Workshop on optimizing plot-level measurements in forest resources assessment

## Welcome to the CARISMA workshop from 21 to 23 August 2017 in Helsinki, Finland.

CARISMA is a virtual Center of Advanced Research for the innovative use of 3D remote sensing in mapping of forest and landscape attributes based on national forest inventories funded by SNS. The network improves the coordination of research on the use of 3D remote sensing data in the Nordic national forest inventories (NFIs). See <http://www.nibio.no/en/prosjekter/carisma> for more information.

Topics of the workshop are

* New 3D devices for plot-level measurements in forest inventory (e.g. digital cameras, terrestrial laser scanning, mobile laser canning)
* Using TLS/MLS data as ground truth information in large-scale forest inventory
* Generalizing sample tree measurements to tally trees
* Efficient use of sample tree measurements in forest inventory
* Possibilities of 3D point cloud data in forest modelling (volume, biomass, growth, quality models)

If you like to give a presentation, please send your title and abstract (max 250 words) (we may not be able to include all presentations) to [Annika.kangas@luke.fi](mailto:Annika.kangas@luke.fi).

Venue: Hotel Kalastajatorppa Helsinki <http://hilton-kalastajatorppa.hotel-rn.com/?lbl=ggl-ex>

Deadlines:

Abstracts by 31.3.2017

Final program 30.4.2017

Registration is open 1.5.-31.5. 2017

### *Program*

### *21 August*

10.00-12.00 **Registration**

12:00-13:00 Lunch

Chair: Kari T. Korhonen

13:00-15:00 **Session 1**: Analyzing pointcloud data

13:00-13:30 Welcome by Luke (Sari Forsman-Hugg)

13:30-14:30 Keynote: **Accurate 3D and 4D tree and forest models from point cloud data**. Prof. Mikko Kaasalainen, Tampere University of Technology

14:30-15:00. **Measuring stem diameters with close-range photogrammetry**. Klatt, S., Breidenbach, J., Astrup, R., Pötschke, M.

15:00-15:30 Coffee break

Chair: Mats Nilsson

15:30-18:00 **Session 2**: Experiences with terrestrial laser scanning

15:30-16:00 **TreeQSM – A tree architecture reconstruction method from TLS data**. Raumonen, P., Åkerblom, M., Kaasalainen, M.

16:00-16:30 **First results from tree measurements using mobile laser scanning systems in Sweden.** Holmgren, J., Willen, E., Tulldahl, M.

16:30-17:00 **Preliminary results of the Finnish TLS data: from point cloud to QSM and beyond.** Pitkänen, T.P., Kangas, A.

17:00-17:30 **Terrestrial laser scanning for forest inventories - Influence of laser beam diameter on DBH retrieval.** Abegg, Morsdorf

17:30-18:00 **Automatic estimation of tree position and stem diameter using a mobile terrestrial laser scanner** Oveland, I., Hauglin, M., Gobakken, T., Næsset E., and Maalen-Johansen, I.

18:00 CARISMA board meeting

19:00 Dinner (funded by CARISMA)

### *22August*

8:30-12:00 **Session 3**: Experiences with the new technologies

Chair: Johannes Breidenbach

08:30-09:30 **Key-note: Possible Concepts and Technologies for Future Large-Area Forest Inventories** Juha Hyyppä FGI

9:30-10:00 **International benchmarking of terrestrial laser scanning for forest inventories**. Liang, X, Hyyppä, J, Kaartinen, H.

10:00-10:30 **Experience acquired through a decade of terrestrial laser scanning measurements**. Kankare, V., Holopainen, M., Vastaranta, M., Saarinen, N., Liang, X., Yu, X., Kaartinen, H., Kukko, A., Hyyppä, J.

10:30-11:00 **Accurate single-tree positions from a harvester: Using a harvester to obtain ground reference data** Hauglin, M., Hansen, E.H. Næsset, E., Gjevestad, J.G.O. and Gobakken, T.

11:00-11:30 **Using statistical reconstruction methods for studying optimal sample designs in forest inventories**. Kuronen, M., Häbel, H., Henttonen, H., Grabarnik, P., Myllymäki, M.

11:30-12:00 **A new sampling strategy for the temporary part of the Swedish national forest inventory**. Grafström, A., Zhao, X., Nylander, M., Petersson, H.

12:00-13:00 Lunch

Chair: Thomas Nord-Larsen

13:00-15:00 **Session 4**: Modelling stem curves from point cloud data

13:00-13:30 **Indications of changes in tree stem form and sampling of trees for robust volume modelling.**

Heikkinen, J. and Henttonen, H.M.

13:30-14:00 **Observing changes in stem form of individual trees by means of TLS-time series.** Luoma, V., Vastaranta, M., Saarinen, N., Kankare, V., Kaartinen, H., Holopainen, M., Hyyppä, J.

14:00-14:30 **Developing species-specific taper curve models with terrestrial laser scanning data**. Saarinen, N., Liang, X., Kankare, V., Vastaranta, M., Pyörälä, J., Holopainen, M., Hyyppä, J.

14:30-15:00 **Evaluation of standing timber using stem curve and branch structure data derived from terrestrial laser scanning point clouds** Pyörälä, J., Vastaranta, M., Saarinen, N., Kankare, V., Liang, X., Rikala, J., Holopainen, M., Sipi, M., Hyyppä, J.

15:00-15:30 Coffee break

Chair: Annika Kangas

15:30-18:00 **Session 5**: 3D materials for forest inventory

15:30-16:00 **3D measurement of tree health with multispectral terrestrial laser scanning**. Junttila, S., Vastaranta, M., Linnakoski, R, Sugano, J., Kaartinen, H., Kukko, A., Holopainen, M., Hyyppä, H., and Hyyppä, J

16:00-16:30 **New opportunities for high-resolution wall-to-wall forest cover and tree type mapping**. Waser, L.T., Ginzler, C, Rehush, N.

16:30-17:00 **Prediction of forest attributes using 3D data from aerial images and field data from the national forest inventory**. Nilsson, M., Nyström, K., Wästlund, A., Axensten, P., Egberth, M., Jonzén J., and Olsson, H.

17:00-17:30 **Comparing photogrammetric point cloud data to 2D and 3D remote sensing material for forest resources mapping.** Tuominen, S., Pitkänen,T.P.Balázs, A. and Kangas, A.

17:30-18:00 Can terrestrial laser scanning (TLS) provide a new way forward for the study of canopy - ecosystem hydrology interaction?Andreasen, M., Nord-Larsen, T. & Christiansen, J.R.

19:00 Dinner at Salutorget restaurant <http://www.salutorget.fi/en/front-page/> Pohjoisesplanadi 15. Take tram 4 to get there, the trip takes approximately 33 minutes with 450 m walking. See the route from https://www.reittiopas.fi/



### *23August: Field trip*

08:00-13:00 Field trip to Nuuksio

Nuuksio national park. The bus will pick people up at Kalastajatorppa at 8:00

13:00-14.00 Lunch at Halti Nature center

14.00-15.30 Optional: Tour to the Halti Nature Center

15:30 Wrap up and coffee