3-D modeling of biodiversity and Ecosystem Services (BES)

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Variable of interest:

1. Above-ground:

- Aboveground vegetation (**Tree height, diameter, BA**, **volume, aboveground biomass, species composition,** site type)
- Understory vegetation (**species, functional group**)
- Biodiversity indices (deadwood, **richness, habitat suitability**)
- Ecosystem services (**recreation potential, bilberry, cowberry, carbon**)
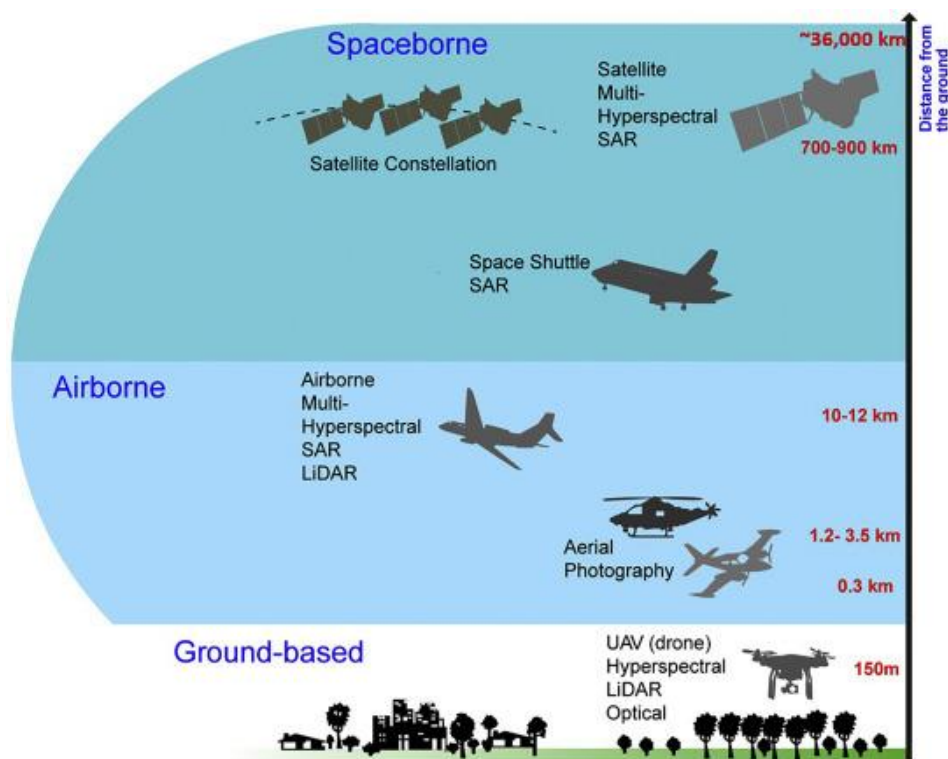
2. Below-ground:

