

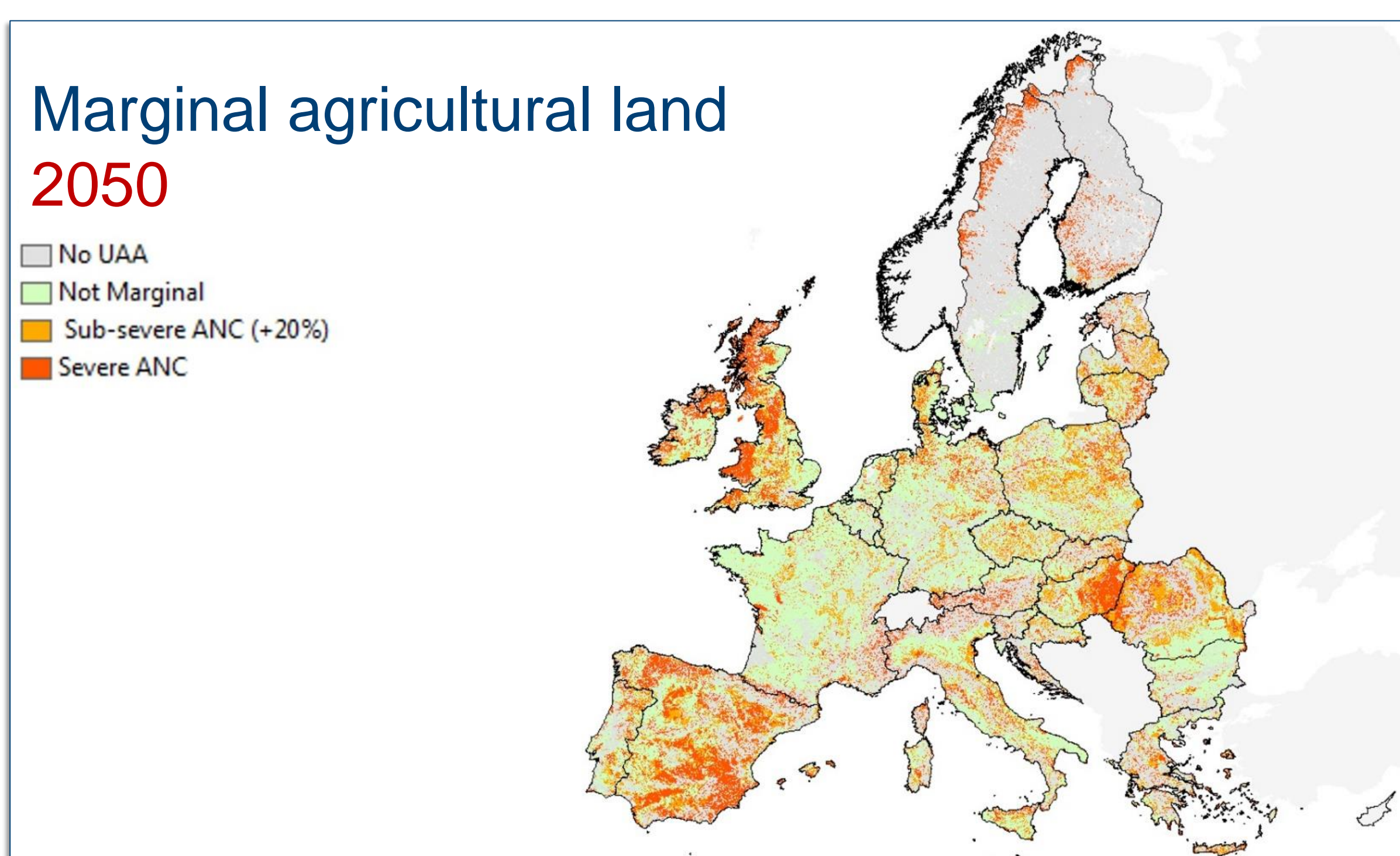
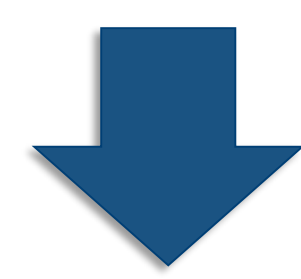
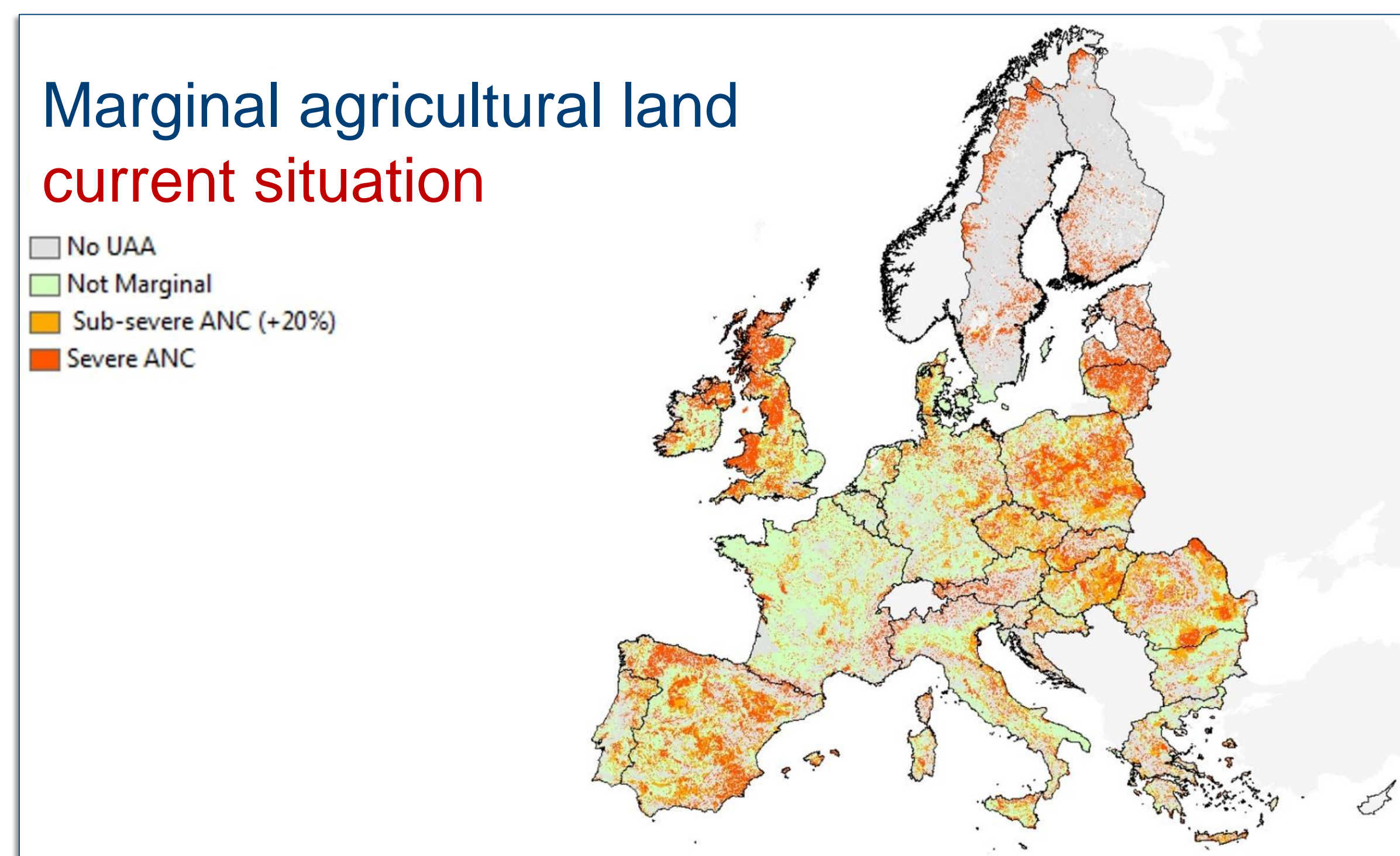
# Climate change-forced shifts in distribution of European marginal agricultural land until 2050 and its implications for food crop cultivation

