

Scotland's Rural College

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Understanding and quantifying carbon cycling in managed grasslands through model-data fusion

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Managed grasslands are extensive terrestrial ecosystems that provide a range of services. In addition to supporting the world's various livestock production systems they contain climatically significant amounts of carbon (C). Understanding and quantifying the C dynamics of managed grasslands is complicated yet crucial. This presentation describes a process-model of C dynamics in managed grasslands (DALEC-Grass). DALEC-Grass is a model of intermediate complexity, which calculates primary productivity, dynamically allocates C to biomass tissues and describes the impacts of grazing/harvesting activities. The model is integrated into a Bayesian model-data fusion framework (CARDAMOM). CARDAMOM uses observations of ecosystem functioning (e.g. leaf area, biomass, C fluxes) to optimise the model's parameters while respecting a set of biogeochemical and physiological rules. The model evaluation results presented demonstrate the model's skill in predicting primary productivity and C allocation patterns in UK grasslands using both ground and satellite based leaf area index (LAI) time series as observational constraints.