

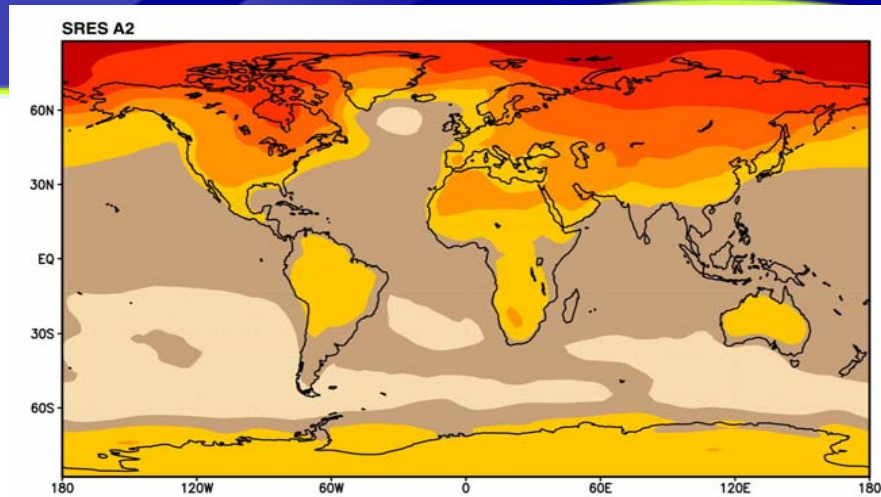


JULES as a framework for impacts modelling

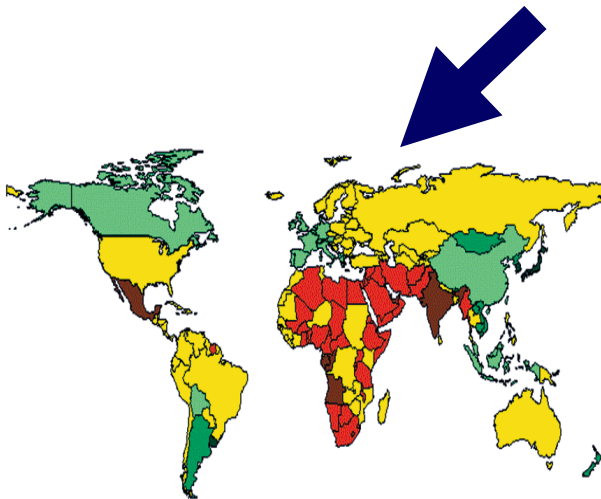
Richard Betts

JULES workshop, 2nd October 2006

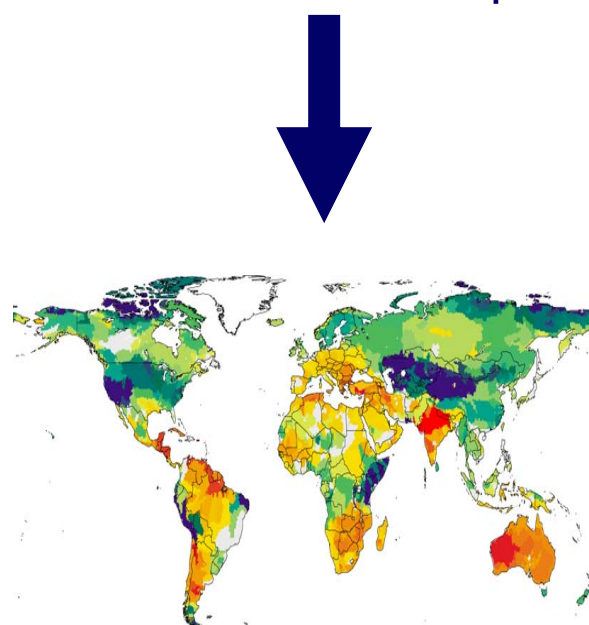
Standard approach to climate impacts modelling



