North Wyke Farm Platform

The potential for radar and optical satellite data to predict grass growth and mass

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The project team, including AgSpace, Satellite Applications Catapult and Rothamsted North Wyke, conducted a pre-feasibility ('look-see') pilot project to test the Sentinel 1 SAR sensor (and also optical data) on ground-truth grass data collected on the Farm Platform.

Initial results (March 2015) from raw unprocessed images were encouraging, as in many cases the optical data broadly matched the SAR backscatter values (Fig. 1). Fig. 2 provides a detailed field level view that highlights the encouraging relationship between the two satellite technologies.

The team collected grass data (biomass and sward height) from three fields from April through August 2015 during the 'look-see' pilot, to build confidence in the innovation ready for a full project. The pilot study design would contribute to the sample design for the full project.

Preliminary results from the 'look-see' pilot study are presented in Fig.3, showing significant relationships (at 99% level) between SAR backscatter values and grass sward height, for cattle and sheep grazed fields.

Respective R-squared values were moderate at 0.45 and 0.42. The R-squared value decreased to 0.40, when the data were combined, tentatively suggesting that the SAR data could discriminate between livestock-type. Although results hold promise, they are still viewed as preliminary, using rather simplistic relationships.

Figure 1: Farm level Chlorophyll (LHS) and SAR data (RHS) from 5m multispectral optical data and the Sentinel 1 SAR sensor, respectively - March 2015
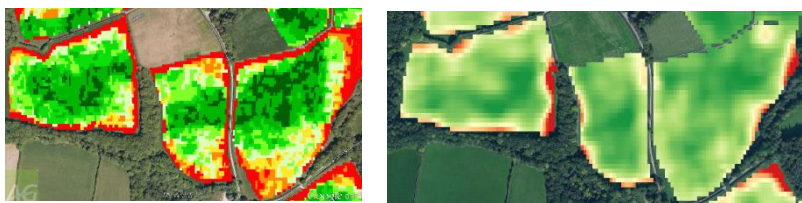

Figure 2: Detailed field level view of chlorophyll (LHS) and SAR (RHS) data from 5m multispectral optical data and Sentinel 1 SAR sensor, respectively
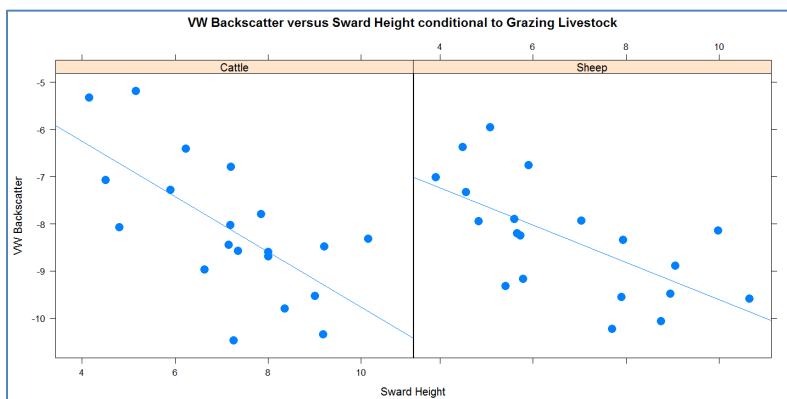

Figure 3: Data relationships for 'look-see' pilot study.

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