



3D remote sensing technology in mapping of forests resources

Advanced_SAR, FP7-SPACE-2013-1, GA# 606971

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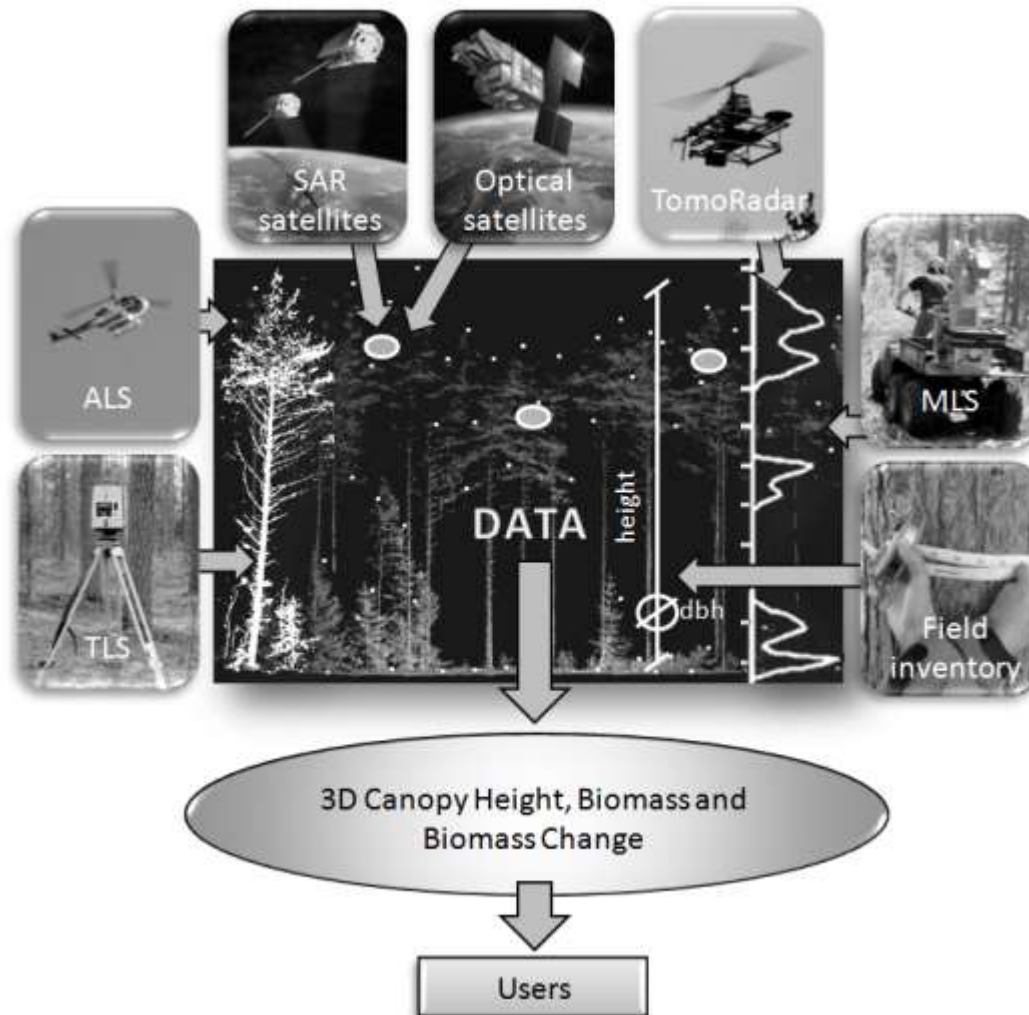


The Advanced SAR project

- EU FP7-SPACE-2013-1, Collaborative project
- Coordinator: FGI/ Prof. Juha Hyyppä
- Beneficiaries: Swedish University of Agricultural Sciences (SLU), Technische Universitaet Wien (TU WIEN), Treemetrics Ltd (TM) and Chalmers University of Technology (CHALMERS).
- EU funding: 2 Million Euros
- 255 person months
- Duration: October 2013 - September 2017
- www site: <http://www.fgi.fi/advancedsar>
- More info: EU space research, Into Space, project catalog

