

**K&C Initiative, Extension Phase 2009-2011:
Mapping and monitoring of forests in Sweden using ALOS
PALSAR data**

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Introduction

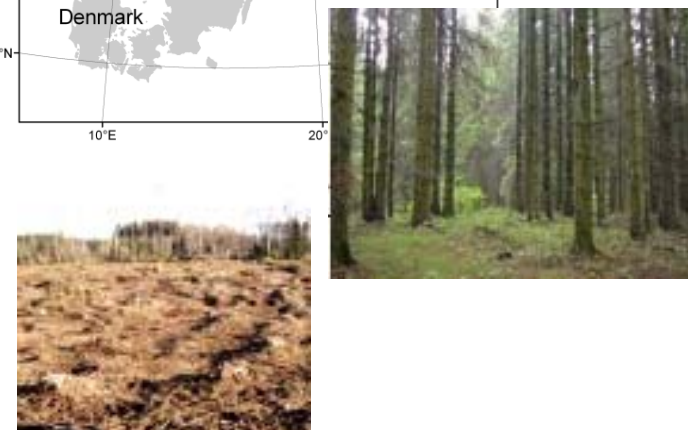
Project objective:

To further develop and evaluate methods for large-scale mapping and monitoring of clear-cuts and possibly also stem volume or biomass for the entire Sweden using ALOS PALSAR data

Project region:

Sweden

NOTE: Sweden + Norway + Finland would be nicer in view of targeting a geographic region but logistically not practical at the moment → PALSAR data are delivered though for this area



Schedule

The objective will be achieved by refining the developed methodology and algorithms in Phase 1 and by performing a scientific evaluation of clear-cut detection and possibly biomass estimation of Sweden

- Refinement of the developed **methodology** in Phase 1 (2009) - ONGOING
- Refinement of the **processing chain** developed in Phase 1 (2009) - COMPLETED
- Adaptation of **processing chain** from regional (for biomass estimation from local) to national scale mapping (2010) - ONGOING
- Up-scaling and testing of **methodology for change detection** (and biomass estimation) (2010)
- Production of clear-cut (and biomass) maps (2010)
- Final delivery of the product with a written report to JAXA (2011)

Johan Fransson, Andreas Pantze and Håkan Olsson, SLU, Sweden

Leif Eriksson and Lars Ulander, Chalmers University of Technology, Sweden

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Schedule – some more details

- Funding has been granted for 2010-2011 by the Swedish National Space Board
- One Ph.D. student full-time employed at SLU since Jan. 2009
- Clear-cut detection method of Phase 1 used as basis for more advanced method in order to improve clear-cut delineation
- Reference data for accuracy assessment being sought at different locations
- Pursuing biomass estimation is yet unclear if feasible within the timeframe of the extension

Deliverables

- No pending deliverables from Phase 1 (← clear-cut maps of prototype areas delivered during this meeting)
- The deliverable of the extension will be a clear-cut map (and possibly also a biomass map) covering the entire Sweden with an estimate of the product accuracy

Johan Fransson, Andreas Pantze and Håkan Olsson, SLU, Sweden

Leif Eriksson and Lars Ulander, Chalmers University of Technology, Sweden

Maurizio Santoro, GAMMA Remote Sensing, Switzerland



List of publications on ALOS PALSAR and K&C

Eriksson, L. E. B., Magnusson, M., Fransson, J. E. S., Sandberg, G., Ulander, L. M. H., "Stem volume estimation for boreal forest using ALOS PALSAR," Proceedings of 5th International Symposium on Retrieval of Bio- and Geophysical Parameters from SAR Data for Land Applications, Bari, 25-28 September, CD-ROM, 2007.

Eriksson, L. E. B., Sandberg, G., Ulander, L. M. H., Smith-Jonforsen, G., Hallberg, B., Folkesson, K., Fransson, J. E. S., Magnusson, M., Olsson, H., "ALOS PALSAR calibration and validation results from Sweden," Proceedings of IGARSS'07, Barcelona, 23-27 July, pp. 1589 - 1592, 2007.

Eriksson, L. E. B., Sandberg, G., Fransson, J. E. S., Magnusson, M., Ulander, L. M. H., "ALOS PALSAR calibration and validation activities in Sweden," Proceedings of The First Joint PI Symposium of ALOS Data Nodes for ALOS Science Program, Kyoto, 19-23 November, CD-ROM, 2007.

