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Project Proposal

Reducing the uncertainty on regional and local climate induced by land-atmosphere feedbacks

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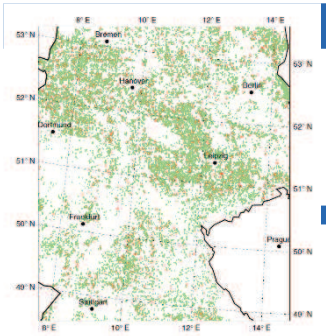
Current status

- Bias in amplitude of annual and diurnal cycle in surface temperature (and T2M)

- Too cold in summer and during day
- Too warm in winter and during nighttime

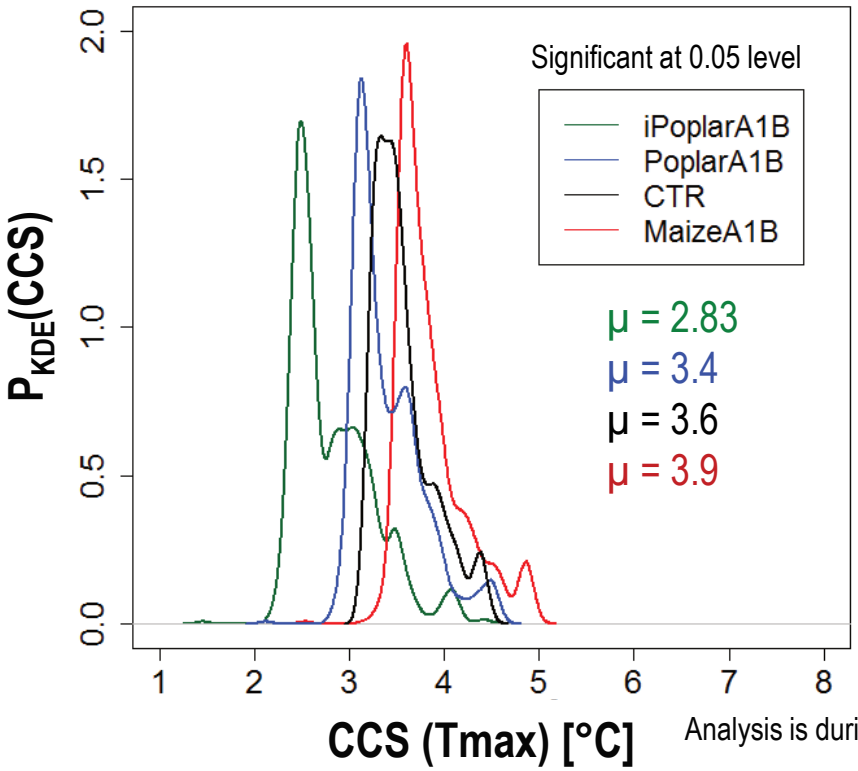
- Inter-annual phenology not captured accurately

- This leads to a bias in the surface turbulent fluxes, and thus to a bias in the land-atmosphere coupling



Land use change impact on future climate

Probability density function during the vegetation period



Analysis is during the vegetation period (May-Sep).

Reduced climate change signal of Tmax due to increases in bioenergy regions.

Tölle et al. 2014

Project Outline

- Anticipated duration: 36 months (2 PhD)

- Reduce uncertainty introduced by land-atmosphere feedbacks on seasonal, inter-decadal, and climate time scales

- Consideration of land surface complexity on fine spatial scales:

  – Transient anthropogenic land use changes
    (-> seasonal forecast)

  – Account for heterogeneous land cover including winter and summer crop
    (-> daily forecast)

  – Dynamic vegetation that accounts for seasonal influences
    (-> daily and seasonal forecast)

Further consideration

- Relate albedo to phenology (plant cover, leaf area index)
- Account for land use dependent permanent wilting point
- Stomatal conductance as in Ball and Berry (1991) depending on CO_2 uptake (light, temperature), spec. humidity, CO_2 mole fraction
- Or Jarvis-type approach
- ICON-LAM
- What else?
- …