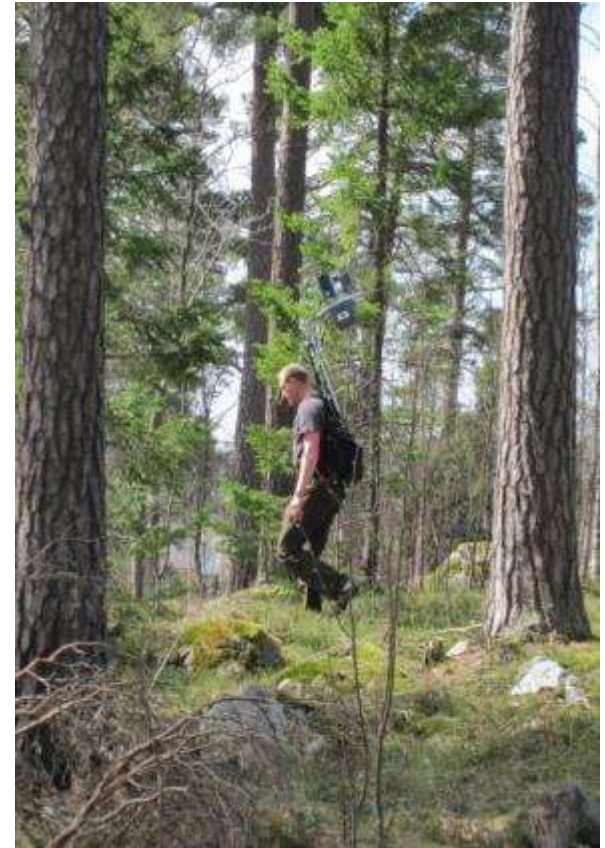


We aim at improved forest resources mapping by integrating various 3D remote sensing techniques from terrestrial to satellite systems



Finnish campaigns 2014 & 2016 in the Evo test site

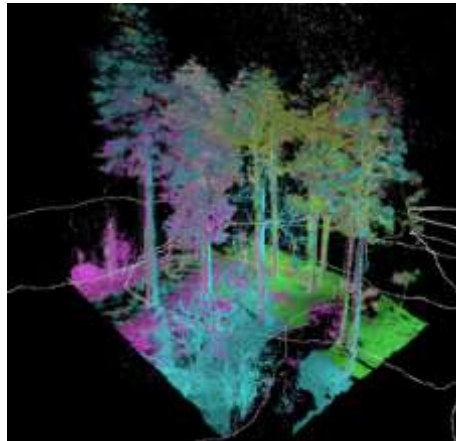
- Field inventory, TLS
- MLS with ATV and PLS using backpack
- Satellite: VHR optical stereo, TSX stereo, TDX INSAR
- Airborne data (NLS & own systems): ALS and aerial images with different flying altitudes, FGI-Tomoradar



Terrestrial Laser Scanning and Mobile Laser Scanning



- Next breakthrough in forest inventories? Automated field surveys, better accuracy with reduced costs
- We are leading the EuroSDR comparison in the use of TLS in forest inventory (coordinated by Dr. Xinlian Liang, FGI)



