

Developing a combined sensor-based technique to monitor pastures under different grazing intensities

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Background

Quantifying the vegetation heterogeneity in pastures is important to understand the behavior and performance of grazing animals. However, obtaining information on vegetation over large areas in a timely manner is difficult. Ground-based remote sensing can provide such information in a rapid and non-destructive way.

As every single sensor system has its own strengths and weaknesses, the combination of complementary sensors is important. In this study, we are developing a technique for mapping spatial distribution of pasture characteristics using the combination of ultrasonic and hyperspectral sensors.

Material and methods

Study area

- Solling uplands, Germany (51°46' 55" N, 9°42' 13" E)
- Average year temperature 8.2°C
- Mean annual precipitation: 879 mm
- Moderately species-rich grassland
- Grazing season: May to September

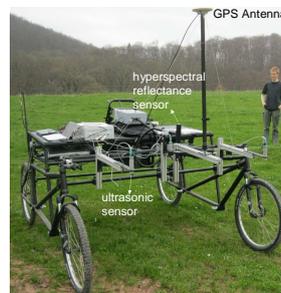


Fig. 1. Remote control vehicle for on-the-go application.

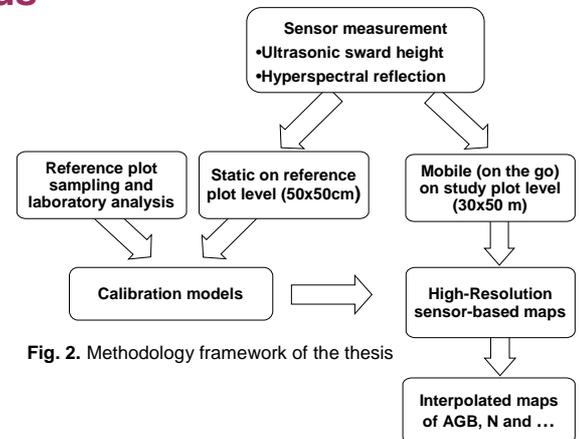


Fig. 2. Methodology framework of the thesis

Results

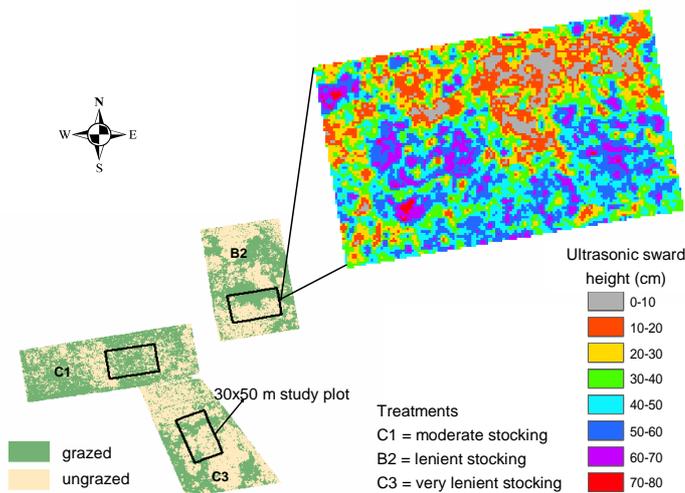


Fig. 3. Paddocks with different grazing intensities and 30x50m study plots (left) Interpolated ultrasonic sward height map from on the go application (right).

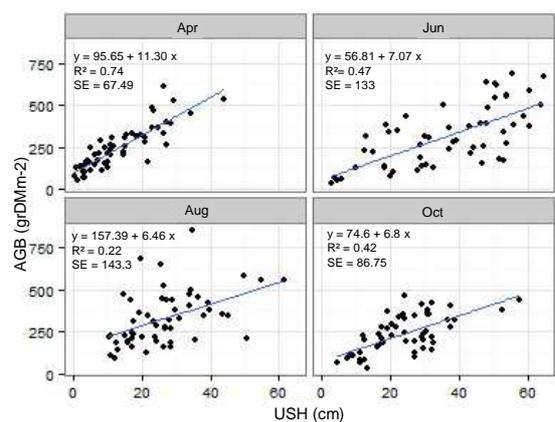


Fig. 4. Relationship between sward height with an ultrasonic sensor (USH) and aboveground biomass (AGB) for April, June, August and October 2013.

Outlook

Preliminary results indicate that exclusive use of ultrasonic sensor may not be satisfactory for quantifying the aboveground biomass in heterogeneous pastures. Accuracy may be further increased by the integration of spectral information in combination with ultrasonic sward height.

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