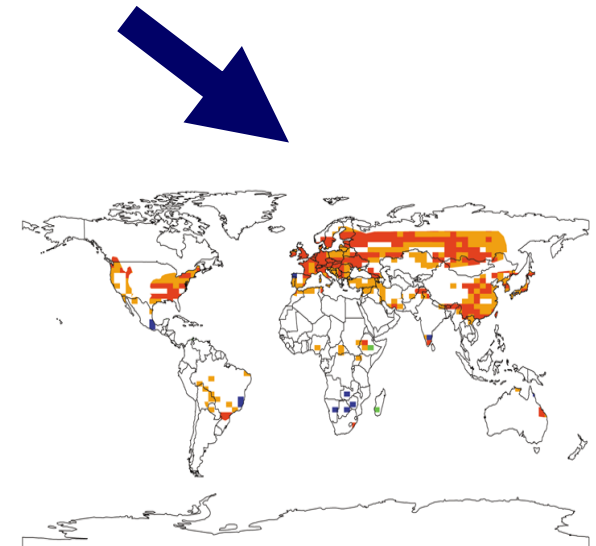
Climate model output



Food supply



Water availability

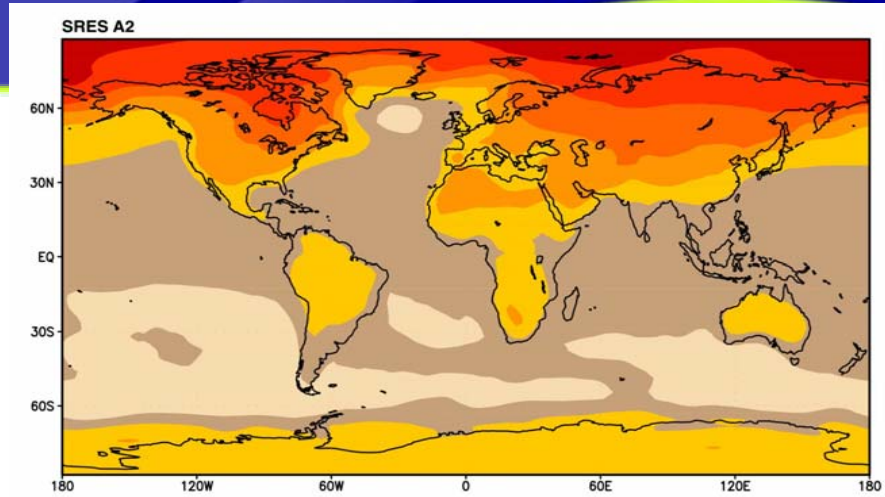


Health risks

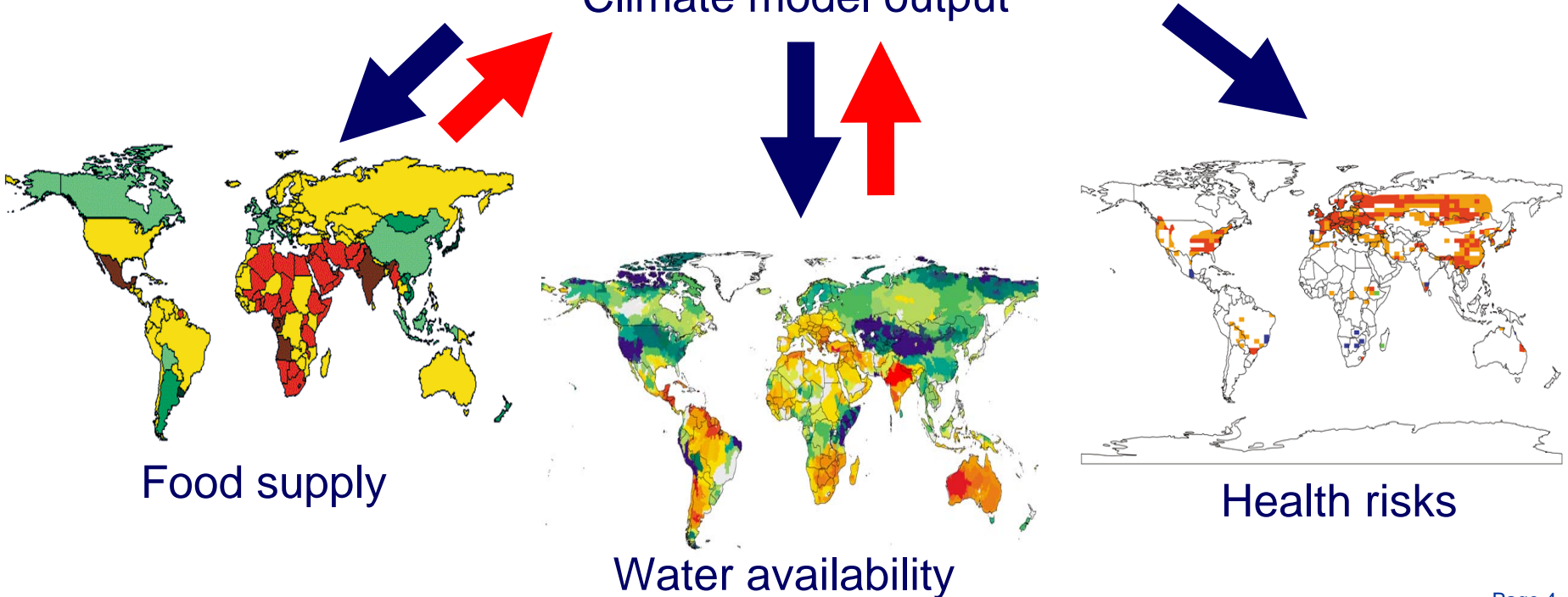
Should we take a more
integrated approach?

Should impacts models be
incorporated in climate models?