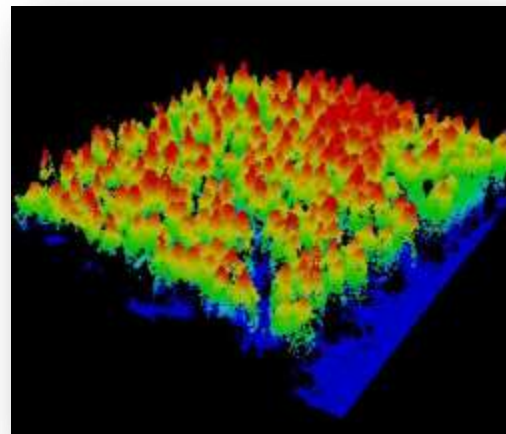
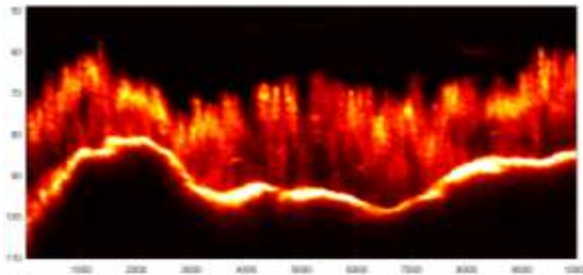
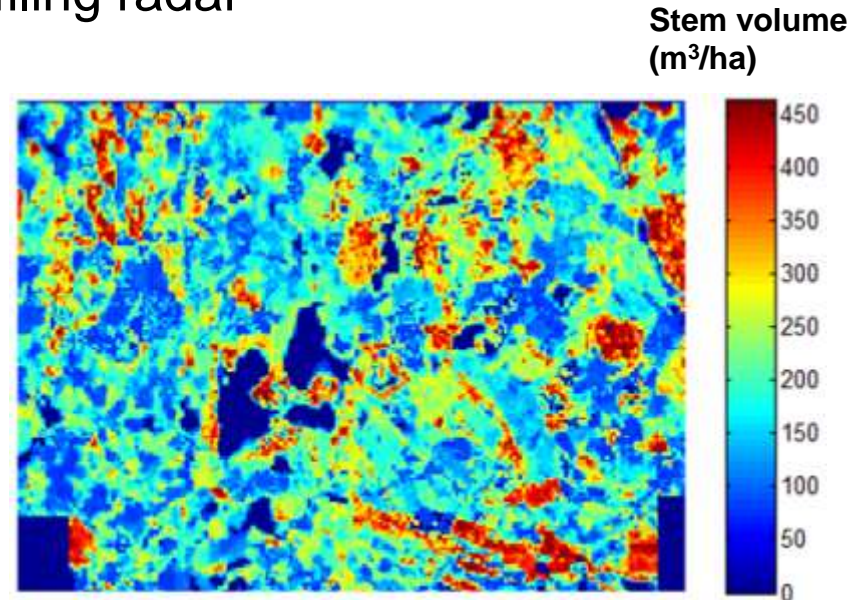
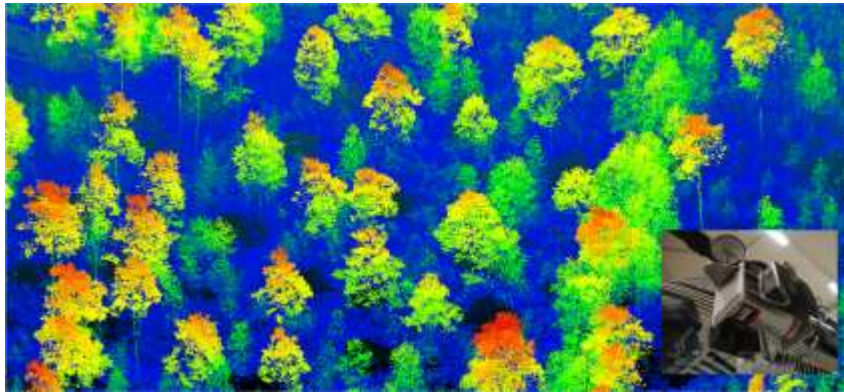
Forest Inventory:
Tree height
DBD
Stem volume
etc..



Liang et al., 2016. Terrestrial laser scanning in forest inventories, ISPRS Journal of Photogrammetry and Remote Sensing, Vol. 115: 63-77.

