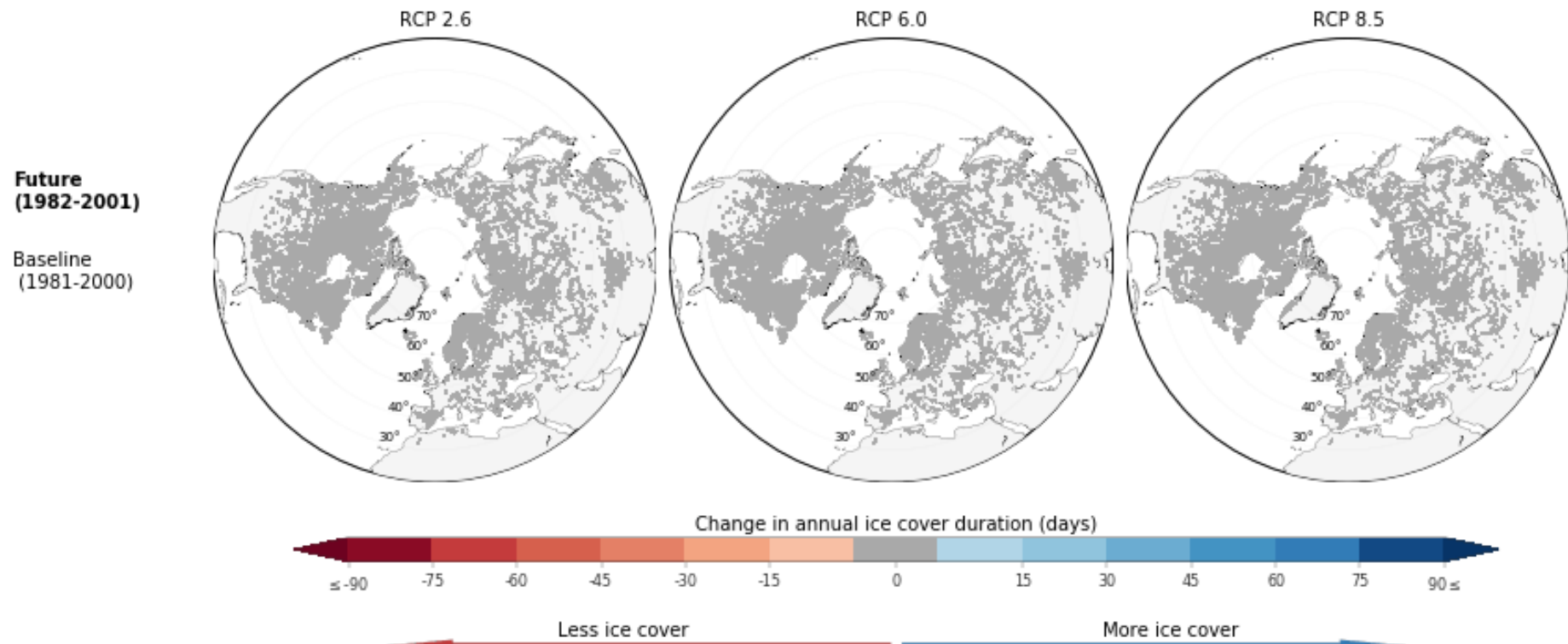




Land cover change impacts on climate and hydrological extremes

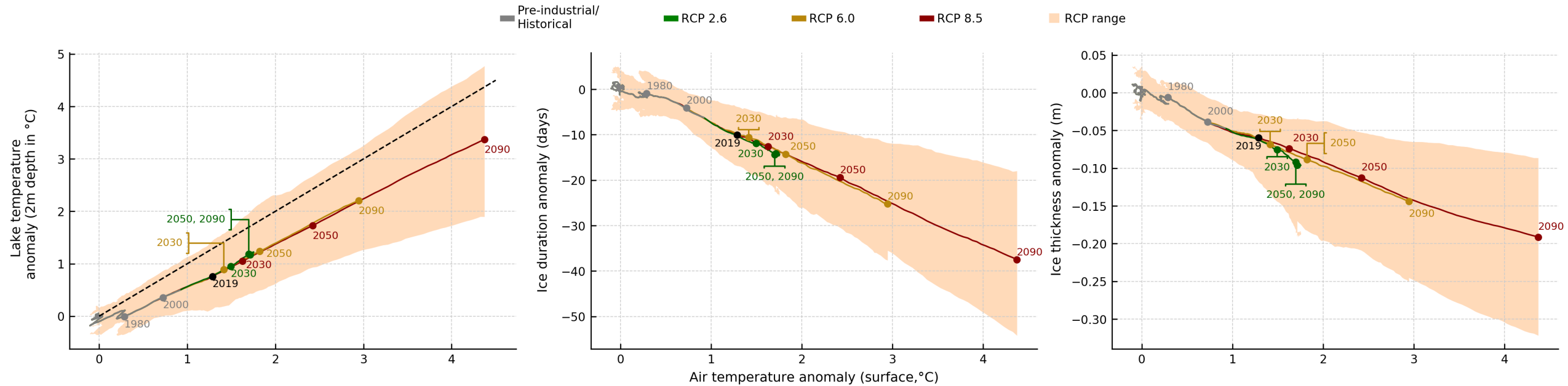
Luke Grant, Ann van Griensven, Wim Thiery

My MSc thesis



(Grant et al., in prep.)

