Evaluation of GHGs, carbon stocks and yield from european cropping and pasture systems under two climate change scenarios

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CONTEXT: Various strategies can be implemented to counteract the effects of climate change on agricultural production. The most practical aspects are related to the adaptation of livestock system including forage production system, with respect to mitigation options of GHG emissions.

METHOD: The Pasture Simulation model **PaSim** and the crop model **CERES-EGC** were run by using input variables derived from spatialized meteorological, soil and management data, to a reference grid of 0.25° × 0.25° .

- The climate change scenarios (RCP4.5 and RCP8.5) derive from CMIP5 (Coupled Model Intercomparison Project Phase 5), which provides daily data (from year 2005 to 2100) of anthropogenic perturbation of the climate system of +4.5 and +8.5 W m^{-2}.
- Soil representative characteristics for each grid cell are provided from the ESDB (European Soil Data Base).
- Crop and fertilisation data are obtained by identifying the two main crop rotations for each mesh of the reference grid, starting from a 1km × 1km resolution database provided by the GHG-Europe project (FP7).
- Grassland cutting date, amount and type of fertilisation, animal management and stocking densities data are obtained from the CAPRI modelling system (Common Agricultural Policy Regionalised Impact).

Simulations from the CERES-EGC and PaSim models allow an overall assessment of

(i) dynamics of GHG fluxes (CO_2, CH_4, N_2O),
(ii) soil carbon stocks
(iii) biomass and animal productions.

CONCLUSIONS: The approach followed allows to represent the real response of models to climate and others drivers of changes. A change in the sowing dates and in the cycle duration of the main cultivated crops, as well as the need to introduce crop irrigation in some European areas has been observed.

THE ANIMALCHANGE PROJECT

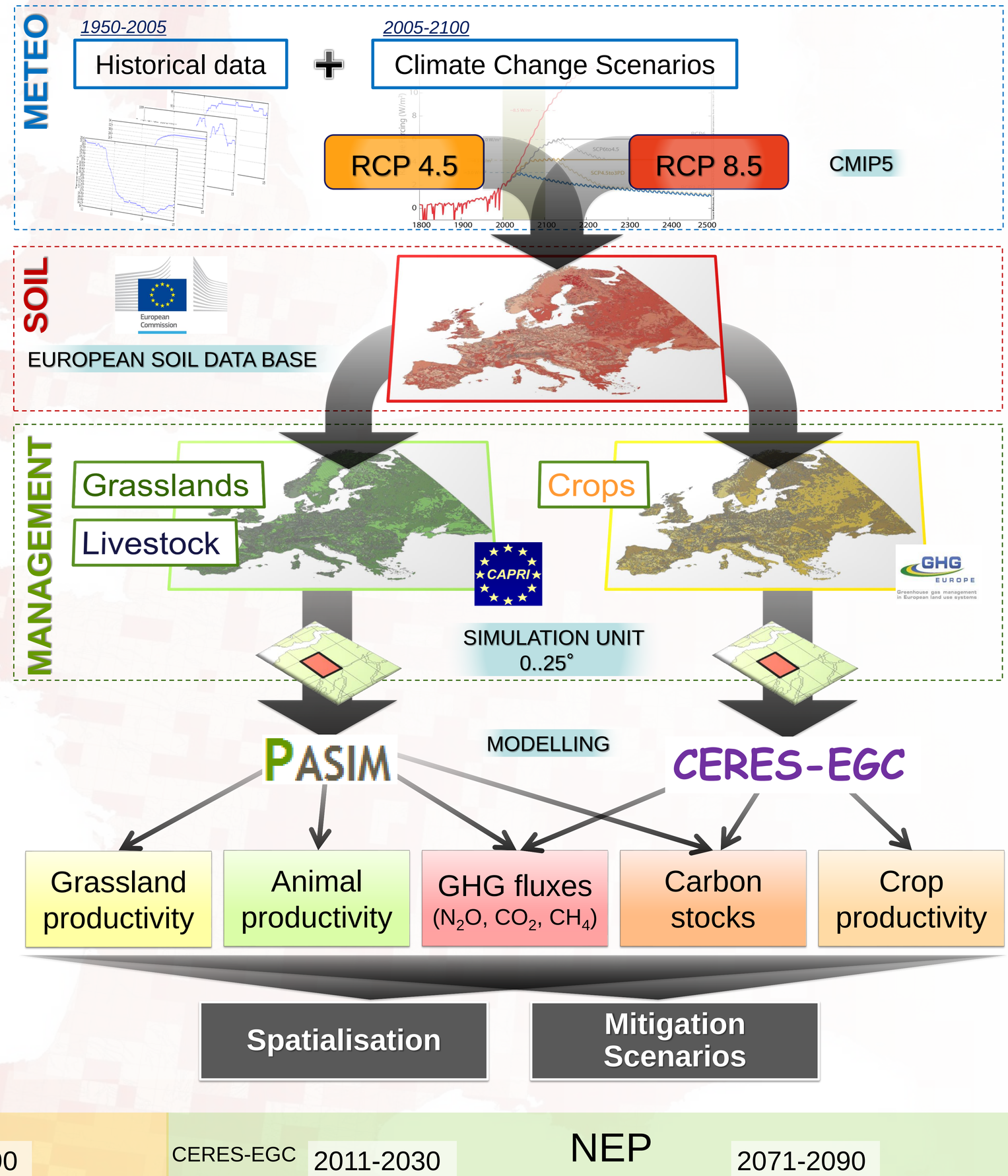
The main goals of this project are to draw sustainable scenarios for livestock production and reduce uncertainties in GHG emissions.

