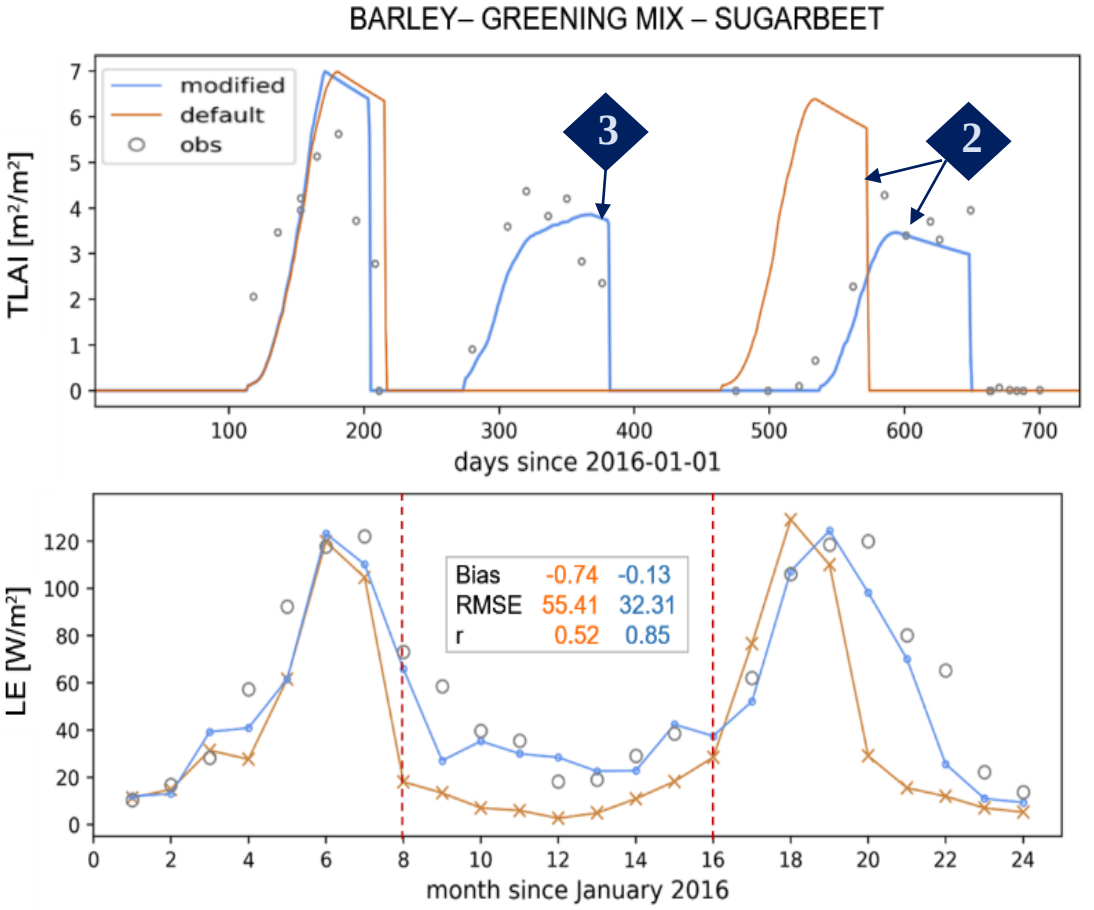
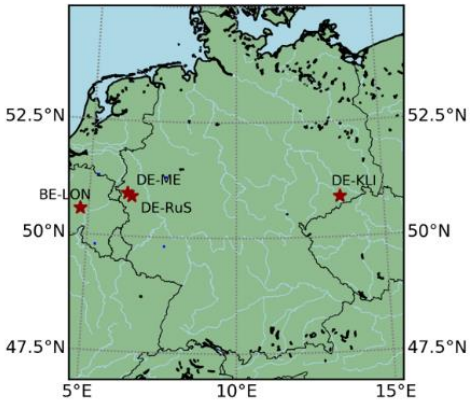
Improving the representation of cropland sites in CLM5

Boas, T. [1,2], Bogena, H.[1,2], Grünwald, T.[3], Heinesch, B.[4], Ryu, D.[5], Schmidt, M.[1], Vereecken, H.[1,2], Western, A.[5], Hendricks Franssen, H.J.[1,2] (2021), *Geoscientific Model Development*

Motivation. A comprehensive crop module in land surface models help to understand biogeophysical and biogeochemical processes on regional and global scales in the framework of climate and land use change. However: CLM5 is not able to correctly represent winter cereals and cover cropping techniques.

Methods. Multiple modifications were developed and implemented to enhance the CLM5 crop module:





ICOS and TERENO sites

1. **Winter wheat representation**
2. **Crop specific parameters for several main cash crops**
3. **New cover cropping and crop rotation routine**

Results. The enhanced CLM5 Model was tested with ICOS and TERENO reference data:

- Improved LAI cycles and magnitudes
- Higher flexibility for crop rotation and multi-cropping systems
- Substantial improvement of post-harvest field condition representation
- up to 59 % RMSE reduction for energy and vegetation fluxes
- up to 87 % improvement in winter wheat yield prediction