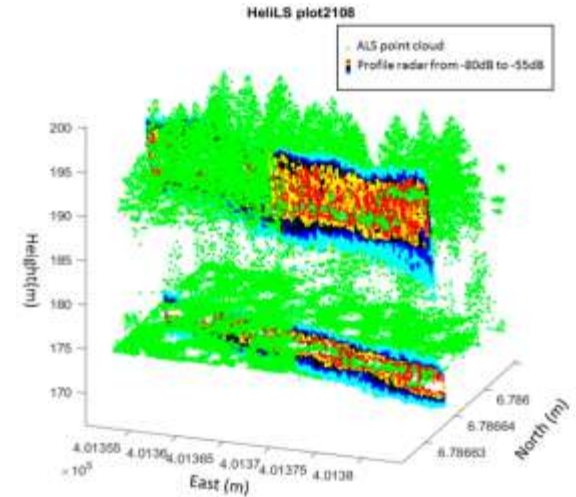
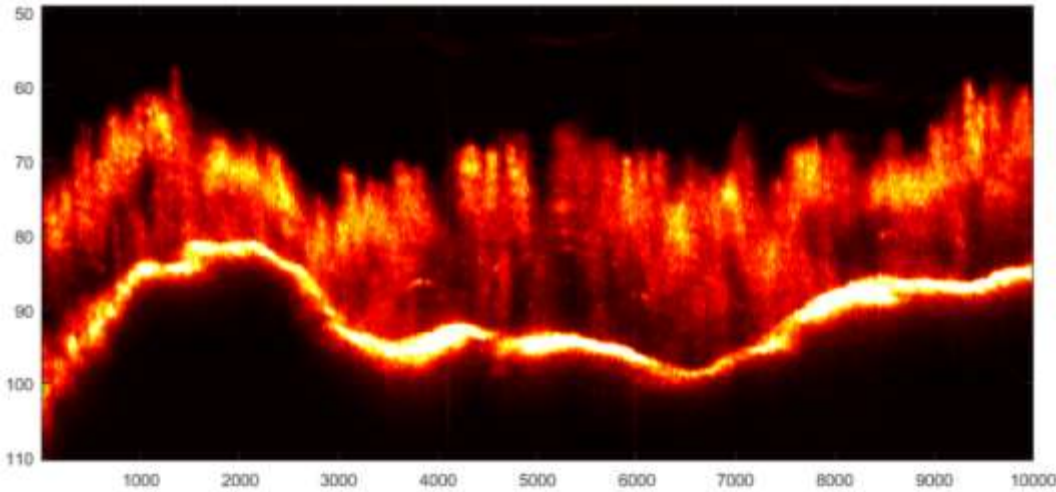
Airborne technology

- Laser scanning, aerial images, profiling radar



FGI-Tomoradar

- An updated version of the HUTSCAT



Chen et al., 2016. UAV-Borne Profiling Radar for Forest Research, Remote Sensing, 9(1), 58.

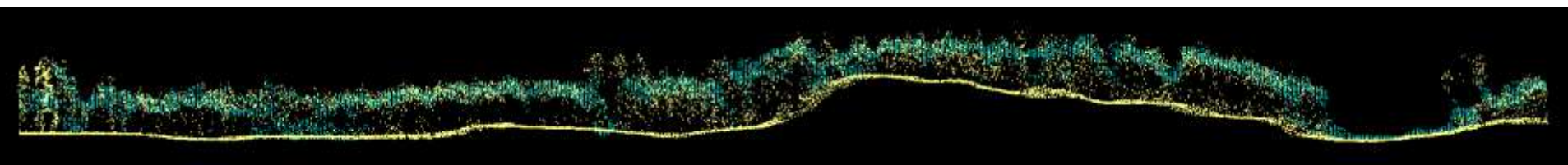
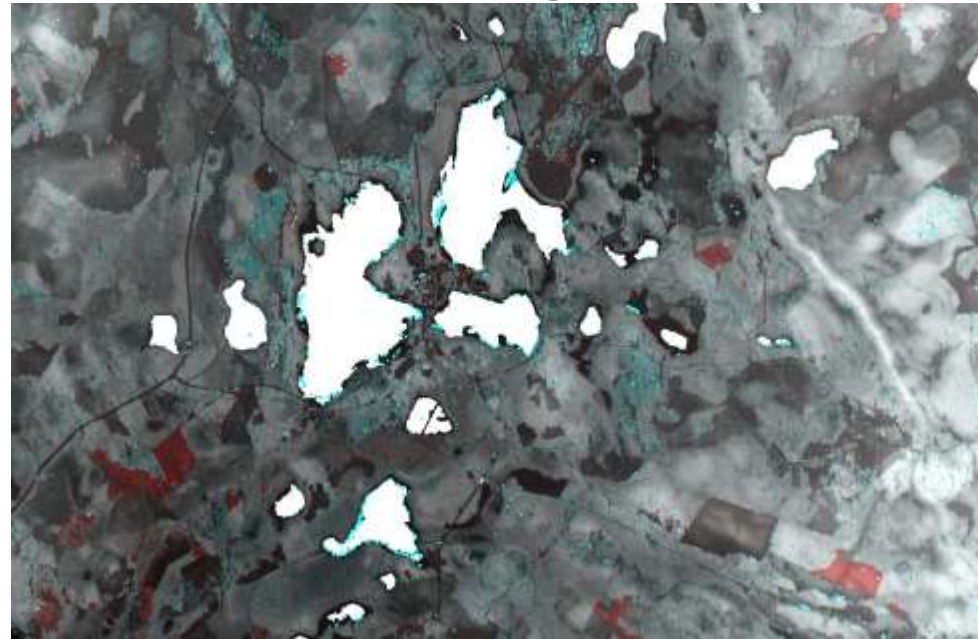