My MSc thesis

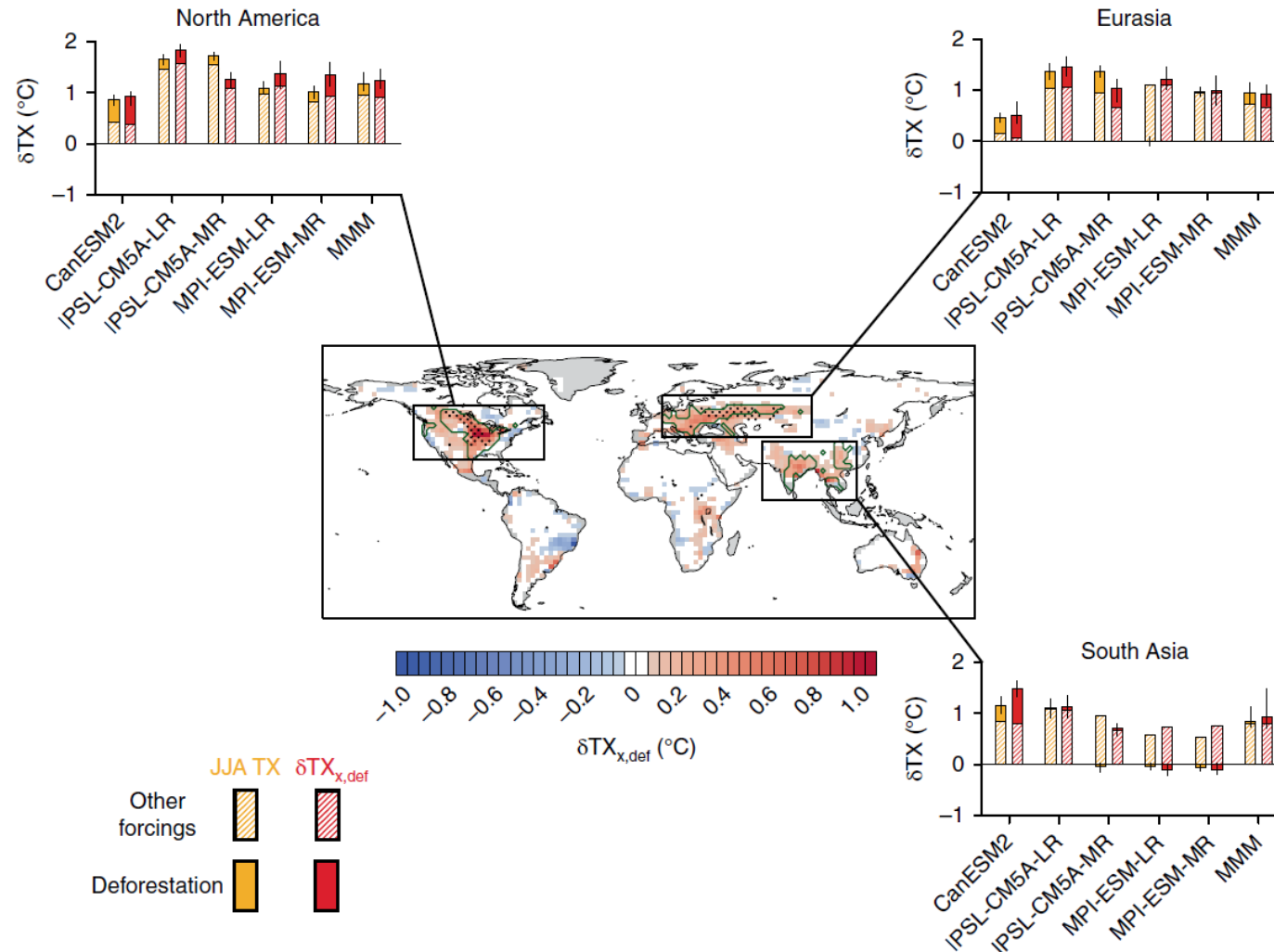


(Grant et