- Topsoils (**surface temperature,** soil organic matter, nitrogen, pH, litter-organic and phosphorous, soil texture)
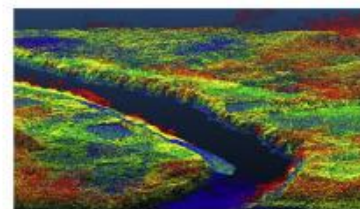- Hydrological (water table depth, **soil moisture**)
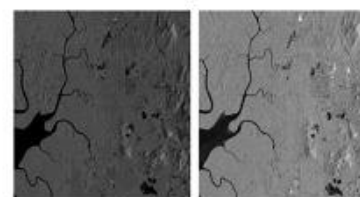- **Soil GHG flux**
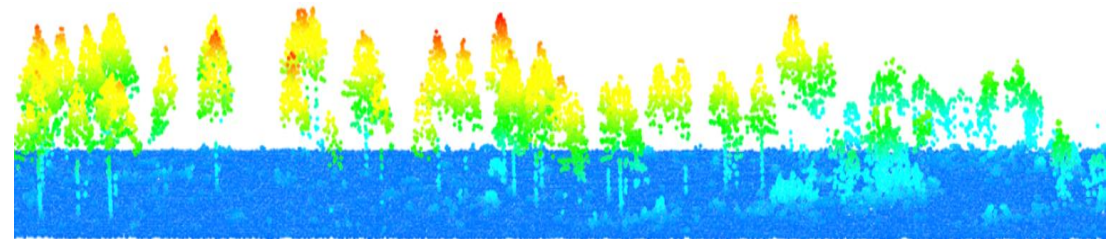
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Remotely sensed data
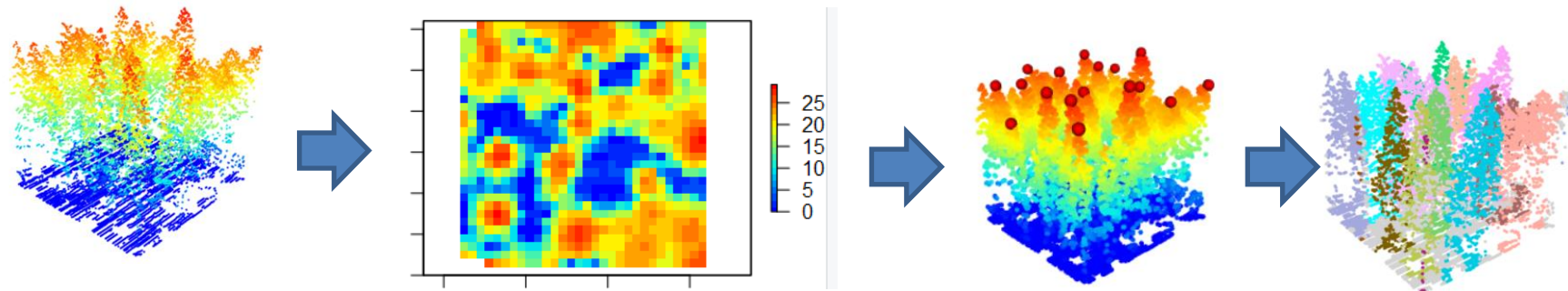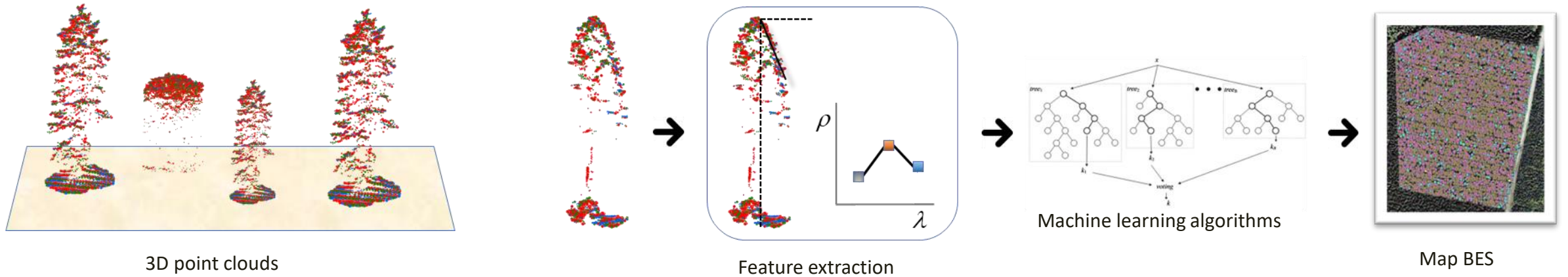

