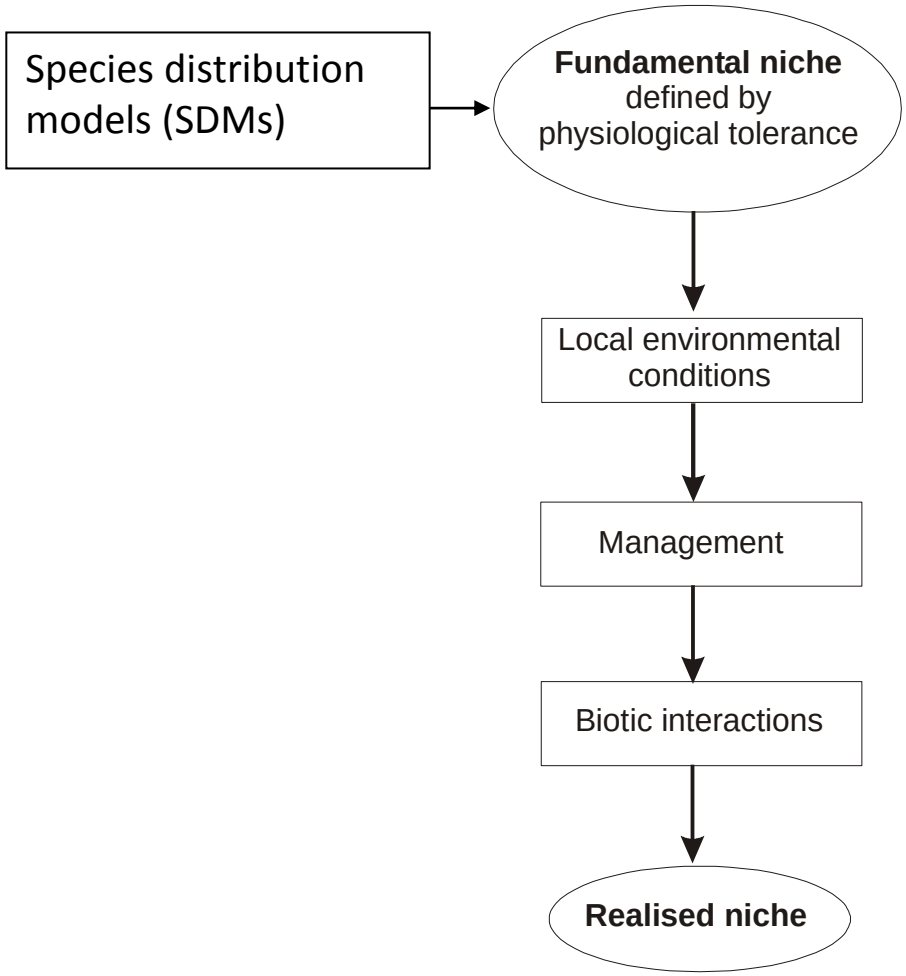
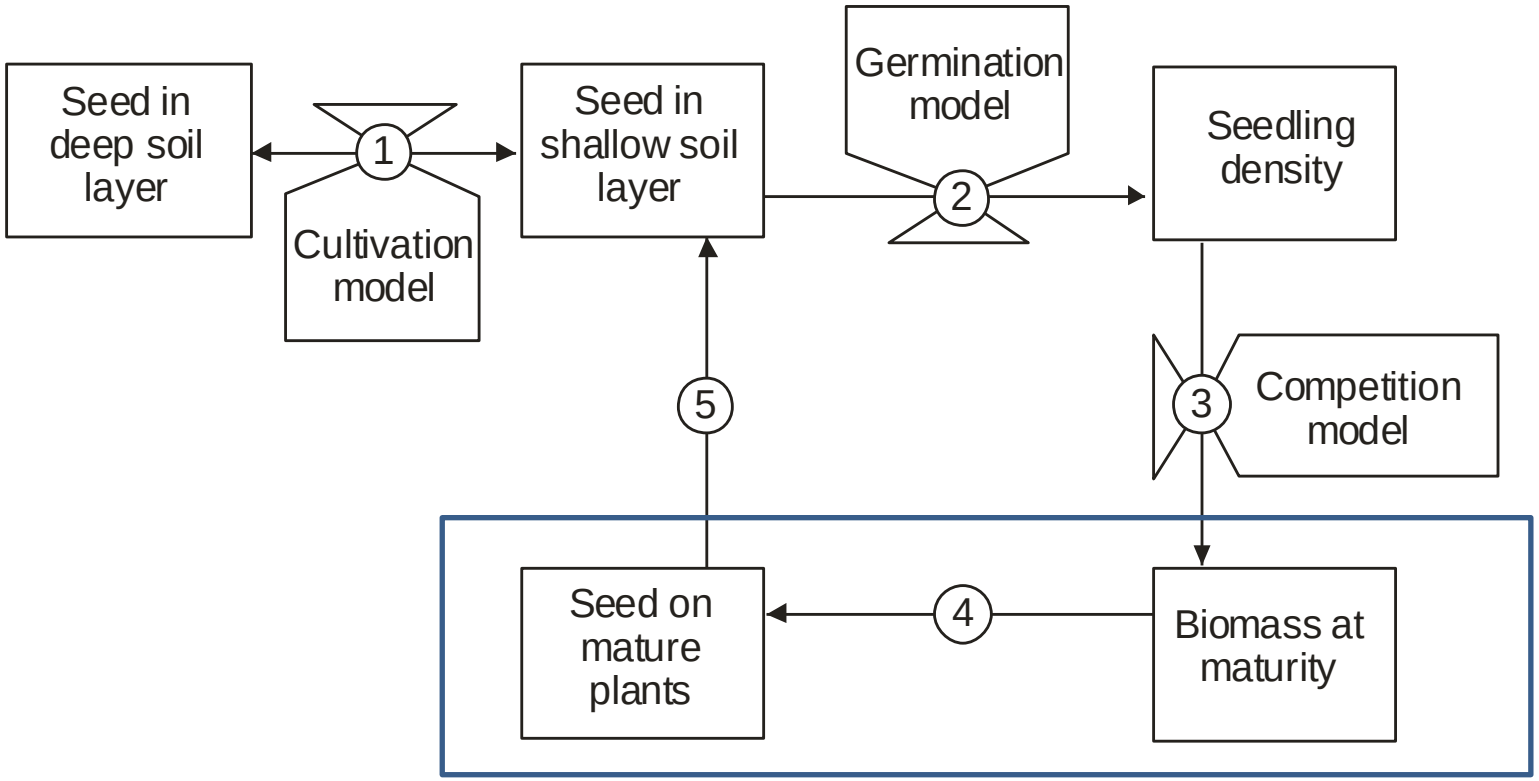
Modelling the niche for annual plants