VHR optical stereo satellite images

- Elevation models from the in-track stereo pairs



DEM change 2014-2016



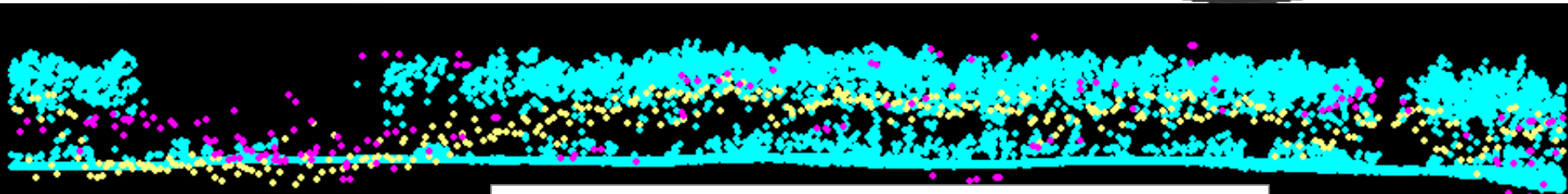
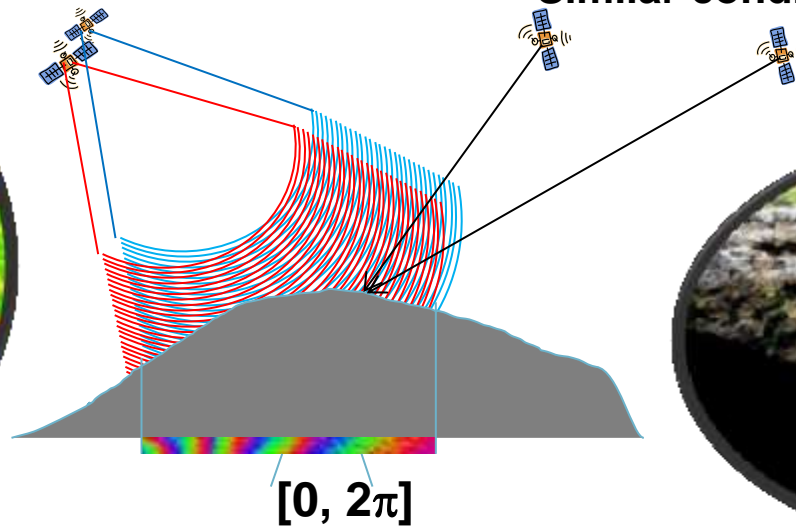
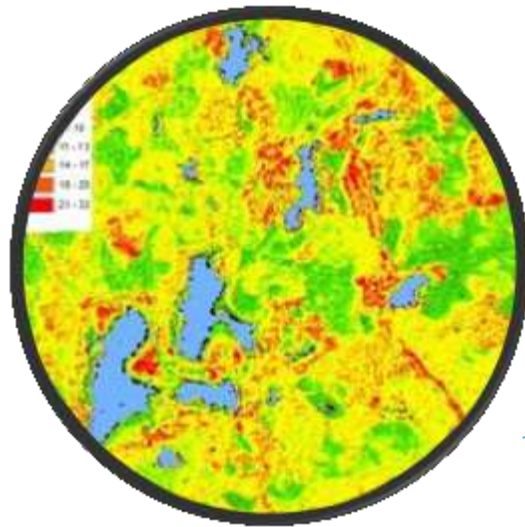
3D SAR techniques (satellite)