al., in prep.)

Motivation: LULCC and extreme temperatures

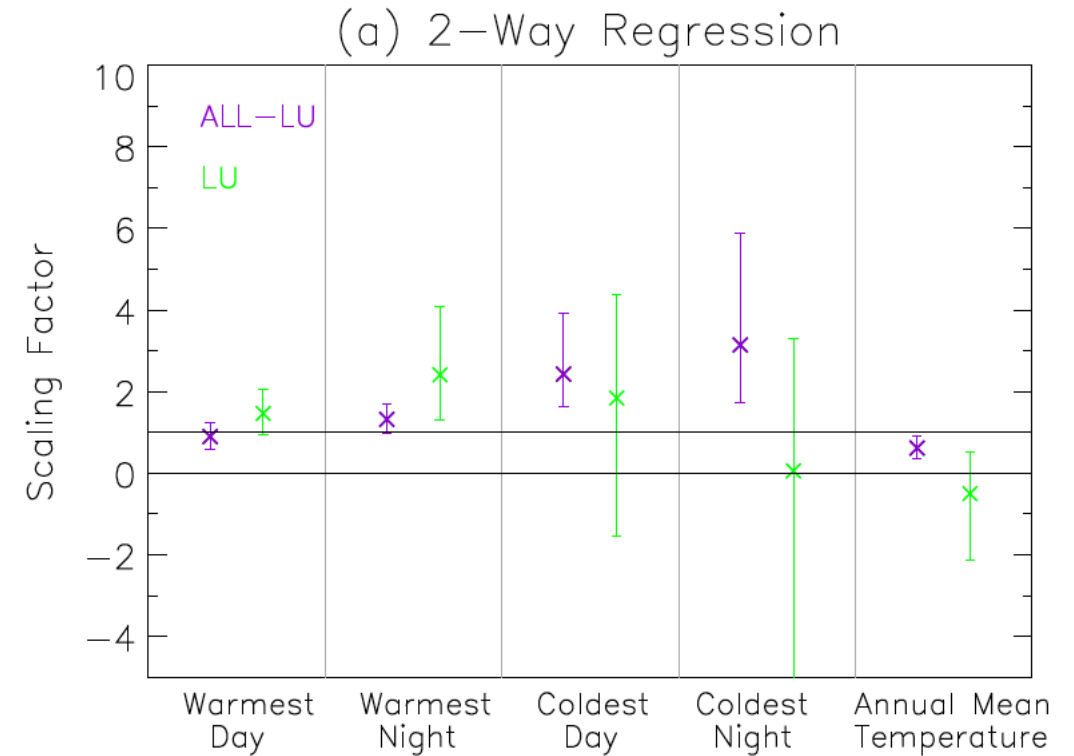
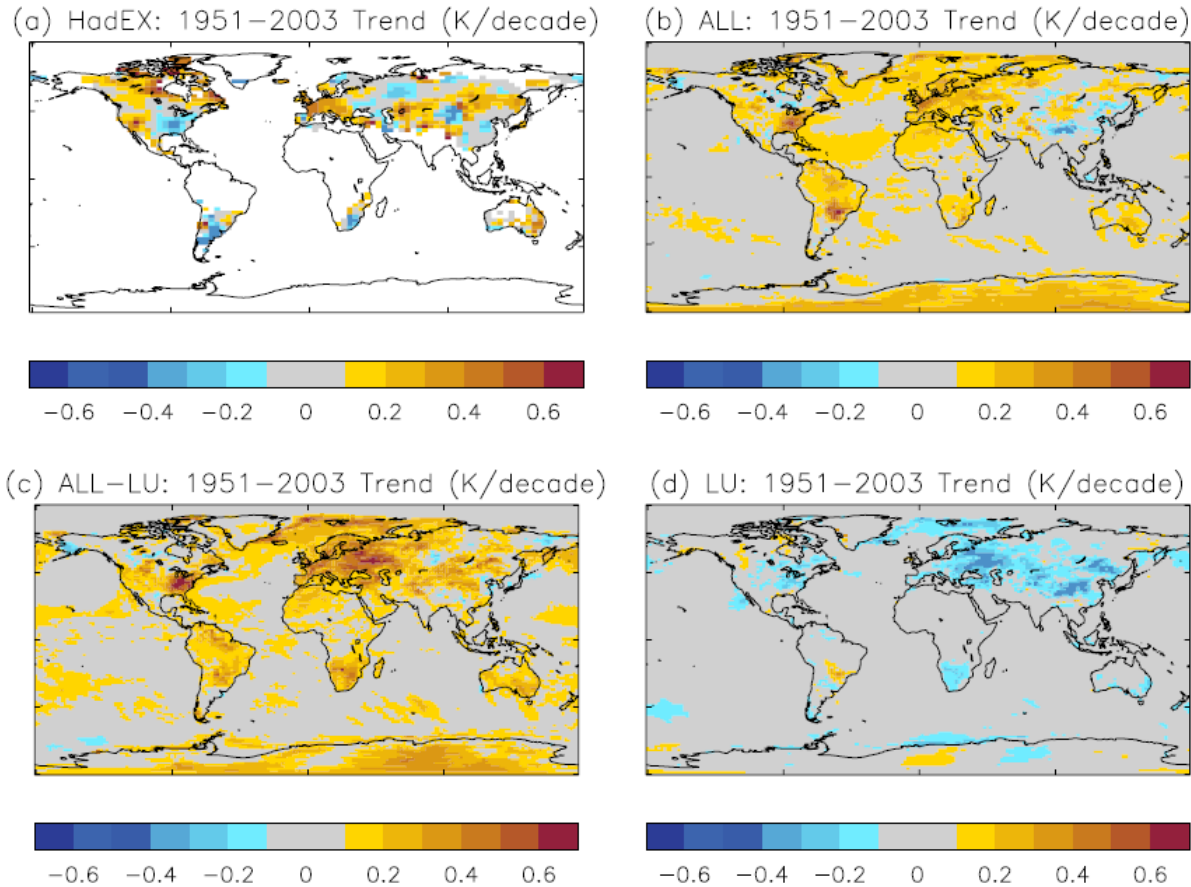


