Session 5.1: PLF Technology development and data accessibility

S05.O-02

PROTOTYPING A REMOTE SENSING DECISION SUPPORT TOOL FOR GRASSLAND MONITORING IN SOUTHERN BELGIUM : VERSATILE FEATURES TO MEET THE DIVERSITY OF FARMERS' PRACTICES.

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Resource management and biomass assessment from satellite imaging are both topics on track for the past decade in the field of grass and grazing. Moreover, we have seen an increasing number of newly released Decision Support Tools (DST) to help farmers improve the management of their grasslands. Due to the lack of such DST specifically adapted to the growing conditions in Southern Belgium, we investigated the relevance of developing one by sending an online survey to Walloon farmers. Out of 156 respondents, 64.7 %, mainly young farmers (84% between 18 and 30 years old), expressed their wish to have a decision tool helping them to manage more efficiently their grass resources. However, they were not inclined to spend more than 10 minutes on this tool per day, requiring a high level of automation and ergonomics.

Therefore, we decided to develop a DST integrating biomass values estimated from CSH predictions made from meteorological and satellite data from Sentinel-1 and -2 using machine-learning algorithms. The trained CSH model has a prediction error around 20 mm. Then, the biomass values were computed from CSH through an experimentally calibrated linear relation of 215 kg of dry matter per cm of CSH. These estimations were aggregated in a dataset on a pixel basis having a 10m x 10m resolution, for a total size of 39,989,584 pixels, thus covering all pastures in Wallonia.

We used an interview-based typology of grassland management practices to shape the desired tool. Based on the literature and this typology, we identified a core set of basic features that would match to the widest range of farmers' needs. Then, we developed the grassland monitoring and management DST on the first web platform that aims to centralize agricultural data in Wallonia. We coded the core application in R programming language and contained it in a Docker container, which allows us to maintain interoperability through a standardized communication protocol using json file format. The web platform displays the front-end interface as a dynamic web page communicating with the core application.

In terms of features, our DST integrates a cartographic tool to visualize the farmer's parcels and a drawing/importing tool to generate the parcels. Once the farmer indicates his parcels, he is able to see the current average biomass for each parcel through a coloured legend. The pixel resolution of the dataset allowed us to display, when the breeder selects a parcel, biomass heterogeneity by pixel along with specific advice for agricultural operations (e.g. grazing or silaging). Data storage over the season and over the years enabled the implementation of a retrospective feature that

shows to the farmer a summary of the growing season and the previous years. Finally, this prototype is a cornerstone for the next steps of the DST's development. Indeed, farmers will be included in the development process through focus groups to get their feedback, refine the existing features, and co-design additional advanced features.