

# Summary of the ScandLaser 2003 workshops and recent developments in Sweden

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## ABSTRACT

The ScandLaser workshops held in Umeå, Sweden, September 2-4, 2003, was arranged by the Swedish University of Agricultural Sciences (SLU), The Finnish Geodetic Institute, and the Agricultural University of Norway (NLH). This was the first international meeting dedicated to laser scanning of forests held in Europe. The aim of the first part of this presentation is therefore to extract the key findings from the ScandLaser meetings and bring them forward to the NatScan conference. The aim of the second part of the presentation is to sum up last years news from Sweden in the field of laser scanning of forests.

ScandLaser started with a one day "Practical workshop" arranged by Prof Erik Næsset, NLH. The aim was to introduce a method for large area standwise forest inventory, using the combination of laser scanning and photogrammetry, developed at NLH. The method is now marketed as operational by Norwegian companies. Cost-plus-loss analysis showed that the higher cost for the laser scanning method could be compensated by the value of obtaining more accurate data.

The ScandLaser scientific workshop was attended by about 70 researchers from 16 countries. Dr Steinvall from the Swedish Defence Research Agency summarized the rapid development of military laser scanning technology which also will influence the future civilian sensors. He concluded: "technology developments in 3D FPA, streak tubes, new compact multi-wavelength lasers and new scanner/beam forming devices point towards compact versatile laser radars for environmental monitoring". In total, 27 oral presentations were given. Most of them were applied studies where features from laser data had been correlated with field plot measured forestry data, often using regression techniques. In Scandinavian boreal forests, a typical accuracy of 15-25 % RMSE is obtained for stem volume assessment at plot level, which is reduced to 10-15 % when aggregated at stand level. There were also several presentations on single tree detection. Under Scandinavian conditions, up to 70 % of the individual trees have been detected, and their height and diameter has been measured with down to 0,5 m accuracy. Also presented were successful tree species discrimination and change studies at single tree level. From the presentations, it was obvious that the results might be less encouraging in forests dominated by broad leaved species. Some studies focused on the assessment of forest structure for use in ecological models. In a poster session, five studies on terrestrial, horizontal, laser scanning of vegetation were presented. The ScandLaser proceedings can be ordered from [Barbro.gunnarsson@resgeom.slu.se](mailto:Barbro.gunnarsson@resgeom.slu.se). Selected papers will also be published in Scandinavian Journal of Forest Research this autumn 2004.

The last year development in Sweden includes four studies carried out at SLU:

- the first large area, semi operational, forestry laser scanning project in Sweden, covering stand wise assessment of a 5 000 ha area;
- a study about assessing diameter distributions using imputation techniques;
- a stand level study in which laser data is compared with, and combined with, satellite data;
- a study in which optical data and laser data is combined at single tree level.