Deforestation exacerbates hot extremes in midlatitudes



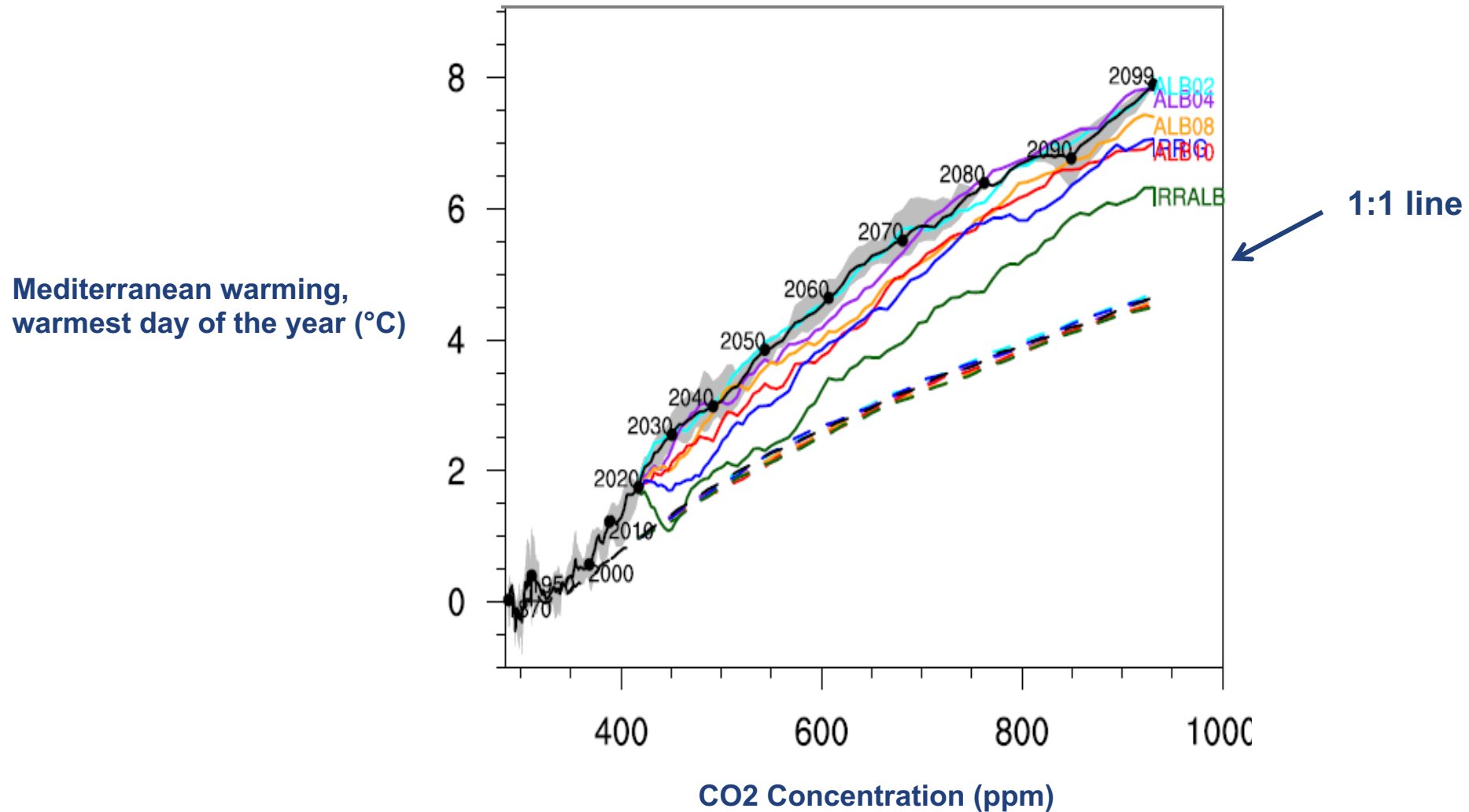
(Lejeune et al., 2018 NCC)