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## Background / Issues

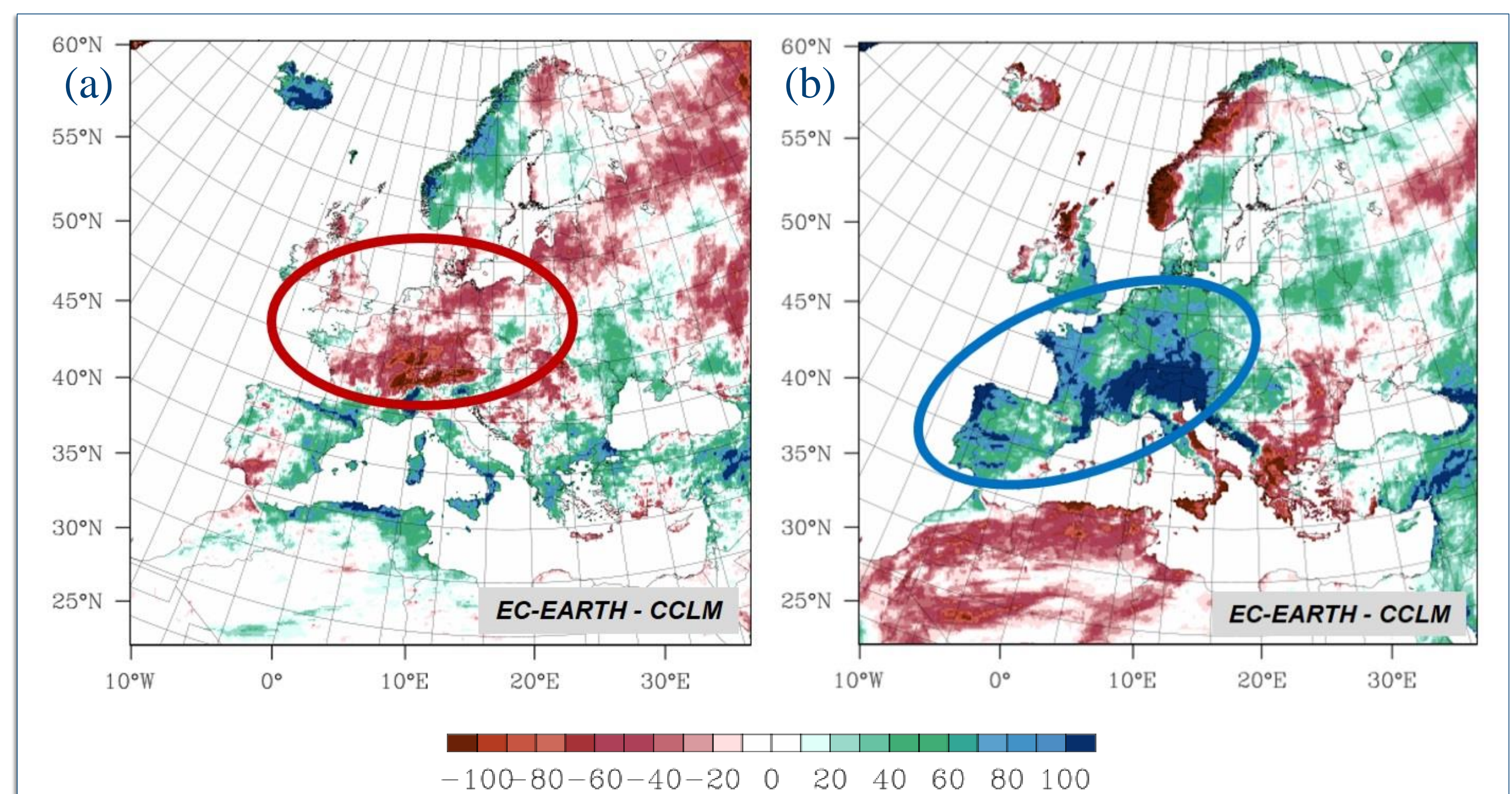
- Food security high on the agenda of SGDs
  - Agricultural land suitable for food crop cultivation limited and rather decreasing (land degradation through wind- and water erosion, sea level rise)
  - Land use conflicts increasing
- Climate change-forced shifts in marginal agricultural land may also become crucial for achieving & maintaining food security



Shifts of marginal agricultural land in Europe until 2050. UAA = utilized agricultural area; ANC = agricultural natural constraint; Sub-severe ANC (+20%) = within the 20% margin of the threshold value of severity (Adapted from: Elbersen et al., 2018, <https://doi.org/10.5281/zenodo.3539311>; Von Cossel et al., 2019a, <https://doi.org/10.3390/en12163123>).

## Research question

- What are potential implications of marginal agricultural land shifts on food crop cultivation in Europe and what are options for mitigation?



Projected changes in precipitation during the seasons March–May (a) and September – November (b) until 2050 given a RCP8.5 scenario. Data based on EC-EARTH–CCLM output (Adapted from: Von Cossel et al., 2019b, <https://doi.org/10.3390/agronomy9100605>).

## Results

- Increases in average air temperature and growth degree days across Europe lead to an increase of marginal agricultural land in the Mediterranean region and a decrease in northern regions
- Changes in precipitation patterns may lead to increased probability of drought events in central Europe in spring and wetness conditions in autumn

## Discussion & Conclusions

- Food crop cultivation expected to become more challenging through climate change-forced marginal land shifts in many European regions, especially in the Mediterranean and central Europe
- Winter-annual C3 crops more promising than summer annuals in central Europe in the future due to crucial shifts of precipitation patterns
- C4 summer annual food crops like maize (*Zea mays* L.) becoming more interesting for northern regions, depending on the required vegetation period length and the type of use such as feed and biogas substrate
- CAM (Crassulacean Acid Metabolism) partially edible crops like prickly pear (*Opuntia ficus-indica* L. Mill.) expected to become more important for food crop cultivation in the Mediterranean