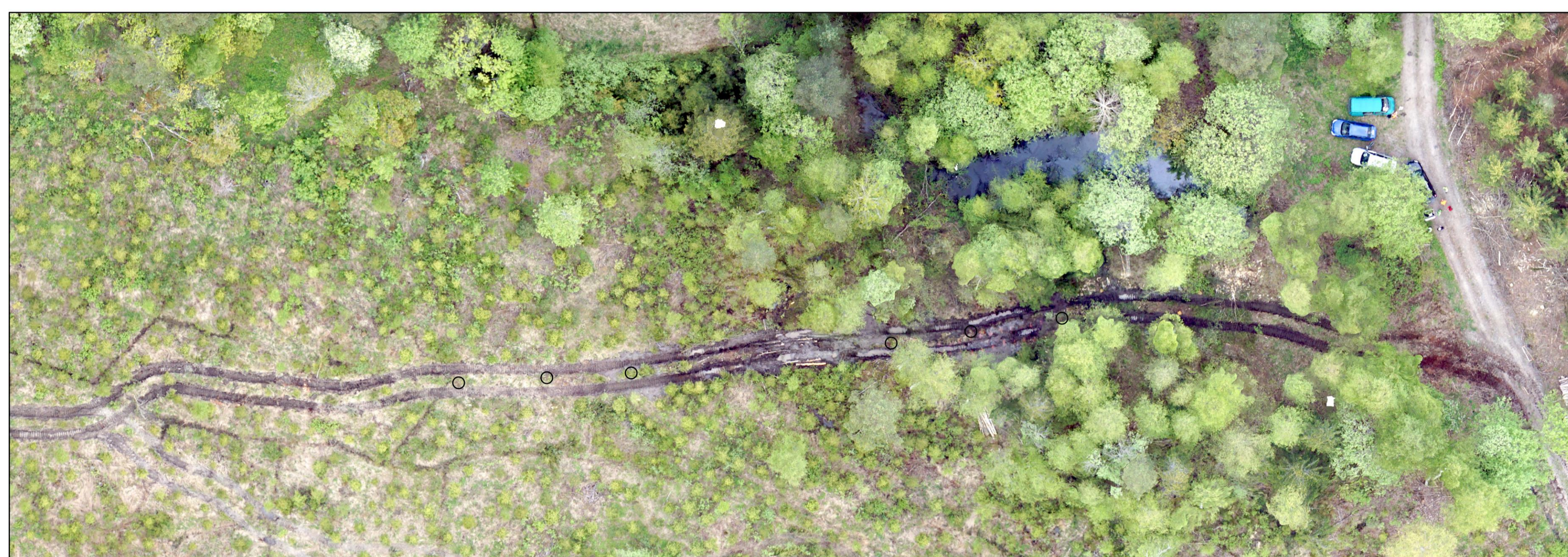


Dynamic forest trafficability prediction by fusion of open data, hydrologic forecasts and harvester-measured data

Aura Salmivaara, S Launiainen, J Ala-Ilomäki, S Kulju, A Laurén, M Sirén, S Tuominen, L Finér
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Forest operations can harm forest growth and water quality through soil rutting and compaction.

RUTS & TRAFFICABILITY influenced by:

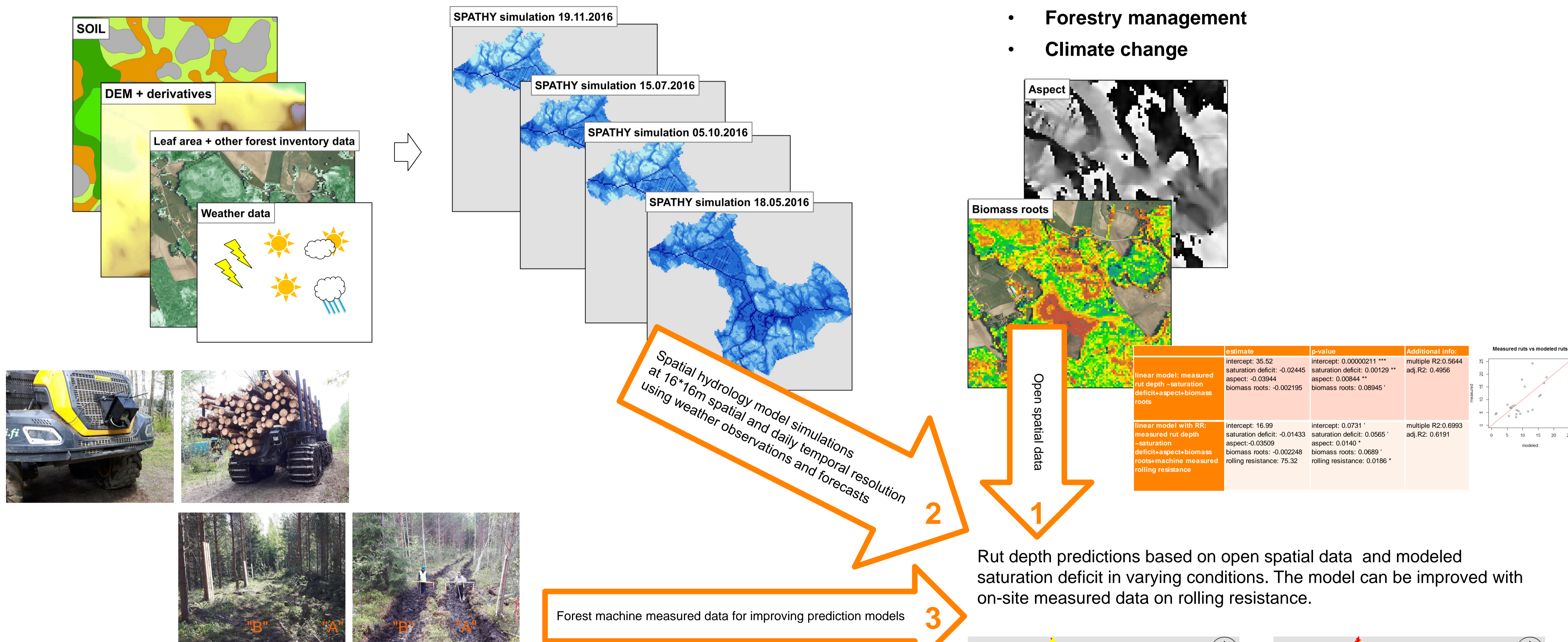
- Bearing capacity
- Soil type
- Roots, trees, stoniness
- Soil moisture
- Frost and snow

Smart tools are needed to predict trafficability conditions and plan forest operations to minimize negative environmental impacts

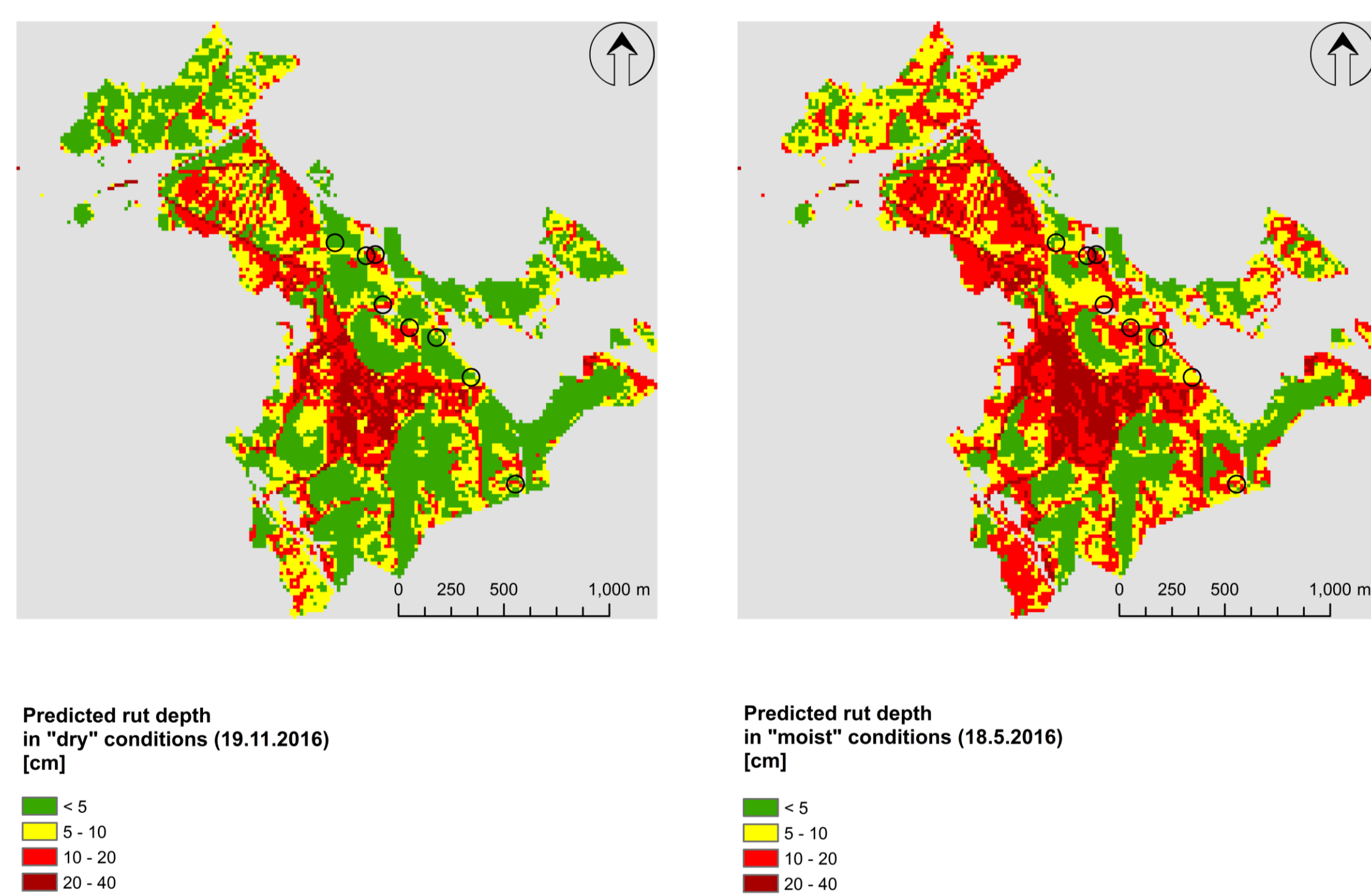
And these are SPATIALLY & TEMPORALLY VARIABLE