Detection and attribution of LULCC impacts on temperature



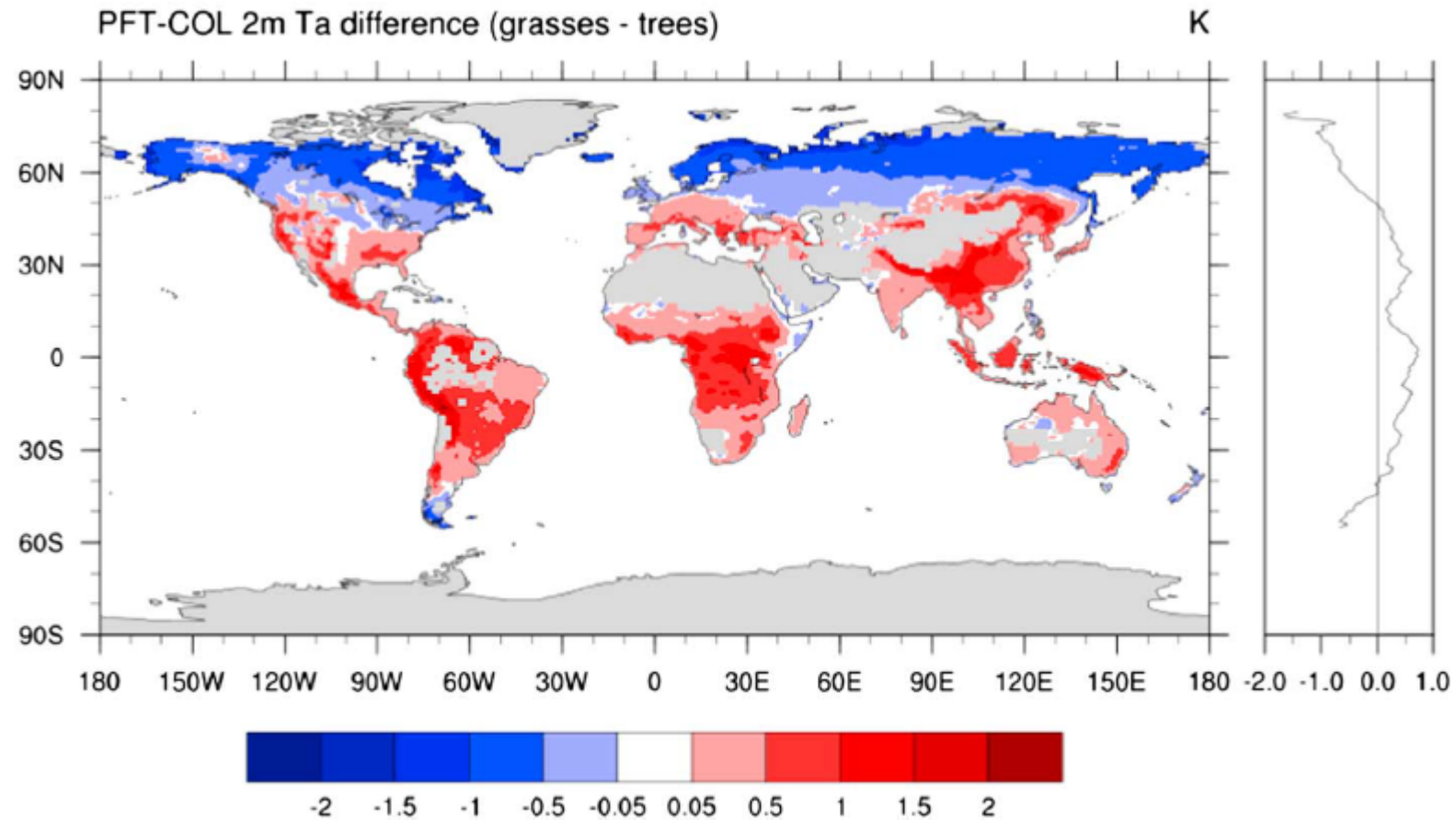
(Christidis et al., 2013 GRL)

Future land management may reduce scaling of hot extremes with GMT



(Hirsch et al., 2017 JGR)

Importance of subgrid-scale analysis



(Schultz et al., 2016 JGR)