➲ *Addressed in the Task 5.1 of the project over European continent.*

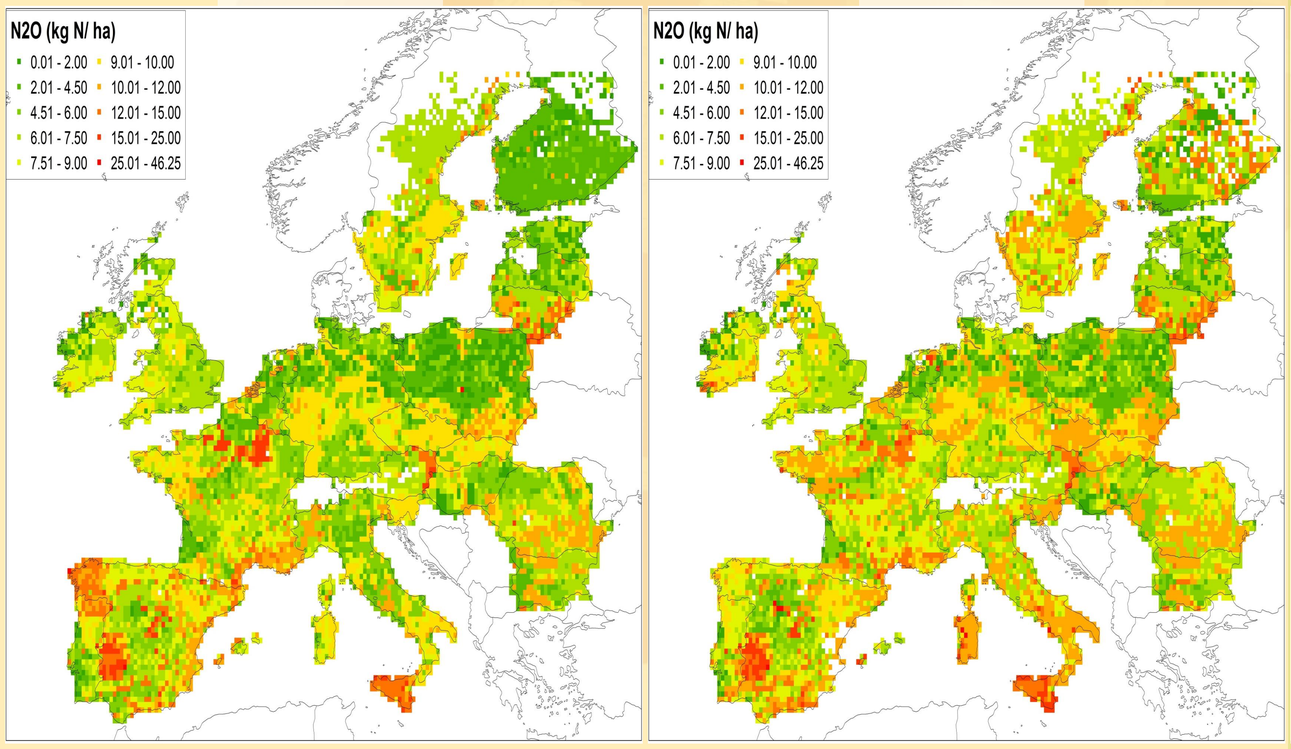
One of the major uncertainties to be tested is the impact of future climate projections

