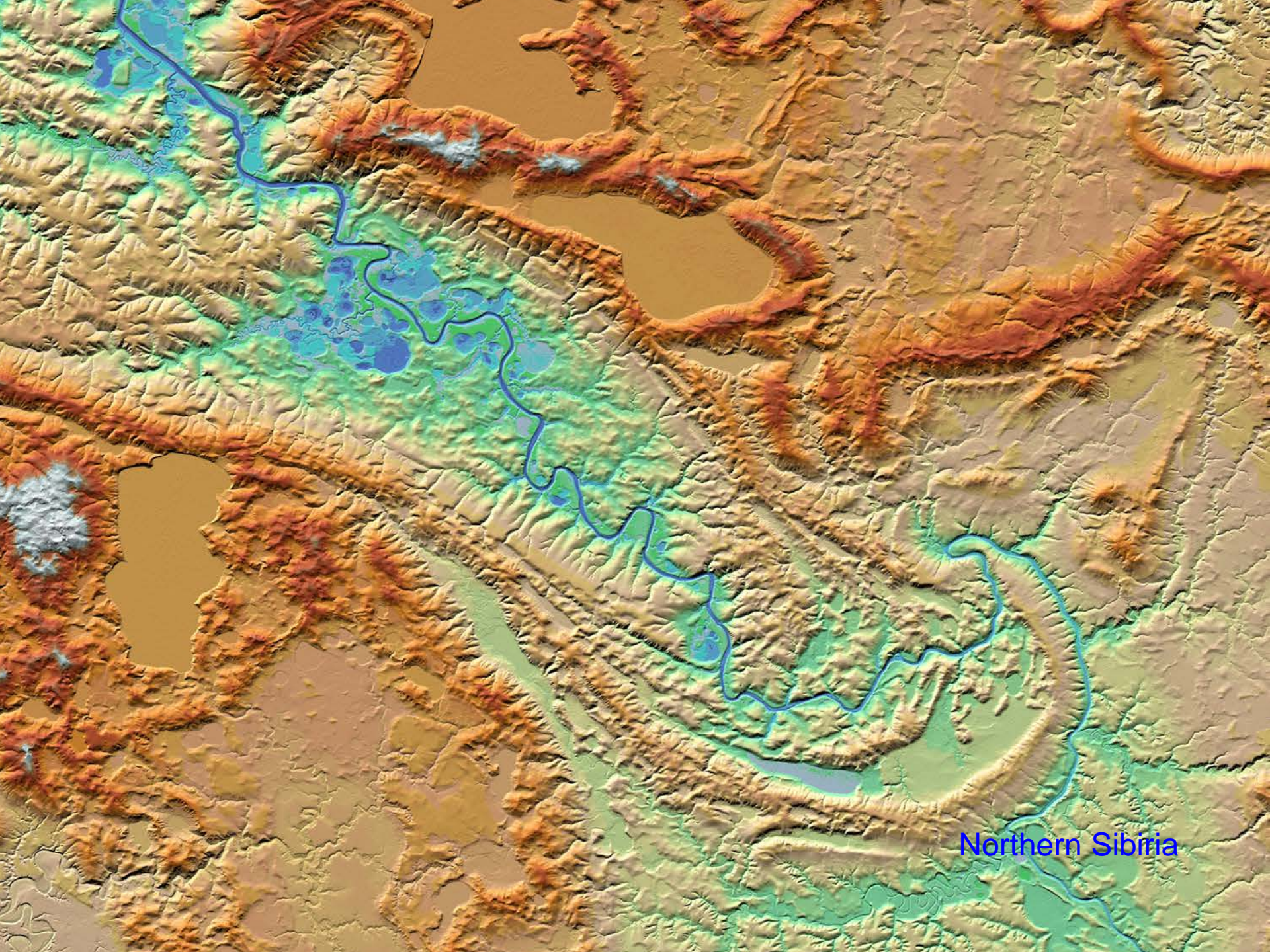


SRTM, 2000
30/90m

TanDEM, 2012
12m

TanDEM "experimental"
6m





Northern Siberia