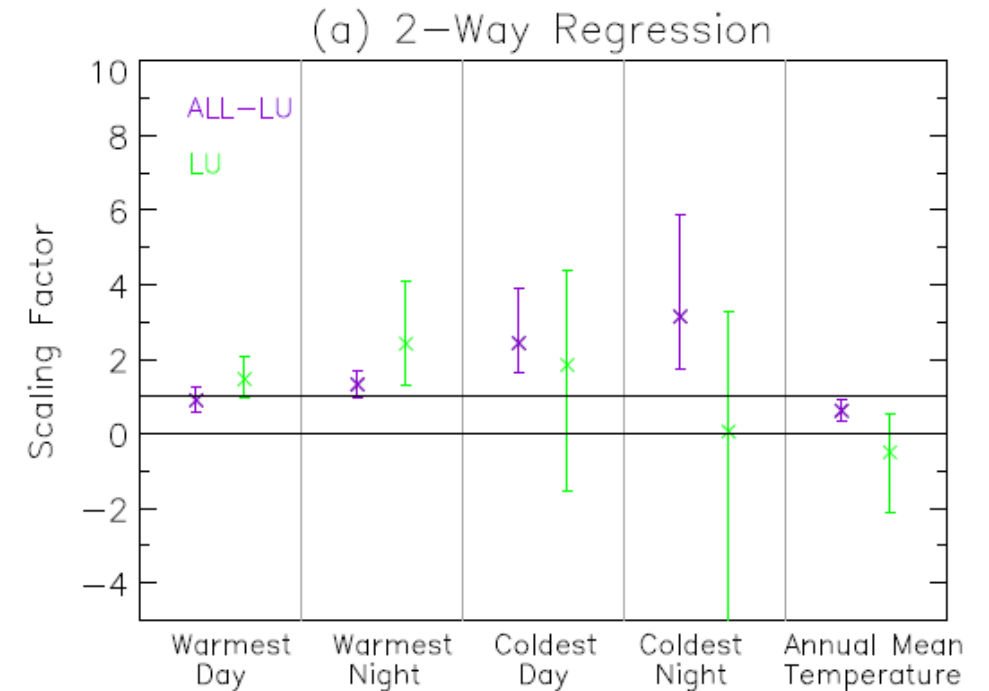
The plan



Research plan

1. Detection and attribution of historical LULCC effects on climate

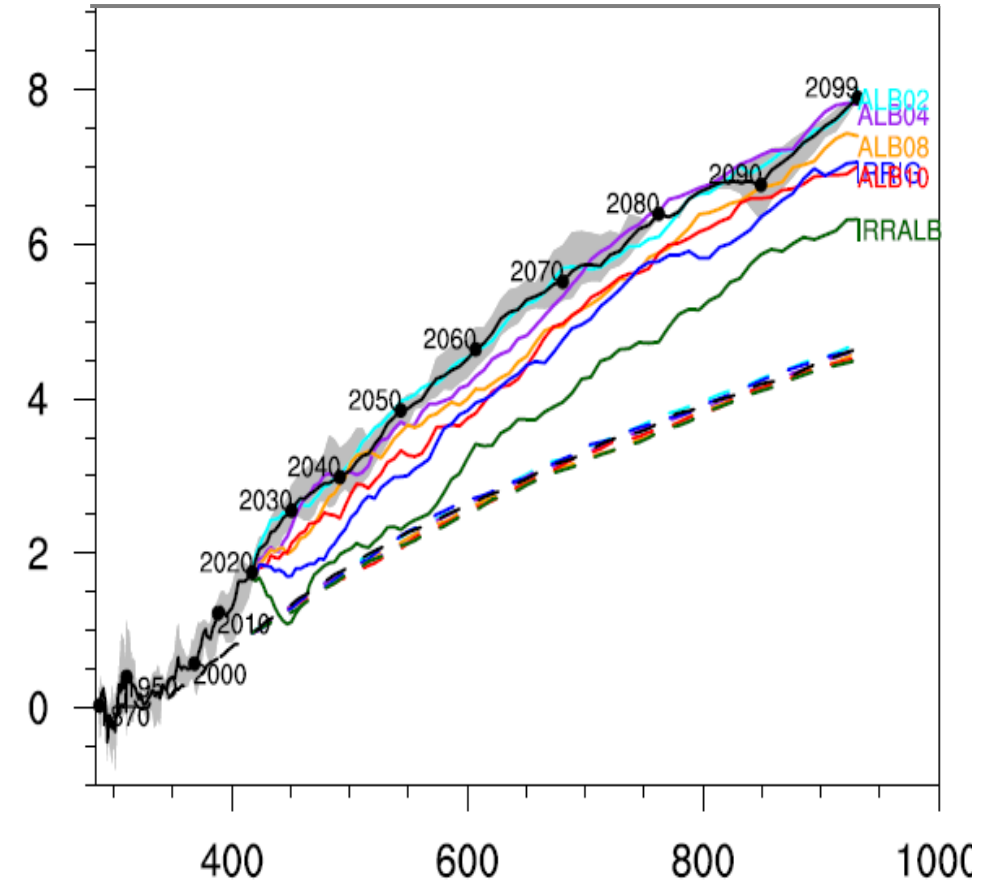
- CMIP6 historical all-forcings simulations and the LUMIP historical no-land use simulations
- Recent tropical deforestation
- Link attributed LULCC signals to individual LULCC forcings (irrigation, fertilizer) with LUMIP land-only simulations



Research plan

2. LULCC + climate change effects on future extremes in climate & hydrology

- SCENARIOMIP simulations and the LUMIP future coupled simulations with alternative land use futures
- 'time of emergence' approach similar to that of Park et al. (2017)
 - When are changes distinguishable from natural variability?