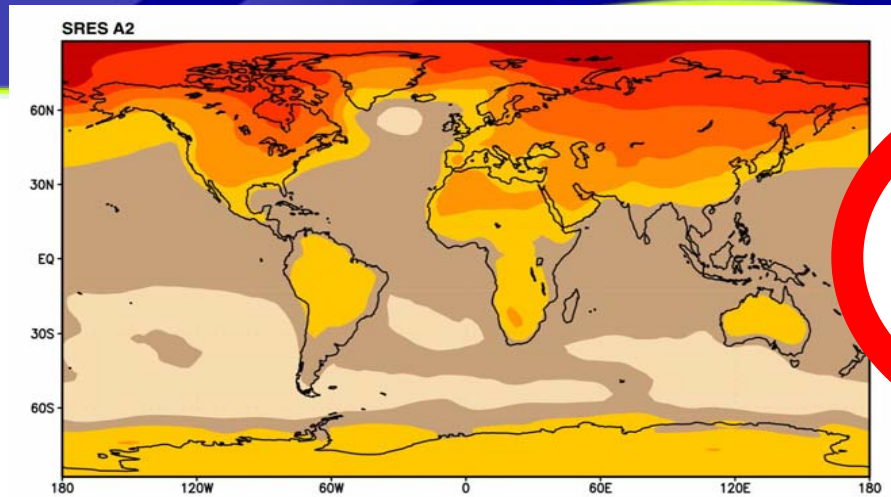
Impacts models in GCMs? (1) Feedbacks



Climate model output



Impacts models in GCMs? (2) Consistency



Climate model output

Surface water budget

Surface water budget

Food supply

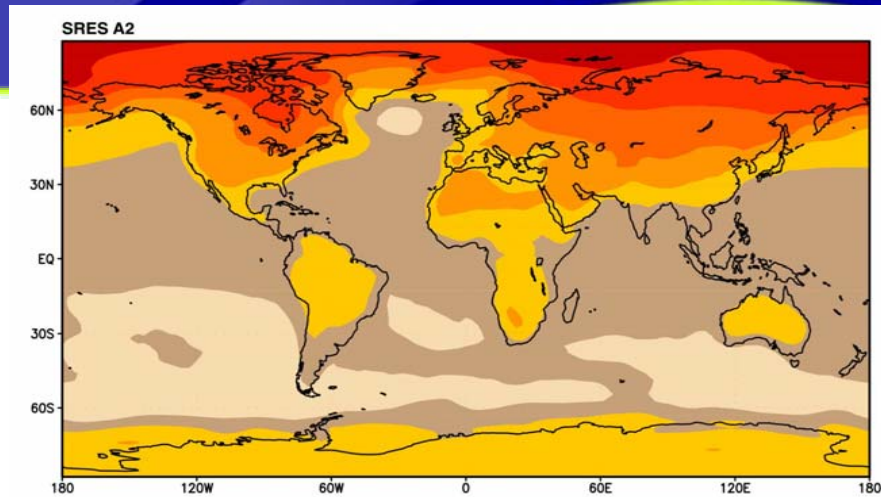
Surface water budget

Water availability

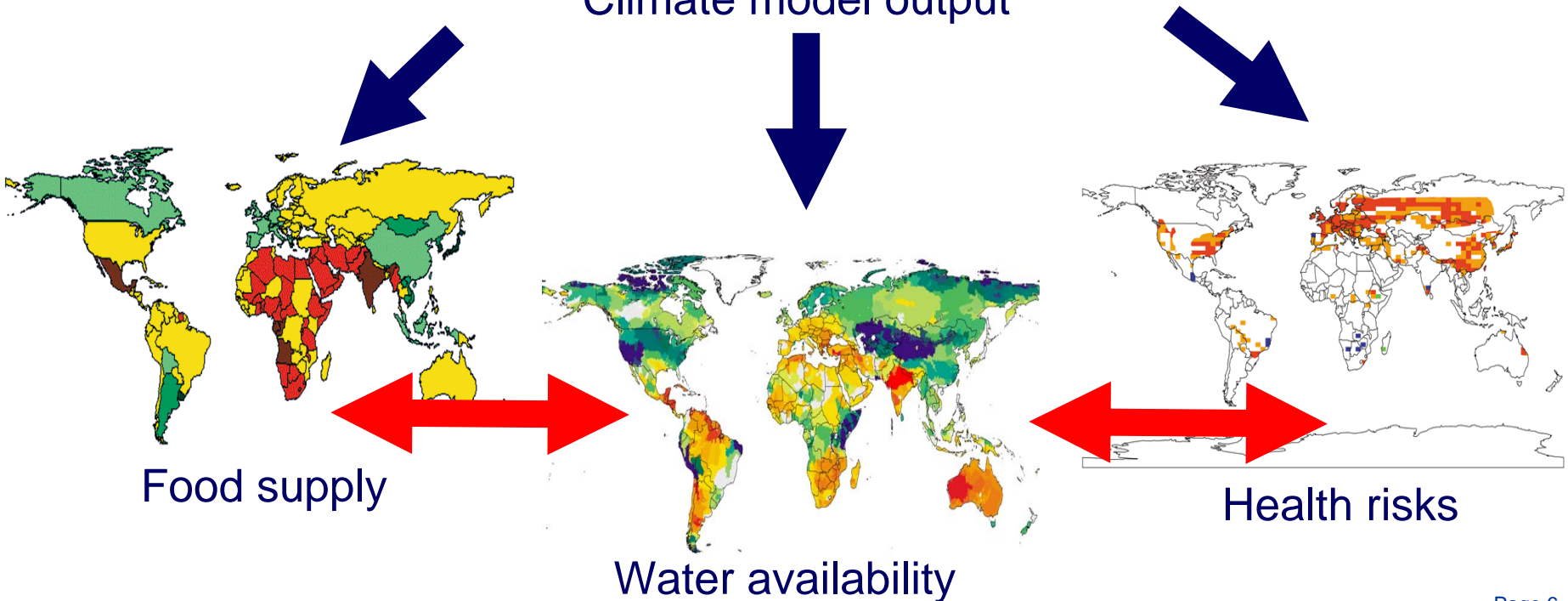
Surface water budget

Health risks

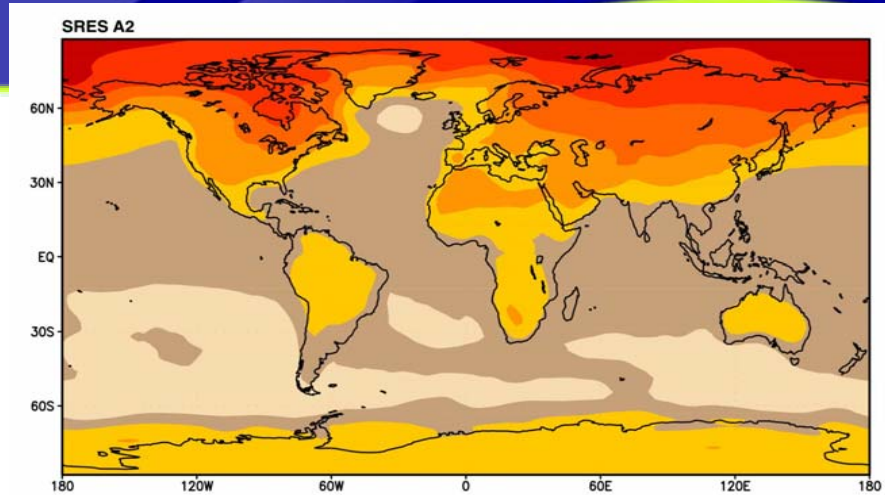
Impacts models in GCMs? (3) Synergistic impacts



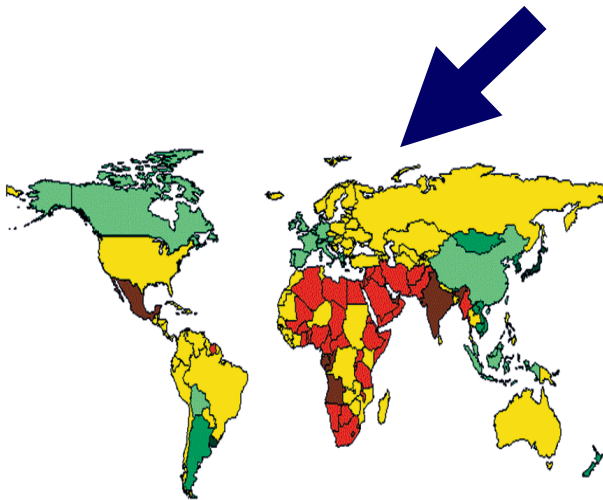
Climate model output



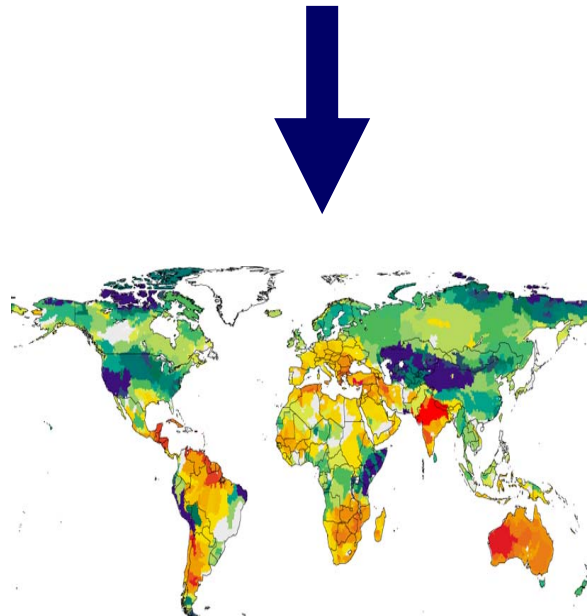
Impacts models *not* in GCMs? (1) no feedbacks



