



## The challenges of modelling mixed management grasslands in North Spain under climate change

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Permanent grasslands are a very relevant cropping system in the North of Spain and support the main dairy farms in the country. Adaptation to climate change will be required given the projected changes of regional precipitation. To support such adaptation, modelling of these systems to generate high quality projections of the system performance is required. In the region to be simulated, grasslands are managed with a mixture of cuts and grazing. Several issues hinder the modelling of this type of systems: 1) the available data of grazing intensity presents large uncertainties; 2) there are few grassland models that allows flexibility to define a variable combination of cuts and grazing; 3) soil heterogeneity. It follows, and expands to grazing, the exercise performed by Gómara et al. (2020), who used the Pasture Simulation model (PaSim) to simulate a mown permanent grassland in the French Massif Central.

The model was calibrated using data from Villaviciosa (Asturias, Spain, 5° 26' 27" W, 43° 28' 50" N, 10 m a.s.l.), located at northern Spain with a temperate climate. This calibration was used to simulate several grassland locations distributed along the Cantabrian Sea. The soil information was obtained from Trueba et al. (2000). The model was configured for the optimum management for mowing and nitrogen fertilization. The 1976-2005 period and the 2030-2059 period were selected. For the future period two representative concentration pathway emission scenarios (RCP, van Vuuren et al., 2011) were selected (i.e. RCP4.5 and RCP8.5). An ensemble of climate models will be used from the Coordinated Regional Climate Downscaling Experiment (CORDEX, Giorgi and Gutowski, 2015) bias-adjusted by using the European observational database EOBS (Haylock et al., 2008) with the empirical quantile mapping method included in the climate4R R package (Iturbide et al., 2019).

Modelling was challenging due to a combination of complexity (many processes involved) and uncertainty (observed data are difficult to generate). The results of the simulation exercise allow for assessing PaSim skill to reproduce the performance of these complex systems, as well as to

determine the main weaknesses of the model and the observational/experimental required to improve the modelling work.

### **References**

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