Research plan

3. SWAT+ (Soil & Water Assessment Tool) global

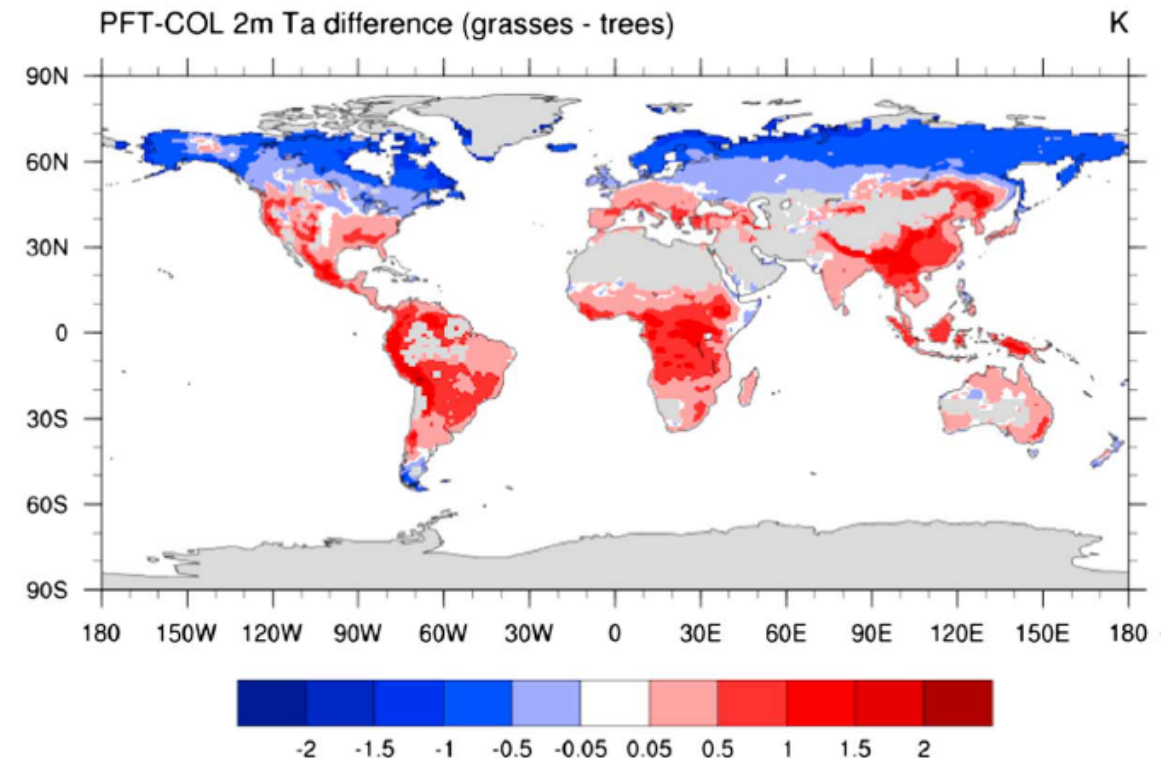
- Current continental-scale SWAT+ → global scale for ISIMIP3 global simulations
- Explore the effects of land use and climate on hydrological variables



Research plan

4. Mapping LSM tile fluxes to land-use maps as a new downscaling method

- Historical evaluations (MODIS + GLEAM)
- Potentially downscale LUMIP future simulations



Data needs

1. Daily, grid:

tas, tasmin, tasmax, huss

2. Monthly (or optionally daily), grid:

tslsi, rsds, rlds

3. Monthly (or optionally daily), subgrid:

hfls, hfss, rsus, rlus (i.e. SEB components), tslsi, tas, tasmin, tasmax (if applicable)

An aerial photograph of a vast terraced rice field system. The terraces are carved into a hillside, creating a series of concentric, wavy steps. The fields are filled with water, reflecting the sky, and are interspersed with patches of green rice plants. A few small trees and a small building are visible on the terraces. The overall scene is a beautiful example of traditional agricultural engineering.

Thanks! Questions?