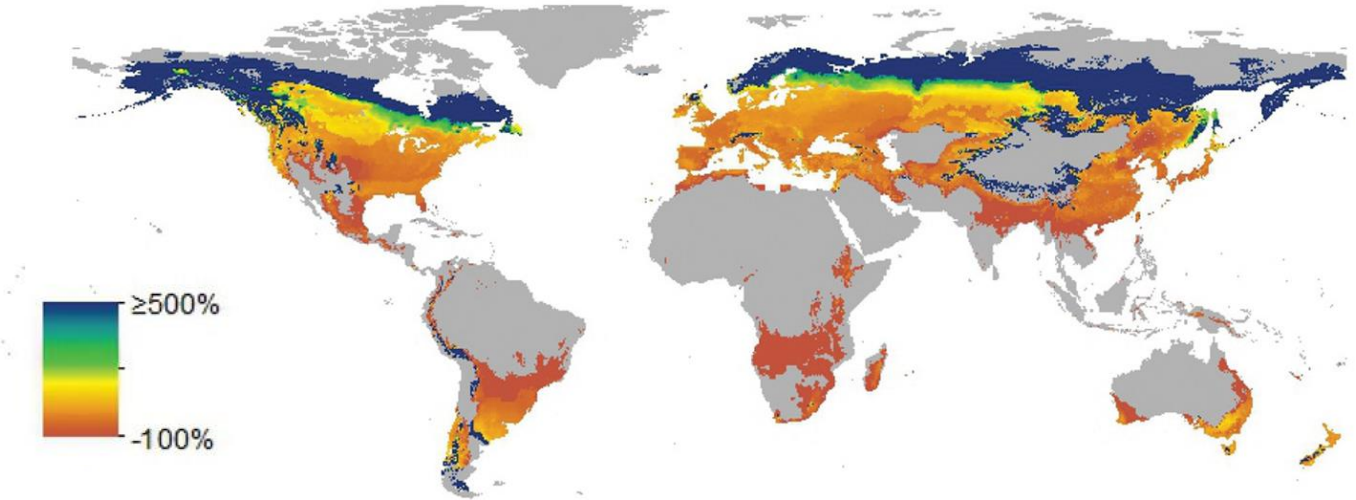
Climate change – mostly negative

- Climate change will alter the geographical distribution, yield, variability and quality of agricultural production, especially crops
- Overall negatively but some higher latitude regions relatively advantaged



Costinot et al. 2016; Nelson et al. 2014; Porfirio et al. 2018; Weibe et al. 2015; IPCC 2019

Interactions with other factors

- Influenced by other scenario elements (e.g. population, affluence, policy environment including GHG mitigation etc)
  - jointly affect prices received and costs
  - in almost all studies, grain prices increase
- Adaptation options include agronomic, technical and landuse options but also trade
- Prices increase less with more flexible trade scenarios and more with inflexible

Costinot et al. 2016; Nelson et al. 2014; Porfirio et al. 2018; Weibe et al. 2015; IPCC 2019

Trade and GHG emissions

- High emissions and climate change scenarios tend to result in a more centralised trade network where a few countries dominate
  - ambitious mitigation scenarios result in a more distributed and stable system
- In a GHG-constrained system, the GHG emissions of trading need to be considered
  - ways to reduce GHG footprints of traded goods
- Carbon-border adjustments could have significant impacts
  - both positive and negative

