

EGU21-7232

<https://doi.org/10.5194/egusphere-egu21-7232>

EGU General Assembly 2021

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Modelling biomass and biodiversity in temperate grasslands with Sentinel-1, Sentinel-2 and Unmanned Aerial Vehicles.

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Land use practices in grasslands are major determinants of their biodiversity and ecosystem functions. Relationships between biodiversity, ecosystem functions and land use practices can vary across climatic and management gradients and across scales. New generations of remote sensing sensors can model grasslands' biomass and biodiversity parameters with relative RMSE that range between 10% and 40%. However, most of these experiments have been carried out in rather small and homogenous areas. In the project SeBAS (Sensing Biodiversity Across Scales) we are using machine learning algorithms (random forest and neural networks) to model biomass and biodiversity indicators along spatial and management gradients and across scales. Field data (above ground biomass and species inventories) was obtained during summer 2020 from the Biodiversity Exploratories: a set of 150 grassland plots across spatial and management gradients in Germany. Remote sensing information at farm level was obtained from microwave Sentinel-1 and multispectral Sentinel-2 satellites, and at plot level from a multispectral camera mounted on a UAV.

First results show the limitations of satellite images to map vegetation parameters in heterogeneous landscapes, and how the incorporation of UAV information can be used to improve model estimations of biomass production and biodiversity indicators.