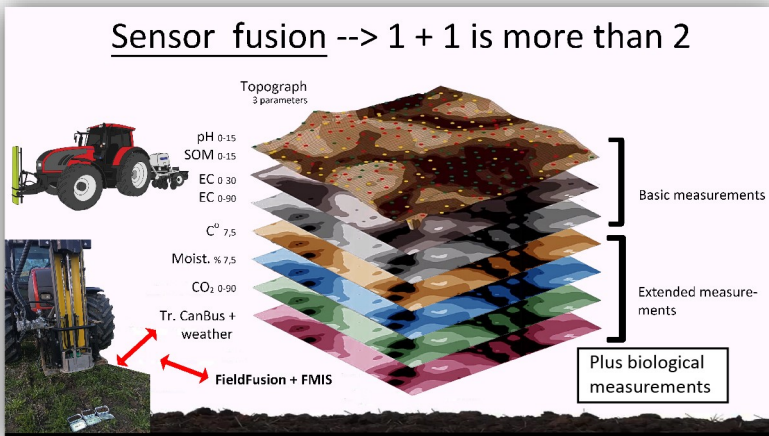


## Real Smart Agriculture needs more measurements and consistency

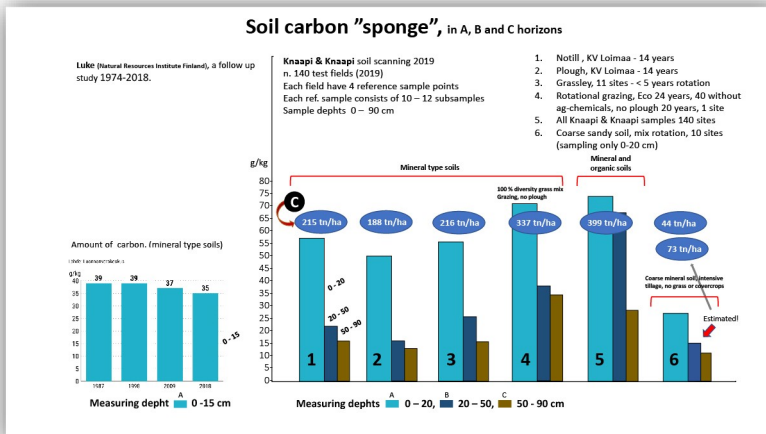
The need for reliable and exact information is a huge task for agronomists and service providers. In measurements relating to environmental emissions - like GHG's or nutrition levels in drainage waters, we need to understand the variability in fields. In other words, we need to extend exactness beyond "normal" precision farming. Driving straight A-B lines or relying to satellite imagery as cornerstones in precision ag, is not enough anymore.

Soil qualities vary hugely inside the field boundaries. This is the conclusion after 2 year experiments of RTK-accurate (+/- 2 cm) soil mapping with Veristech MSP3 scanner. As important as mapping itself is, we need reliable RTK-accurate reference samples and zoning. This is not only important when measuring pH-, or SOM levels, but also then defining risks for environmental emissions. The most important nutrient in this aspect is nitrogen. It may leach as nitrate or escape in gaseous form (N<sub>2</sub> or nitrate oxide) depending on soil qualities and management. By soil mapping and zoning we can define these risk areas and build up a management plan to avoid possible problems.

Zoning is also a base for variable rate inputs. For ex amount of released nitrogen varies based on SOM and microbial activity.

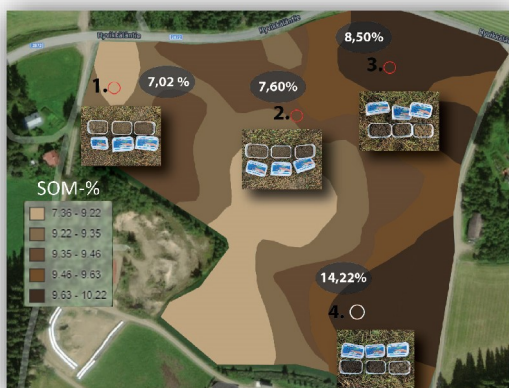


Soil mapping consists of topography, EC, pH and SOM measurements. Extended measurements give more information. By combining all data to history database, we can generate proactive management.



RTK-accurate reference sampling is important part of modern soil mapping. Sampling to subsoil depth is essential part of carbon measurement.

Finnish soils hold more carbon than often thought. Based on management, subsoil horizons have a large carbon stock. Our boreal climate has natural "carbon negative" character. Green covers, grass dominant rotation and Notill are all supporting carbon accumulation.



Amount and depth of SOM varies even inside the field boundaries. To get reliable carbon stock data, we need RTK accurate sampling points.