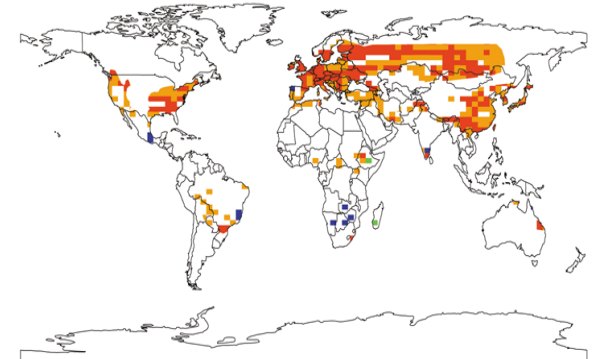
Climate model output



Food supply

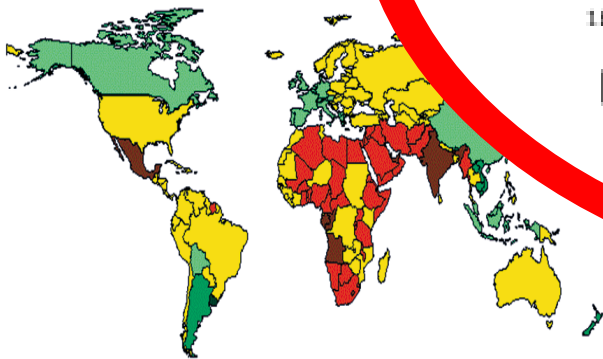
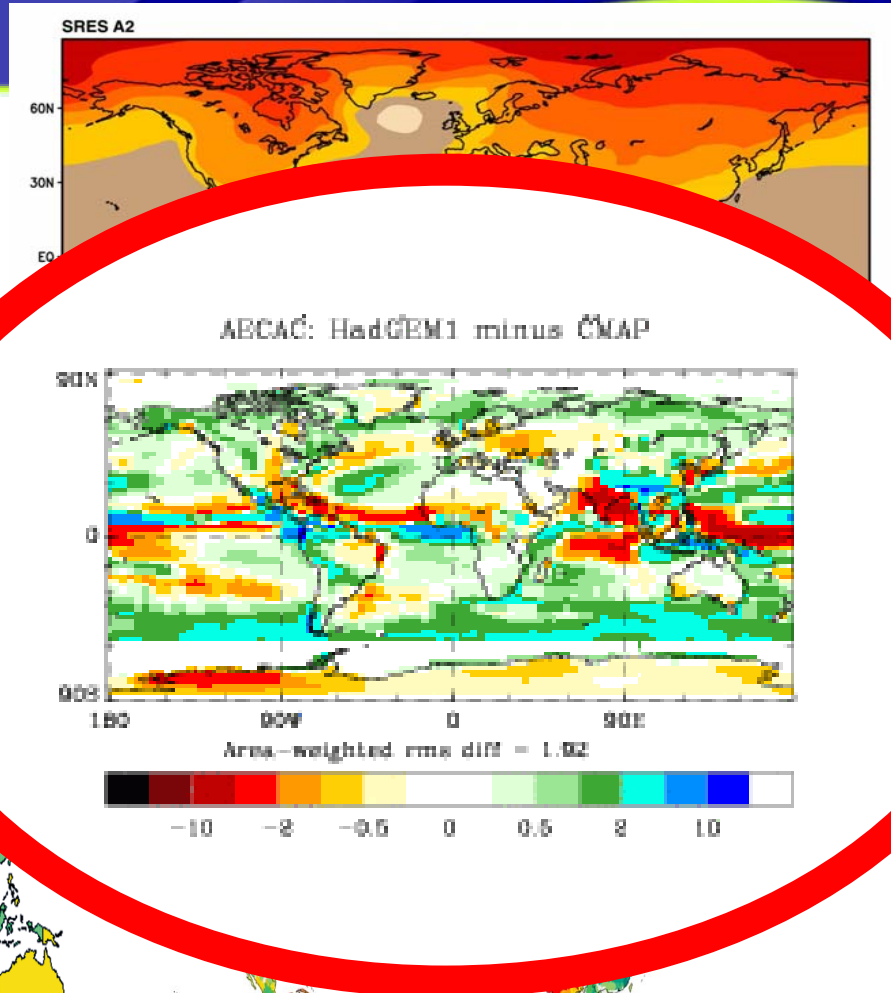


Water availability

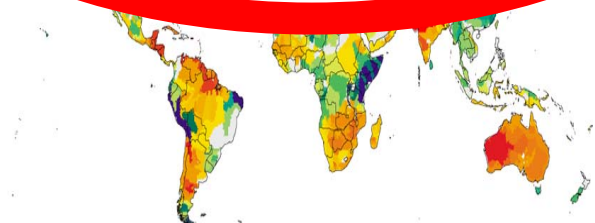


Health risks

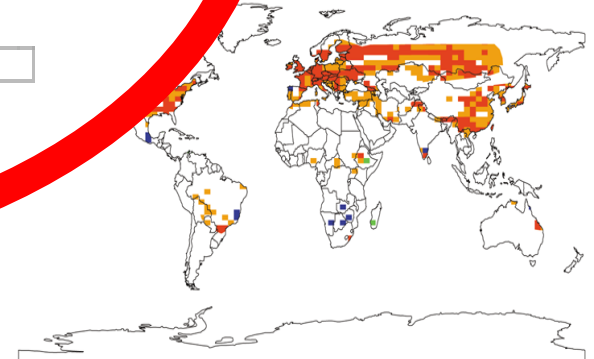
Impacts models *not* in GCMs? (2) model biases