+ Future changes concerning

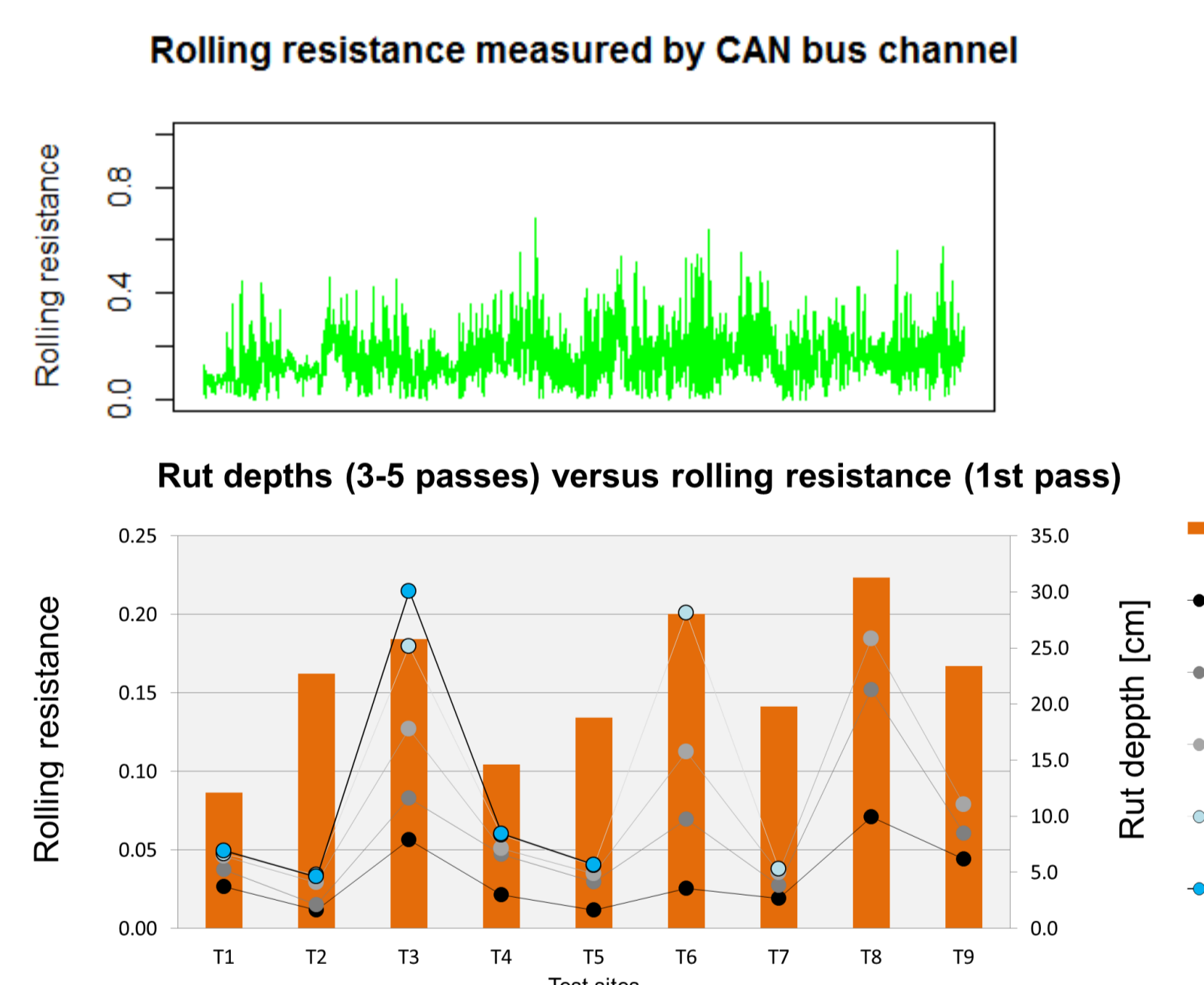
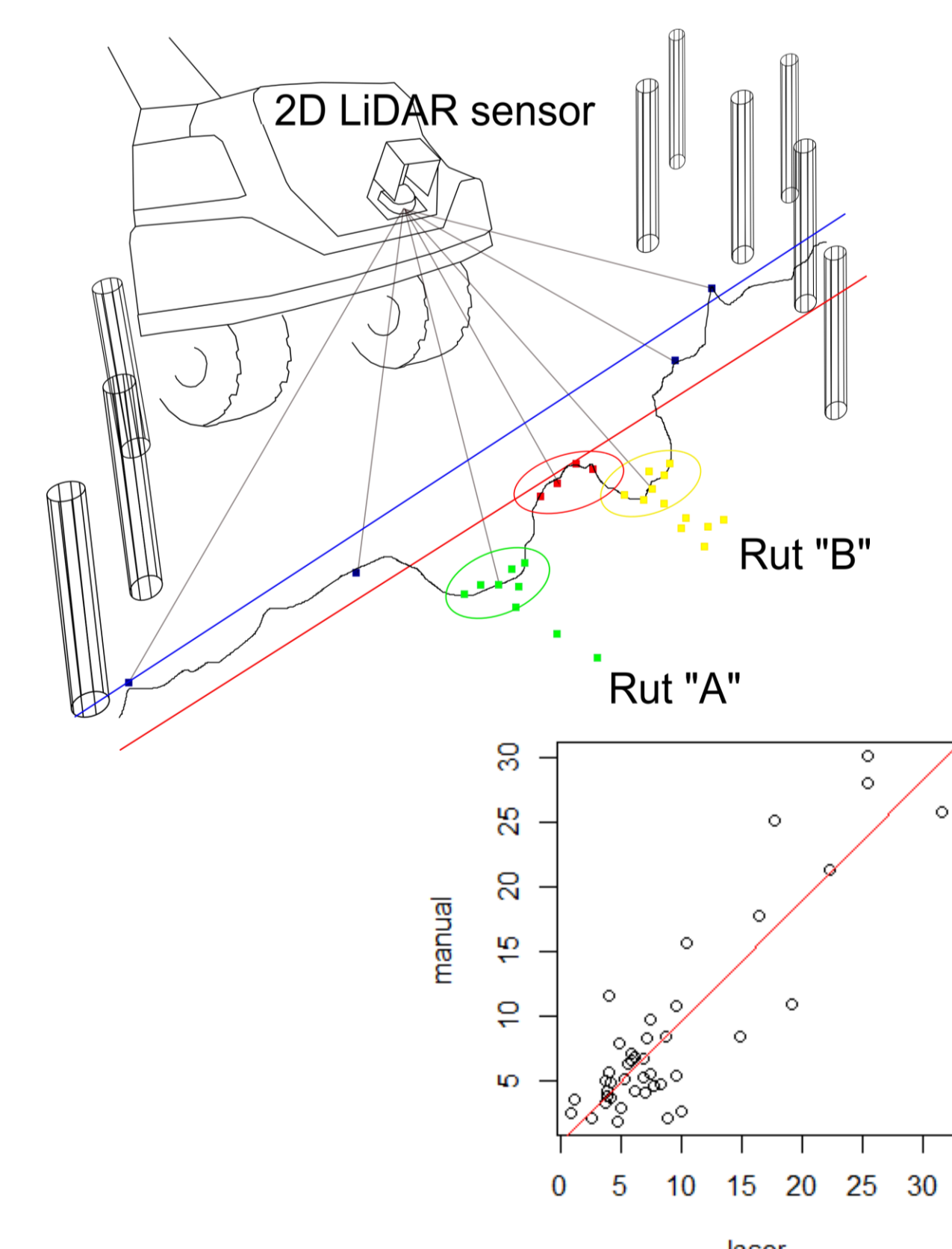
- Forestry management
- Climate change



Rut depth predictions based on open spatial data and modeled saturation deficit in varying conditions. The model can be improved with on-site measured data on rolling resistance.



In "moist" conditions the area with ruts >10 cm covers 45% of the total area, while in "dry" conditions this proportion is 26%.



Promising results from three field tests in southern and central Finland in measuring the rolling resistance from CAN bus channel of the harvester and measuring average ruts depths by 2D LiDAR sensor.

VISION: "Google maps for forest vehicles"

Dynamical forest trafficability model that is constantly updated with on-site measurements of rolling resistance and rut depth can provide valuable information for planning of forest operations, minimize costs caused by jammed vehicles and delayed schedules, and enable more sustainable forestry by minimizing negative environmental impacts caused by rutting.