- Building on SDMs to predict local productivity



Methodology

- Integration of process based models



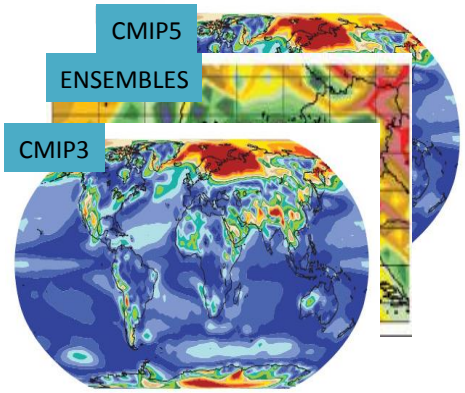
Sirius 2010: a simulation model for inter-plant competition

- Based on Sirius wheat simulation model and Intercom model for weeds competition
- Daily time step for major processes, including phenology, crop architecture, water and nitrogen uptake, biomass accumulation and yield. Computationally efficient, 0.5 sec per season per site on a single core. All Europe ~10 mins on 10 cores.
- Wheat model has been calibrated for several modern wheat cultivars and tested in diverse environments against experimental data including Europe, NZ, Australia and USA and conditions of climate change (FACE experiments)
- Weed model has been calibrated for several species of weeds and tested against experiments in the UK

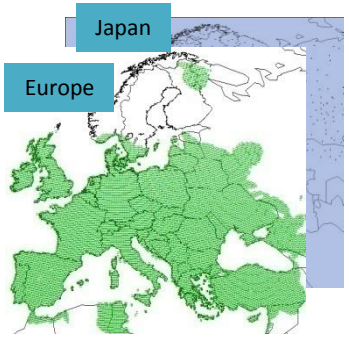
ELPIS: local-scale climate scenarios for Europe