Food supply

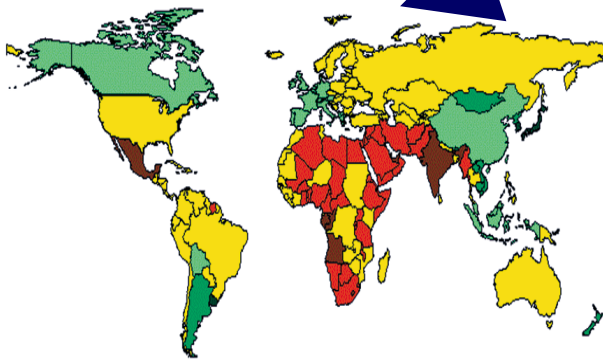
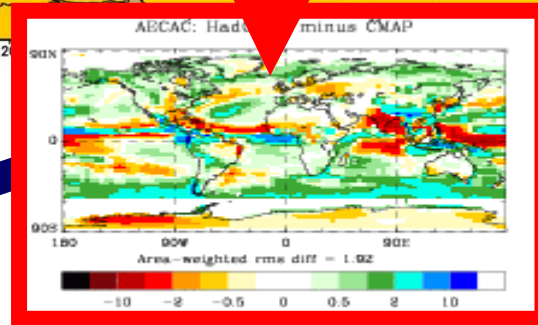
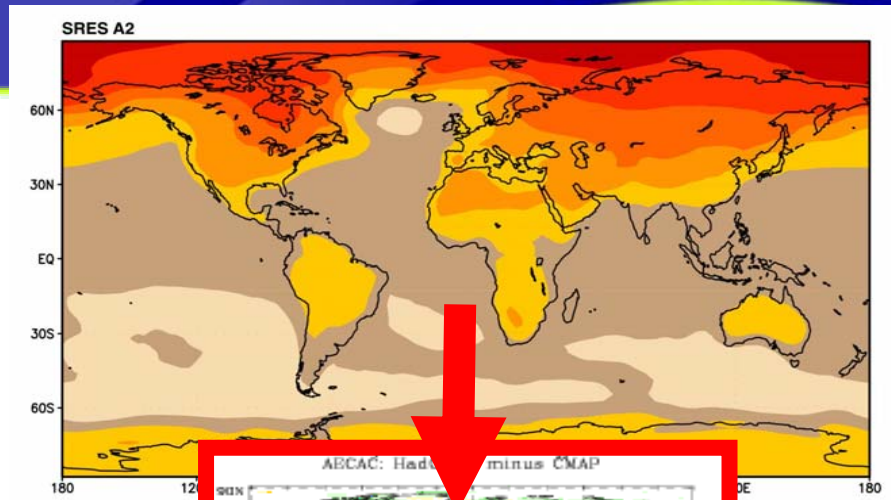


Water availability

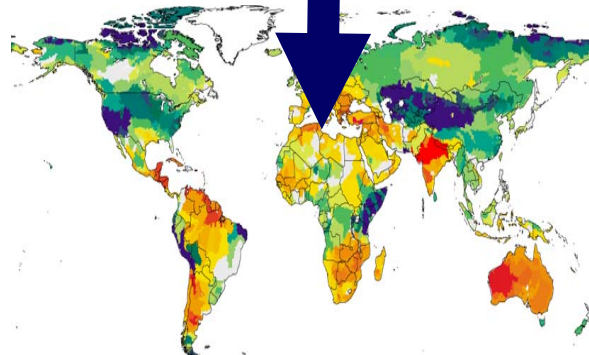


Health risks

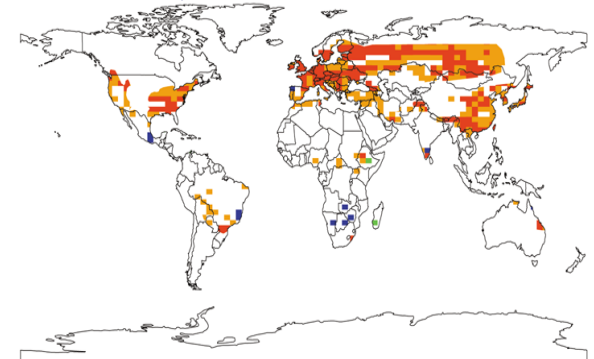
Impacts models *not* in GCMs? (2) model biases



Food supply

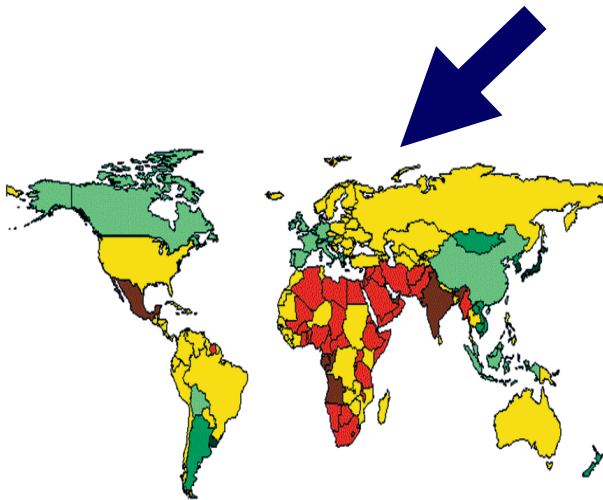
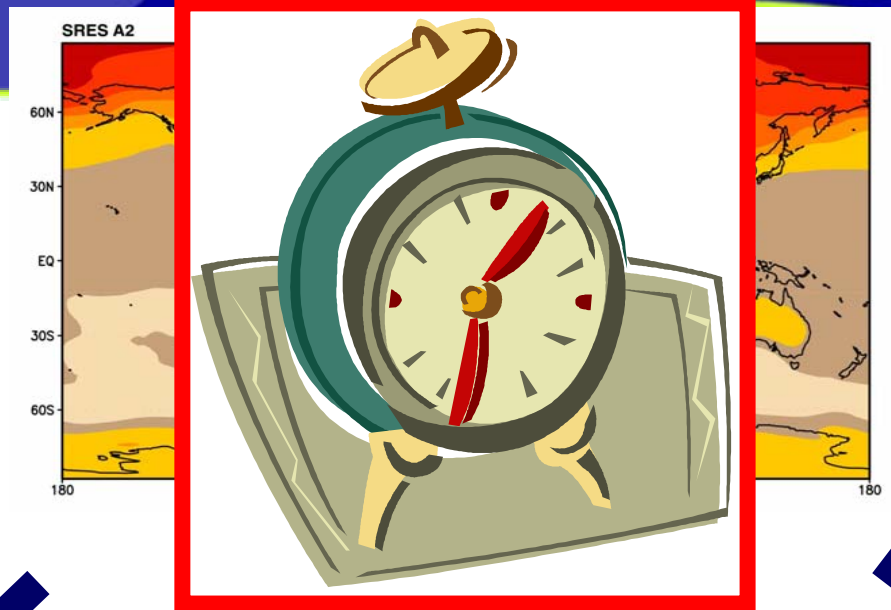


