Abstract template for the conference "A century of national forest inventories – informing past, present and future decisions"

Dear author. This is a two-page template that in the first page will ask for information on presenter name, topic, and preferred presentation form.

On page two, you are asked to fill in your abstract in the format and font size indicated. Please remember to include authors affiliation information in the footer section of page two. The length of the abstract may not be more than one page including references.

Abstract title:		The Norwegian forest resource map SR16 - the integration of airborne laser scanning and optical satellite data
Take-home message:		The Norwegian forest resource map SR16 is an attractive dissemination tool as many users can easier relate to maps than to tables. The specific characteristics of lidar projects are considered in linear mixed-effect models. Sentinel-2 data are used for tree species classification.
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General topic, see website: (please double click on the check box and activate the relevant one)	☐	Improving future NFIs by learning from the past
	☒	NFIs today and in the future
	☐	Cutting edge and futuristic inventory techniques and technologies
Preferred presentation form:	☒	Oral presentation
	☐	Poster
Abstracts will be reviewed by members of our scientific committee and you will be given information on decisions in due time after the submission deadline has passed.		

The Norwegian forest resource map SR16 - the integration of airborne laser scanning and optical satellite data

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Introduction: The Norwegian forest resource map (SR16) based on image matching data, was published for the Trøndelag region in 2015 (Astrup et al. 2019). Timber volume, biomass, basal area, tree height, site index, and the respective model-dependent uncertainties are provided for maps with a grid cell size of 16x16 m and "stand" segments generated using object-based image analysis (OBIA) (Kilden 2015). In 2015, the Norwegian Mapping Agency started a national airborne laser scanning (ALS) campaign that is supposed to be finalized in 2020. Laser data from this campaign are used in the further development of SR16 which is described here.

Materials and methods: Linear mixed-effects models with a random slope given ALS project area on the most important predictor variable are fitted to all Norwegian National Forest Inventory (NFI) plots currently covered with ALS data. Independent models are fitted for each of three dominant tree species groups (spruce, pine, deciduous). Sentinel 2 and other ancillary data are used for mapping the dominant tree species groups. For the potential use in Forest Management Inventories, maps are also generated using models stratified by tree species and site index. The plot-level response variables are forecasted to the current year and the difference between the current year and the respective ALS campaign is used as a predictor variable in the models. The models are applied to the wall-to-wall grid cells each year in order to provide updated maps. The Landsat-based Forest Cover Loss service is rather accurate in Norway, especially in the recent years (Rossi et al. 2019) and is used to update areas with stand replacement events.

Results: Based on the data currently available for the southern and south-eastern part of Norway, the root mean squared errors (RMSEs) of timber volume and above ground biomass for spruce, pine, and deciduous forest are 25%, 28%, and 40%, respectively. Tree species maps have an overall accuracy of 72% and a kappa of 0.55.

Conclusion: The combination of NFI and remotely sensed data is useful for mapping forest characteristics and the improvement of estimates on various scales. It is currently analysed weather further variables, especially those related to stand age and biodiversity, can be included in SR16.

References:

Astrup et al. 2019: SJForRes, https://doi.org/10.1080/02827581.2019.1588989

Kilden 2015: https://kilden.nibio.no/?X=6610117.75&Y=302723.56&zoom=6&lang=nb&topic=arealinformasjon&bgLayer=graatone_cache&layers=skogressurs_volum_r, web application

Rossi et al. 2019: RemSens, https://doi.org/10.3390/rs11050543

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