Lechner et al. (2020)
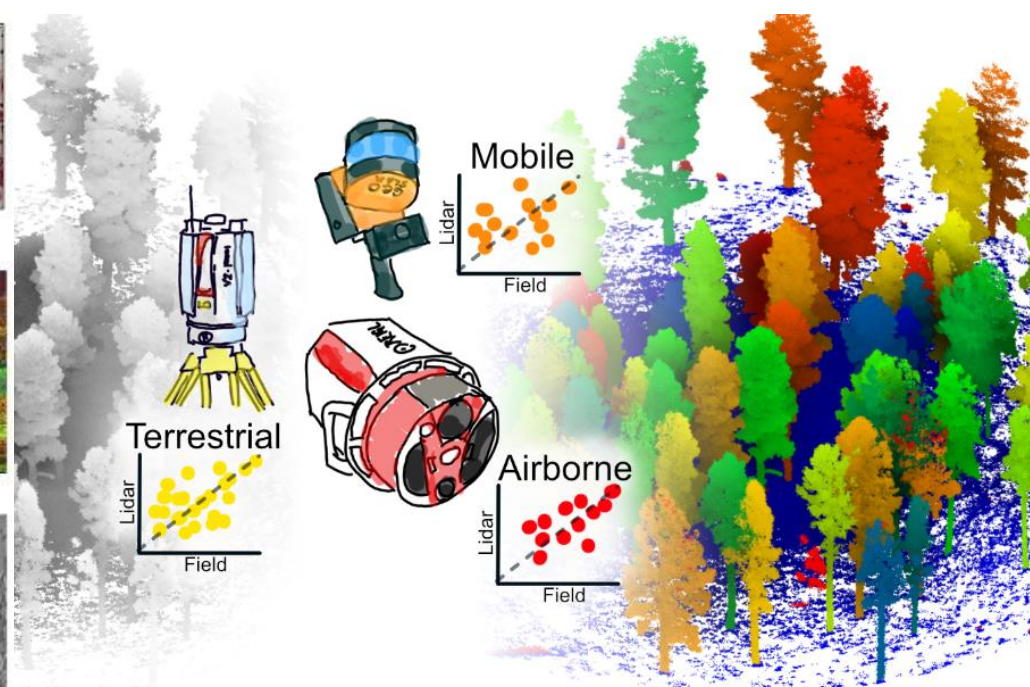
Donager et al. (2021)

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A workflow of above-ground variables mapping

