



SUSALPS

Internationale Grünland-Konferenz 2025

Contribution ID: 34 Contribution code: 3-RSM

Type: Oral presentation (9:10 AM - 4:10 PM)

Satellite remote sensing for extensive analyses of grassland ecosystem functions in southern Germany

Tuesday 15 July 2025 13:55 (15 minutes)

Grasslands are widespread ecosystems that play a vital role in providing multiple ecosystem functions, particularly as sources of fodder. Despite their ecological and economic importance, knowledge about grasslands remains limited due to their high heterogeneity in use and management and, consequently, their species composition. This is particularly the case in regions such as southern Germany, where a wide variety of grassland types exists. Remote sensing offers significant potential for large-scale, consistent, and continuous monitoring of grassland characteristics. Within the SUSALPS project, various aspects of grassland ecosystems were investigated using Sentinel-2 (S2) satellite data. This research focused on analyzing mowing dynamics, yield, nitrogen content, and flower species richness of grasslands across multiple years. Mowing events were detected for the years 2018-2024 for entire Germany using high-resolution S2 time series and a rule-based thresholding method, achieving an average accuracy (F1-Score) of 0.65. Grassland biomass was estimated with S2 time series and in-situ measurements from 2019 to 2022 using an extreme gradient boosting algorithm, yielding an R^2 of 0.69. Grassland yield estimation was based on the estimated multi-temporal biomass and the mowing dates and conducted for the Ammer catchment area in southern Germany. Nitrogen content and species richness were estimated with a random forest approach also based on S2 time series, demonstrating promising results ($R^2 = 0.79$ and 0.56 , respectively) for the SUSALPS study regions in the Ammer catchment area in southern Bavaria and the Rotmain-Weißmain catchment area in northern Bavaria. The resulting remote sensing-based products provide valuable insights into grassland dynamics and support both scientific modelling and decision-making processes for sustainable land management.

Primary author: Dr REINERMANN, Sophie (DLR DFD-LAX)

Co-authors: ASAM, Sarah (DLR DFD-LAX); GESSNER, Ursula (DLR DFD-LAX); SCHUCKNECHT, Anne (OHB Systems EO Applications); OBRECHT, Laura (JMU Würzburg); KIESE, Ralf (IMK-IFU - KIT); KUENZER, Claudia (DLR DFD-LAX)

Presenter: Dr REINERMANN, Sophie (DLR DFD-LAX)

Session Classification: Remote Sensing & Modelling

Track Classification: Day 1: Science (English) / Tag 1: Wissenschaft (Englisch): Remote Sensing & Modelling