Water availability

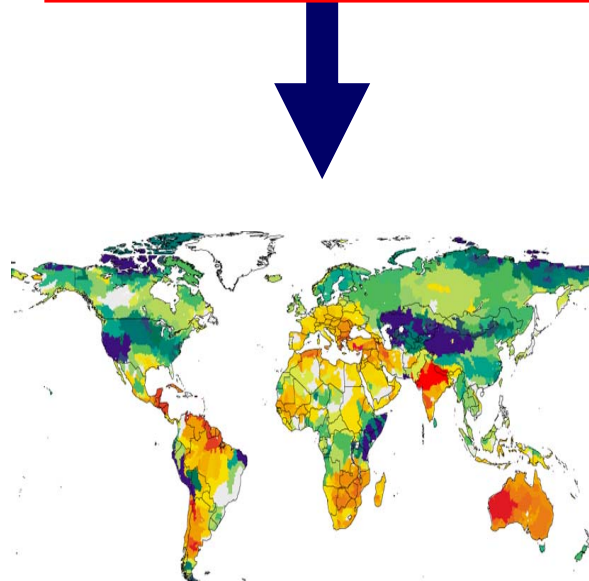


Health risks

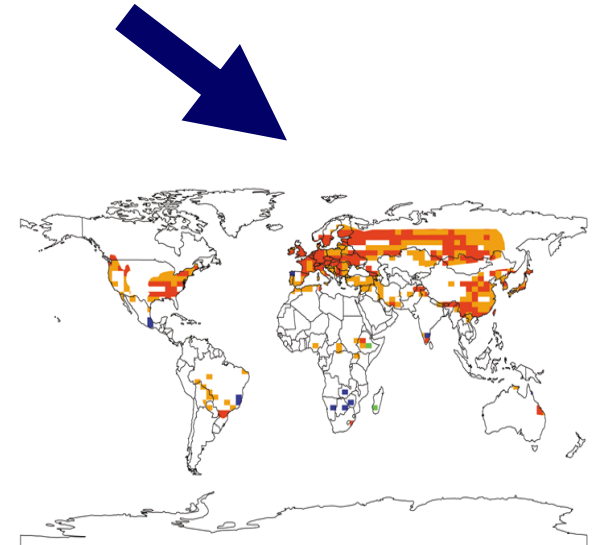
Impacts models *not* in GCMs? (3) slow GCMs!



Food supply

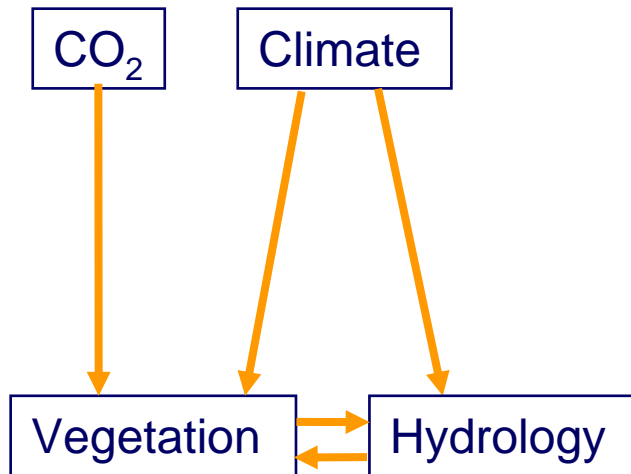


Water availability

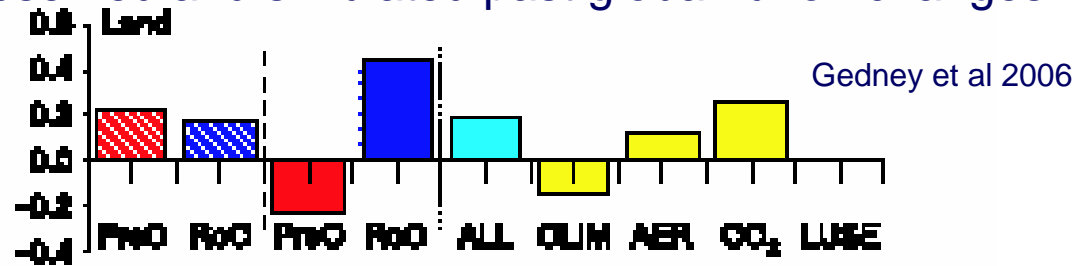


Health risks

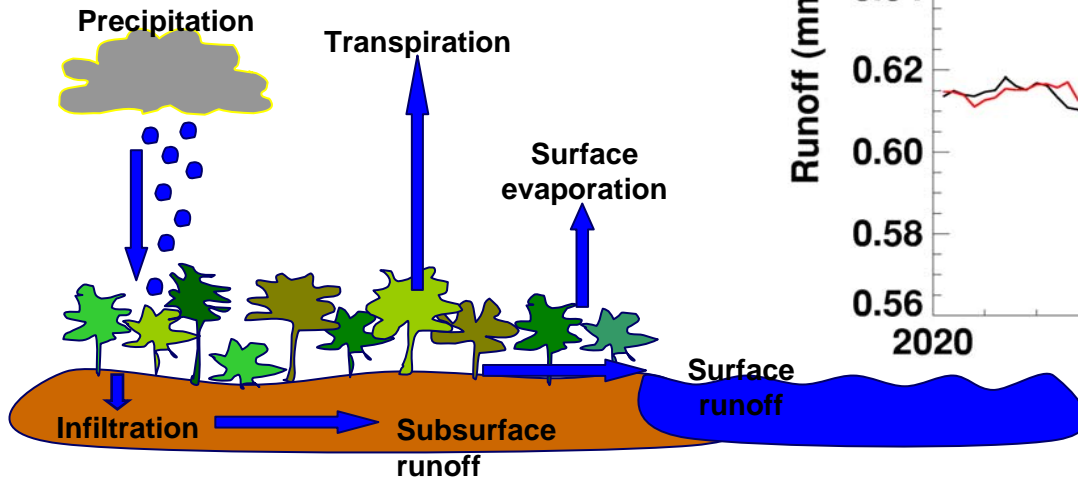
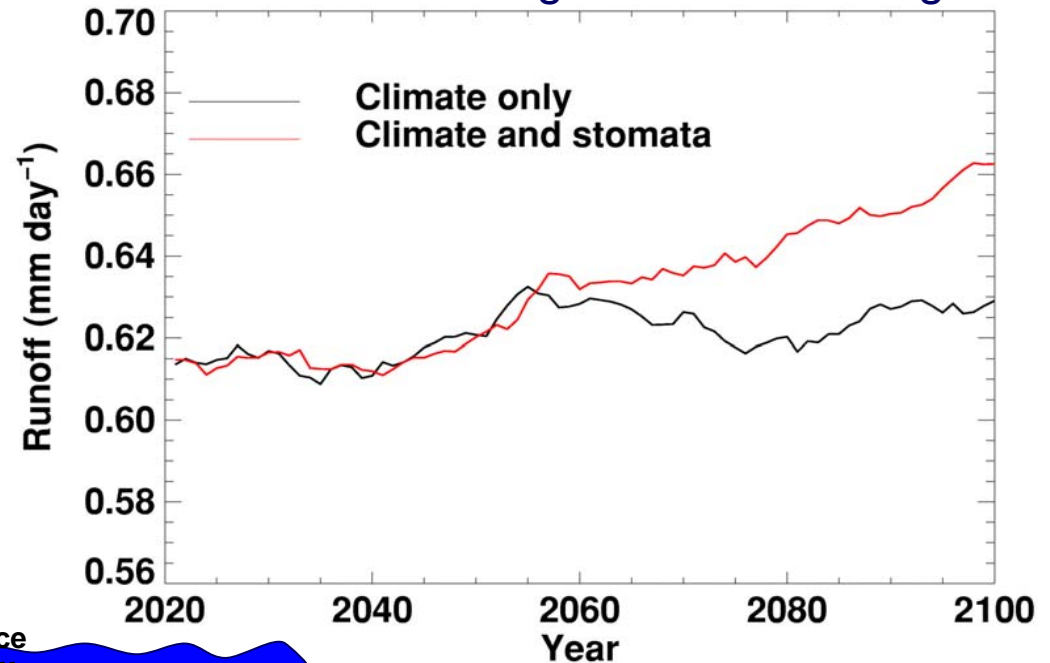
- Land surface model outside of GCM
- Consistency of processes
- Allows interaction between impacts sectors
- Can use “climatology + anomaly” method
- Not constrained by run speed or development overheads of GCM