INSAR

- Phase difference, relative elevation differences
- Baseline of hundreds of meters
- Simultaneous imaging

Stereo-radargrammetry

- Stereoscopic measurement (automatic image matching), absolute elevation measurements
- Baseline of hundreds of kilometers
- Similar conditions



ALS, TDX INSAR, TSX Radargrammetry

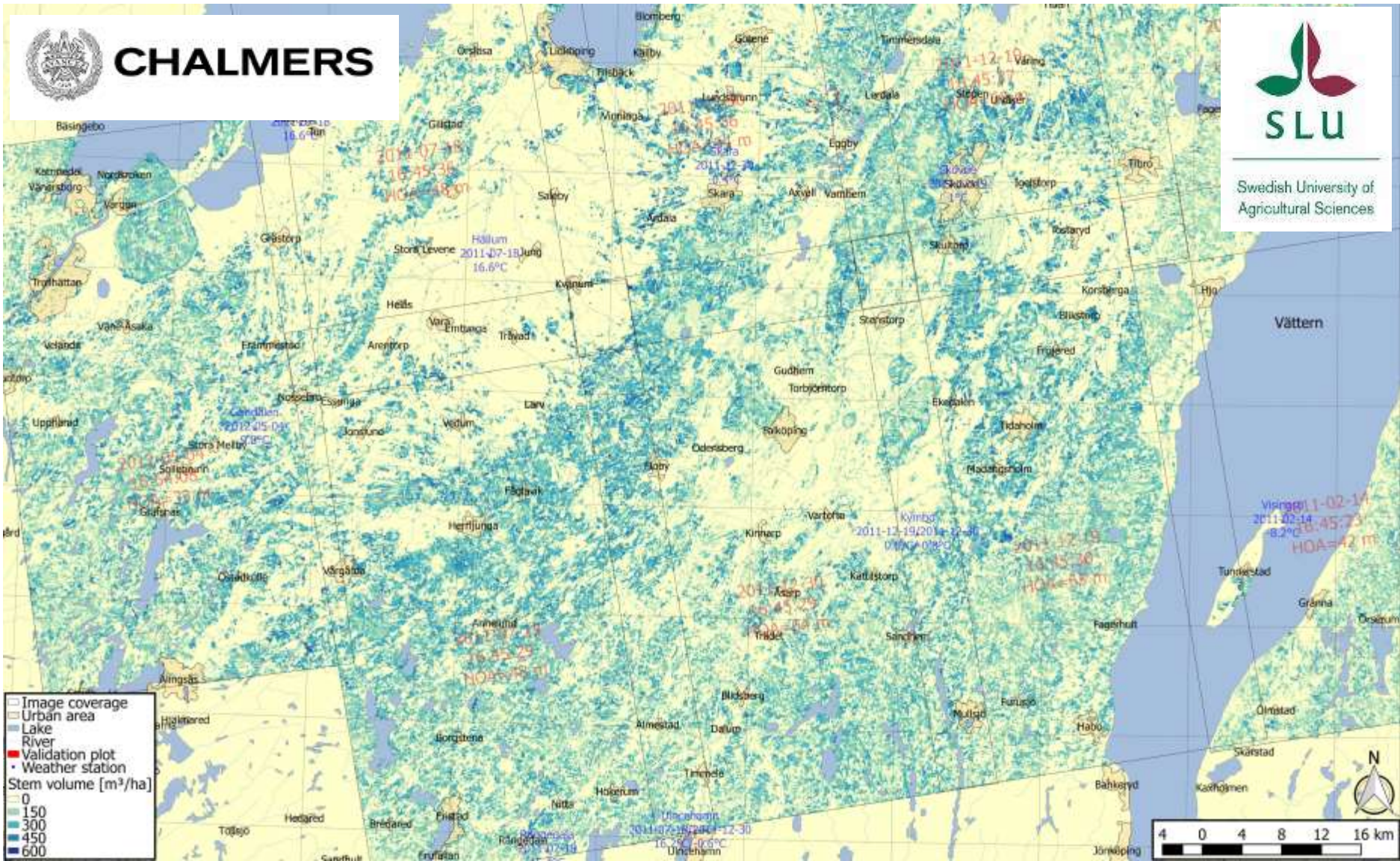
TanDEM-X Satellite-based forest map of Sweden