Eriksson, L. E. B., Santoro, M., Fransson, J. E. S., "Temporal decorrelation for forested areas observed in spaceborne L-band SAR interferometry," Proceedings of IGARSS'08, Boston, 6-11 July, in press, 2008.

Fransson, J. E. S., Magnusson, M., Olsson, H., Eriksson, L. E. B., Sandberg, G., Smith-Jonforsen, G., Ulander, L. M. H., "Detection of forest changes using ALOS PALSAR satellite images," Proceedings of IGARSS'07, Barcelona, 23-27 July, pp. 2330-2333, 2007.

Fransson, J. E. S., Magnusson, M., Olsson, H., Eriksson, L. E. B., Folkesson, K., Sandberg, G., Santoro, M., Ulander, L. M. H., "Detection of clear-cuts using ALOS PALSAR satellite images," Proceedings of EUSAR 2008, Friedrichshafen, 2-5 June, CD-ROM, 2008.

Fransson, J.E.S., Olsson, H., Eriksson, L.E.B., Ulander, L.M.H., and Santoro, M., "K&C Science Report – Phase 1, Detection of deforestation in Swedish forest", JAXA, 2009, 11 pages.

Magnusson, M., Fransson, J. E. S., Eriksson, L., Sandberg, G., Smith-Jonforsen, G., Ulander, L. M. H., "Estimation of forest stem volume using ALOS PALSAR satellite images," Proceedings of IGARSS'07, Barcelona, 23-27 July, pp. 4343 - 4346, 2007.

Pantze, A., Fransson, J.E.S., and Santoro, M. 2010. Forest change detection from L-band satellite SAR images using iterative histogram matching and thresholding together with data fusion. In Proceedings of IGARSS 2010 Symposium, Remote Sensing: Global Vision for Local Action, 30th Anniversary, Honolulu, Hawaii, USA, 25-30 July, 2010. Submitted abstract.

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- Pantze, A., Krantz, A.H., Fransson, J.E.S., Olsson, H., Santoro, M., Eriksson, L.E.B., and Ulander, L.M.H. 2009. Mapping and monitoring clear-cuts in Swedish forest using ALOS PALSAR satellite images. In Proceedings of IGARSS 2009 Symposium, Earth Observation – Origins to Applications, Cape Town, South Africa, 13-17 July, 2009.
- Santoro, M., Fransson, J.E.S., Eriksson, L.E.B., Magnusson, M., Ulander, L.M.H., Olsson, H., and Krantz, A. 2008. Investigations on forestry applications in Sweden using ALOS PALSAR. In Proceedings of ALOS PI 2008 Symposium, Rhodes, 3-7 November, ESA-SP 664, 2008.
- Santoro, M., Fransson, J.E.S., Eriksson, L.E.B., Magnusson, M., Ulander, L.M.H., and Olsson, H. 2009. Signatures of ALOS PALSAR L-band backscatter in Swedish forest. *IEEE Transactions on Geoscience and Remote Sensing* 47(12), 4001-4019.
- Santoro, M., Fransson, J.E.S., Eriksson, L.E.B., and Ulander L.M.H. Clear-cut detection in Swedish boreal forest using multi-temporal ALOS PALSAR backscatter data. Submitted to IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing.*
- Santoro, M., Wegmüller, U. Strozzi, T., Askne, J., and Fransson, J.E.S. 2009. Examples of thematic mapping with ERS-Envisat tandem cross-interferometry. In Proceedings of Fringe 2009 Workshop, ESA-ESRIN, Frascati, Italy, 30 November - 4 December, in press.
- Ulander, L. M. H., Eriksson, L., Smith-Jonforsen, G., Fransson, J. E. S., Olsson, H., "ALOS calibration and validation activities in Sweden," Proceedings of IGARSS'06, Denver, 31 July - 4 August, pp. 336-339, 2006.

Future publications

Pantze et al., topic: Clear-cut detection in Swedish using ALOS PALSAR data, tentative date: 2010

Pantze et al., topic: Stem volume retrieval using ALOS PALSAR data, tentative date: 2011

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Acknowledgments

- Swedish National Space Board
- Hildur Sven Wingquist's Foundation for Forest Research
- JAXA EORC and ALOS K&C team at JAXA
- Forestry Society's Estate Management Company (Skogssällskapet)
- Swedish Hydrological and Meteorological Institute (SMHI)
- Svartberget research station, SLU
- Swedish National Land Survey
- Sveaskog