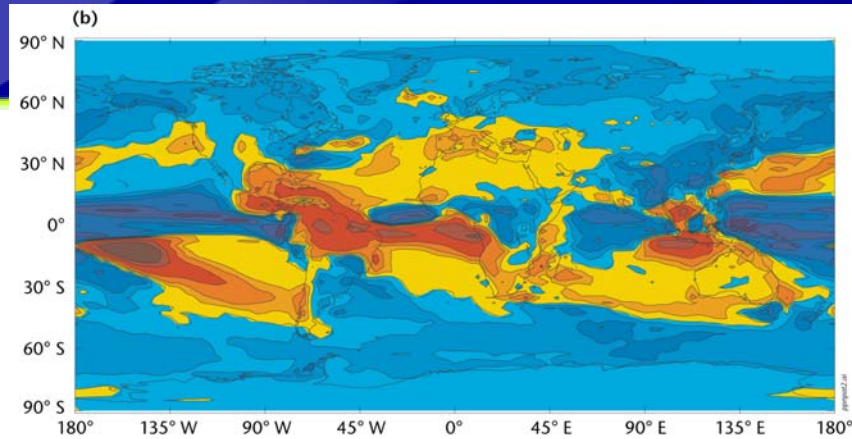
Observed and simulated past global runoff changes



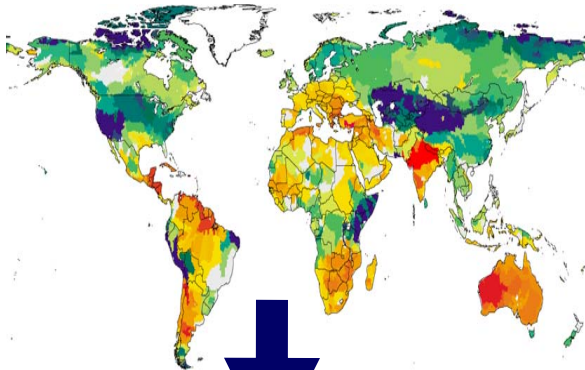
Simulated future global runoff changes



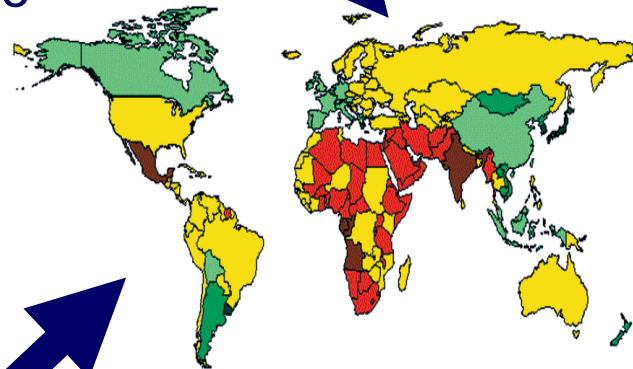
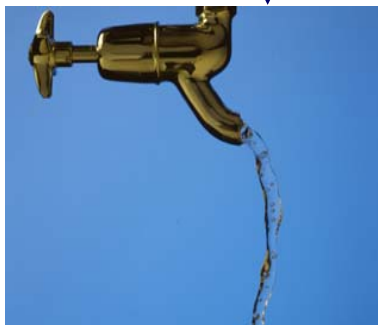
Interactions between water resources and crops