Ensembles of climate predictions from global and regional climate models

Regional datasets of site parameters for baseline climate



LARS-WG
weather generator

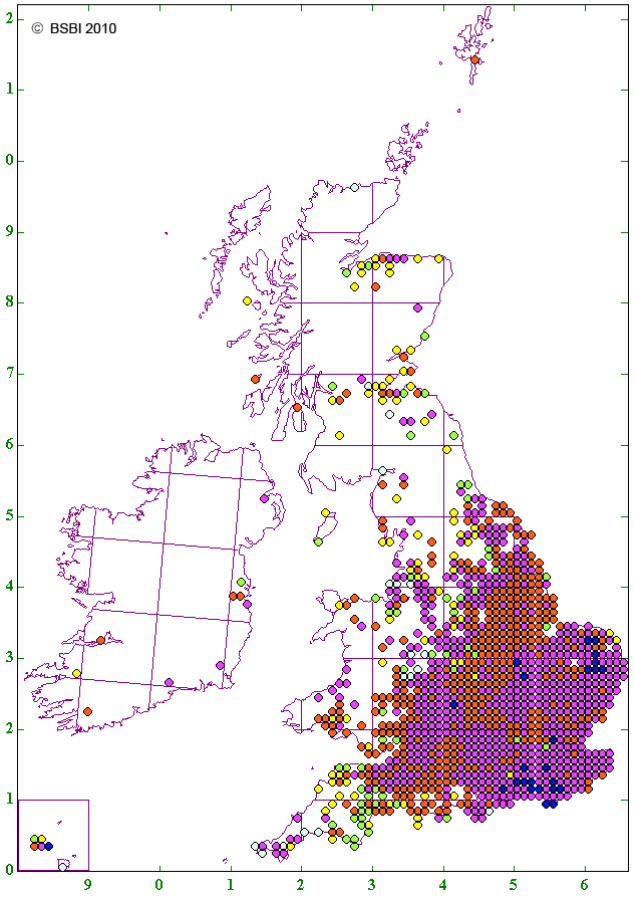


Scenarios for impact assessments for process-based models

WEB: http://www.rothamsted.ac.uk/mas-models/larswg.php

Semenov MA, et all (2010) ELPIS: a dataset of local-scale daily climate scenarios for Europe. *Climate Research* 44:3-15

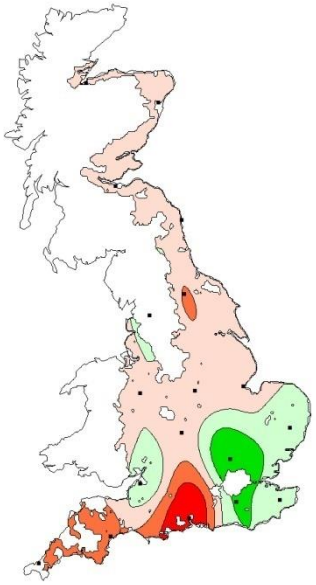
Alopecurus myosuroides (Black-grass)



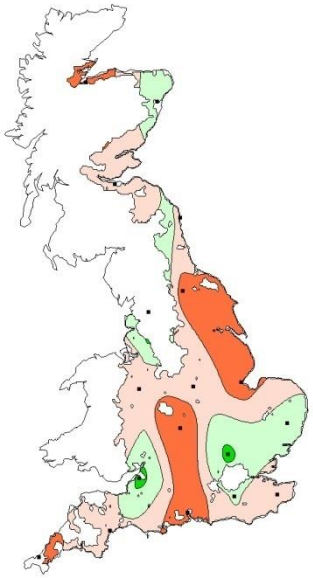
Changes in distribution of black grass

HadCM3 projections for A1B emission scenario

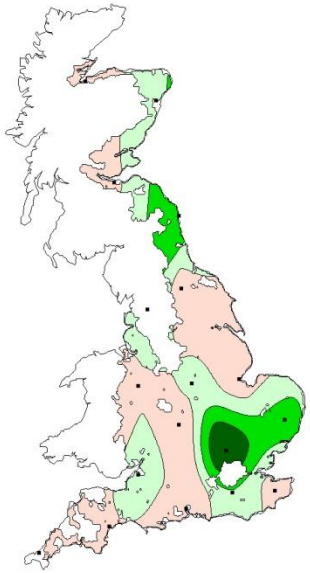
baseline



2050s



2080s



$\Lambda = \text{mean}(\log(\lambda))$

- -0.3 to -0.2
- -0.2 to -0.1
- -0.1 to 0.0
- 0.0 to 0.1
- 0.1 to 0.2
- 0.2 to 0.3