3D point clouds
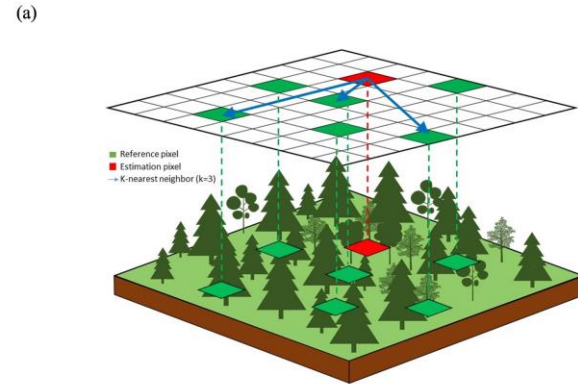
Feature extraction

Machine learning algorithms

Map BES

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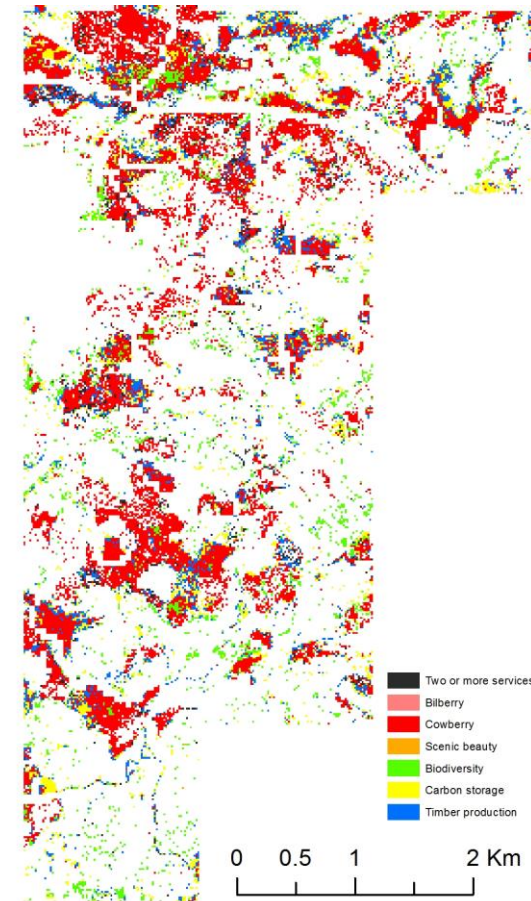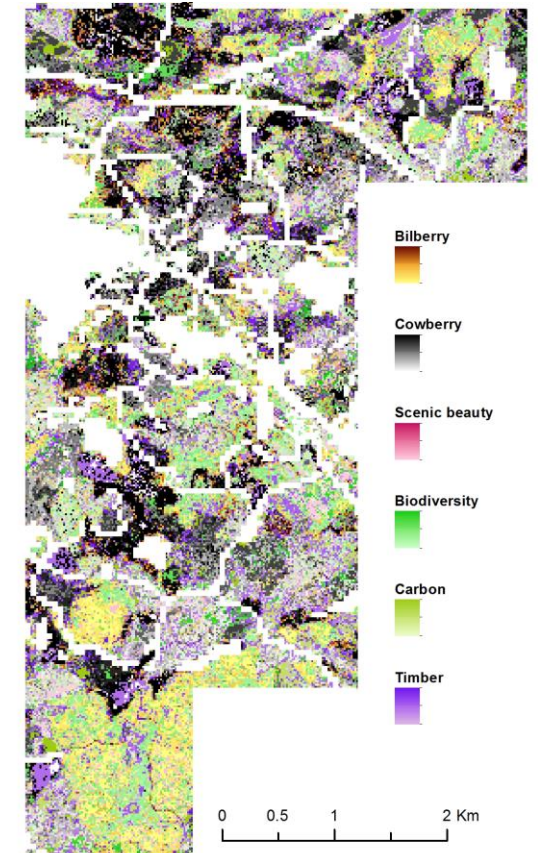
Priority mapping of biodiversity and ecosystem services (BES)

- 3D point clouds data

- BES data

- *k*-nearest-neighbor imputation method

- Stochastic multicriteria acceptability analyses (SMAA) for priority mapping
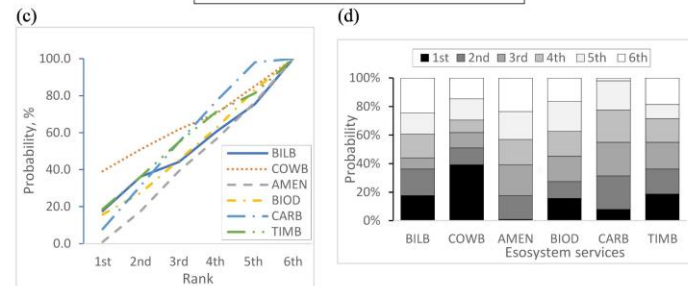
Fig. A schematic overview

Fig. Hotspot map

Fig. Priority mapping BES

Rana and Vauhkonen (2023)

3-D modeling of BES

References

- Donager, J.J., Sánchez Meador, A.J. and Blackburn, R.C., 2021. Adjudicating perspectives on forest structure: how do airborne, terrestrial, and mobile lidar-derived estimates compare?. Remote Sensing, 13(12), p.2297.

- Lechner, A.M., Foody, G.M. and Boyd, D.S., 2020. Applications in remote sensing to forest ecology and management. One Earth, 2(5), pp.405-412.

- Rana, P. and Vauhkonen, J., 2023. Stochastic multicriteria acceptability analysis as a forest management priority mapping approach based on airborne laser scanning and field inventory data. Landscape and Urban Planning, 230, p.104637.