Precipitation change



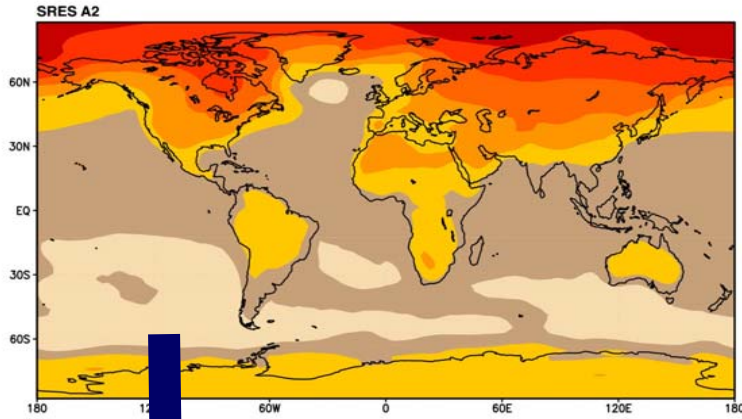
Water availability



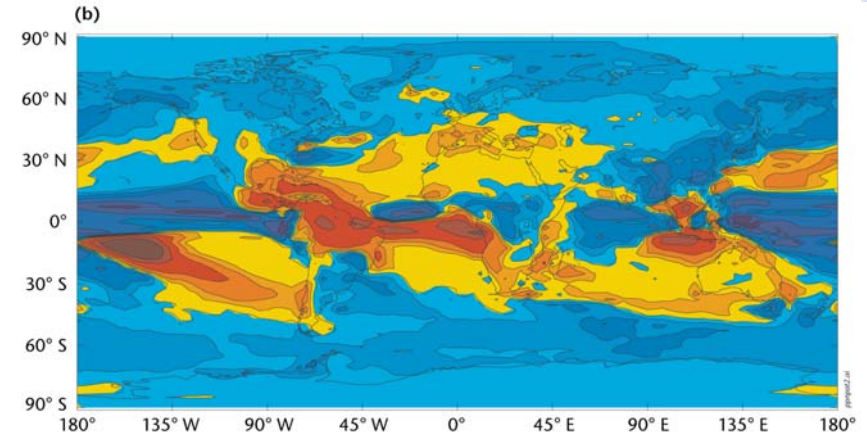
Food supply



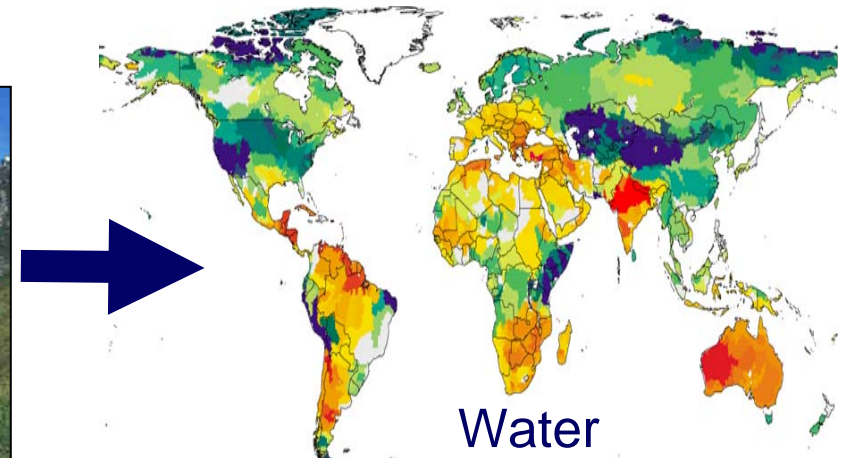
Interactions between ice melt and hydrology



Warming

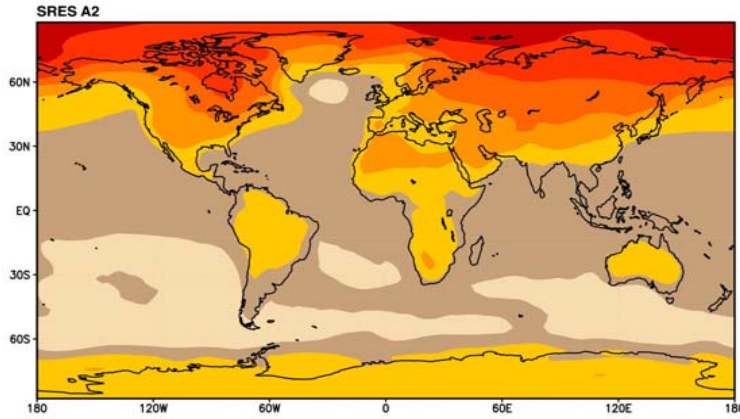


Precipitation change

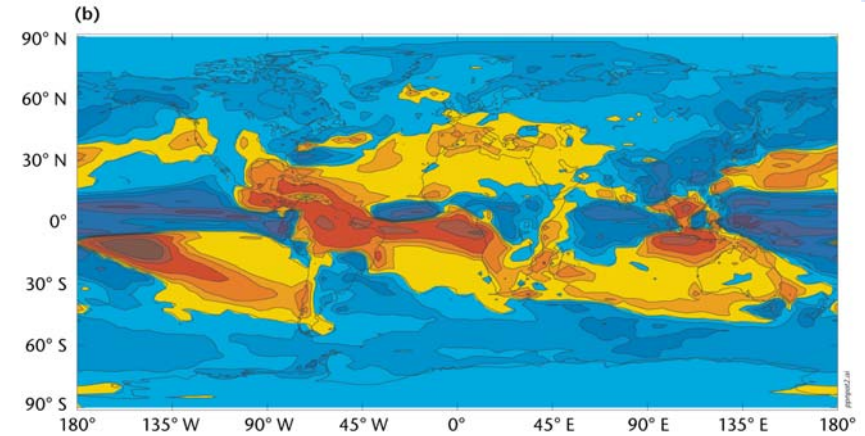


Water availability

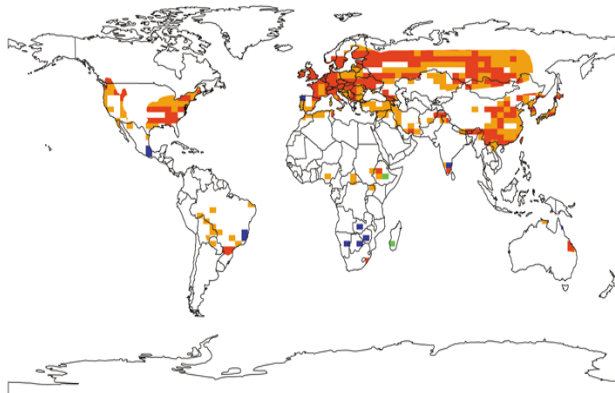
Interactions hydrology and vector-borne diseases



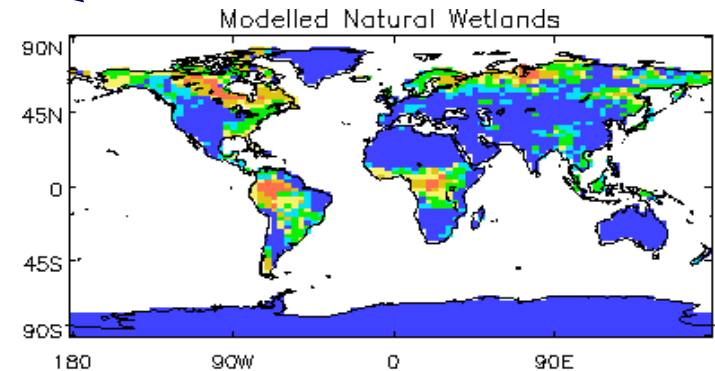
Warming



Precipitation change



Malaria transmission



0.025 0.05 0.1 0.15 0.2 0.3

- Many impacts of climate change cannot be considered in isolation
- Incorporation of impacts within Earth System Models would be the most complete solution
- BUT ... there are a number of practical problems to overcome
- JULES offers an opportunity to model terrestrial impacts within a common framework
 - Consistency between models
 - Interactions between impacts sectors
 - Still allow “climatology+anomaly” methods to reduce GCM biases
 - No constraint on speed of model development or experiments