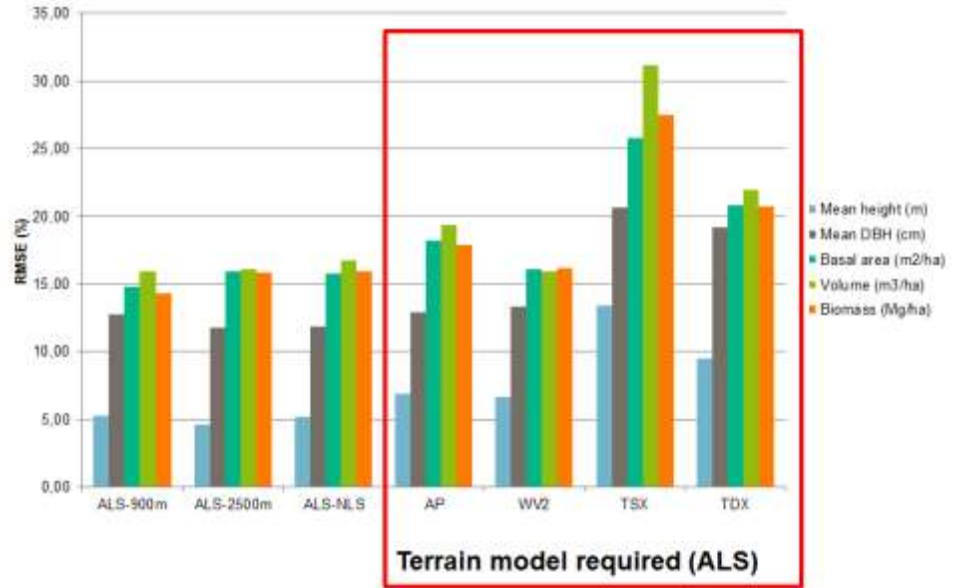
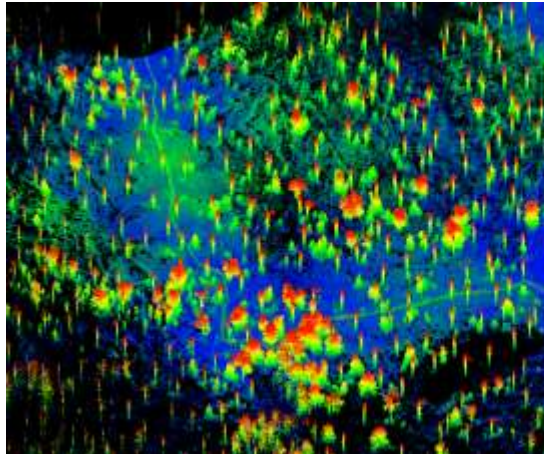
CHALMERS



Swedish University of
Agricultural Sciences



Success stories



Yu et al., 2016. Comparison of Laser and Stereo Optical, SAR and InSAR Point Clouds from Air- and Space-Borne Sources in the Retrieval of Forest Inventory Attributes, Remote Sensing, 7(12), 15933-15954.



SOLID POTATO

SHARPER SHAPE
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More information

www.fgi.fi/advancedsar