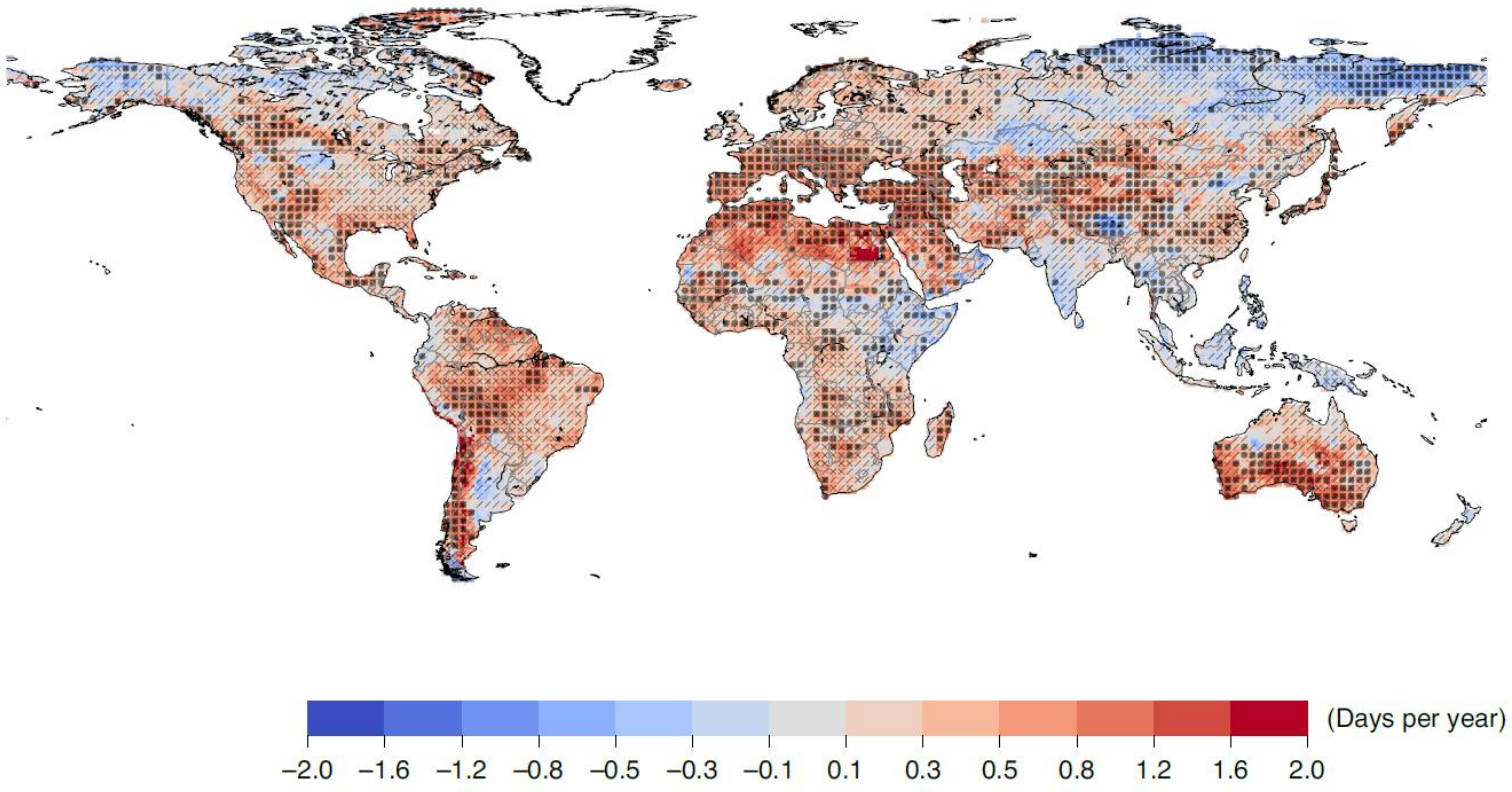
Costinot et al. 2016; Nelson et al. 2014; Porfirio et al. 2018; Weibe et al. 2015; IPCC 2019

Some caveats

- Substantial variation arising from choice of model
- Economic models operate from average changes but it is becoming increasingly clear that climate change will bring substantial increases in yield variability etc
  - which will increase costs, risks and trade
- Competition for land (and water) from carbon sequestration, biofuels or renewable energy could be significant
  - land area the size of Australia for the amount of bio-energy CCS required to contribute significantly to achievement of the 1.5^{o}C goal

IPCC 2014, 2018, 2019

Drought becomes much worse



Pokhrel et al. 2021

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