- on **crop** and **grassland** systems,
- soil **carbon sequestration**,
- **GHG** emissions.

To achieve that, a combined modeling approach is used at European scale.



N_2O



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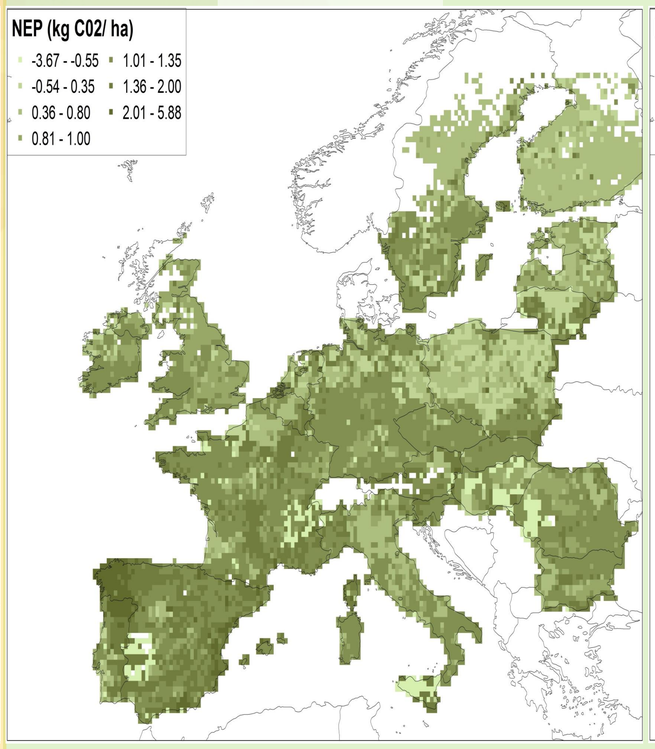

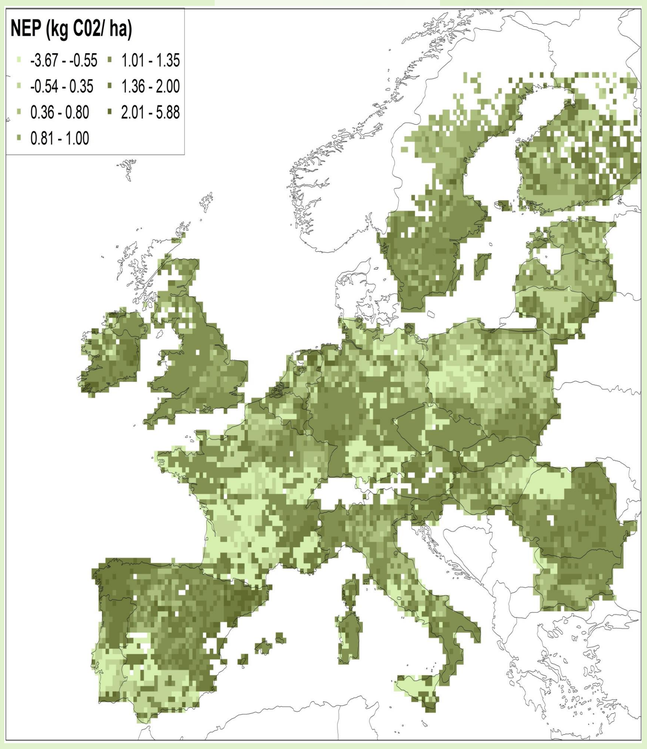

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