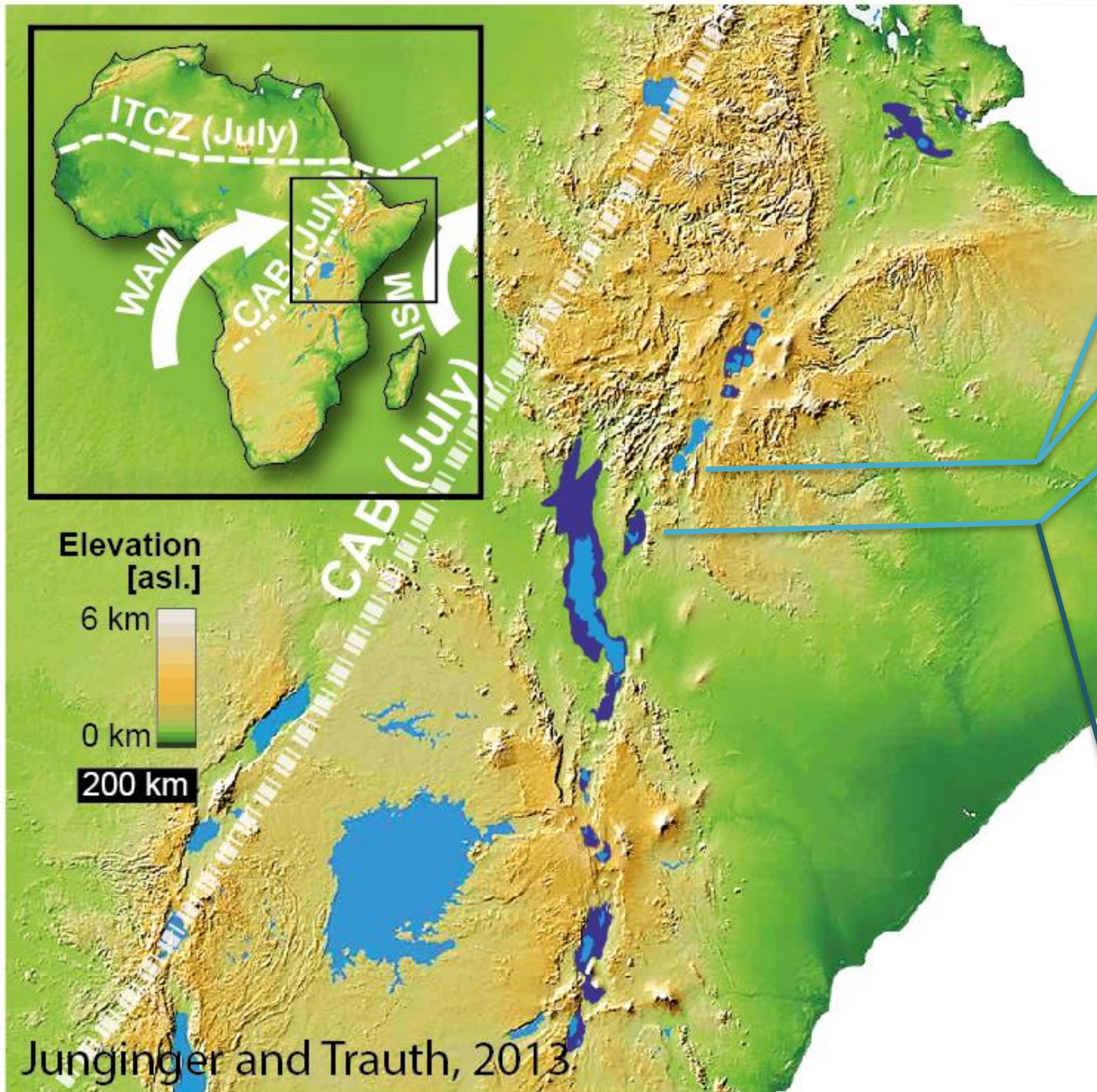# Linking Paleo Vegetation Modelling with a Phytolith Record for the African Humid Period (15 - 5 ka BP) of the Omo-River-Lowlands and the Chew Bahir Basin, southern Ethiopia

**Markus L. Fischer, Fabian Sittaro, Claudia Manntschke, Chad Yost, Verena E Foerster, Frank Schäbitz, Christian Schepers, Martin H Trauth and Annett Junginger**
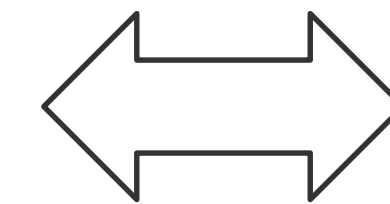
Picture from A. Junginger

**Lake Abaya**

**Lake Chamo**
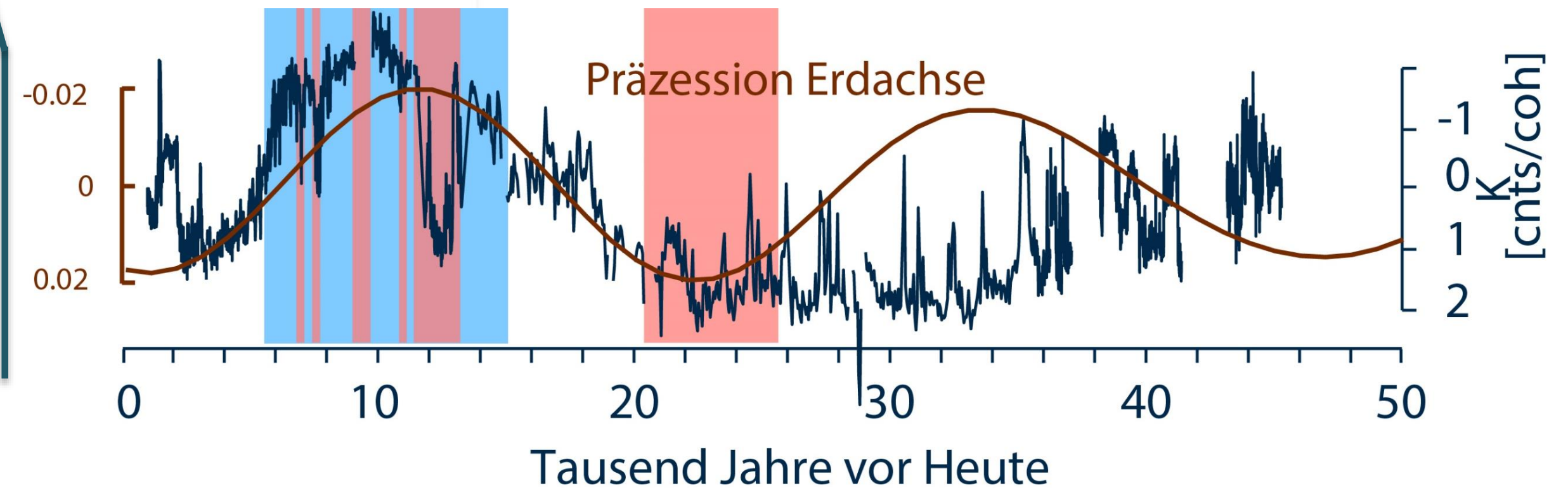
**Paleo-lake Chew Bahir**

- **Combined Lake Balance Model** has proved Lake Level **Fluctuations within Decades** and a **20 to 30% increased Precipitation** during the AHP (Fischer et al., submitted)
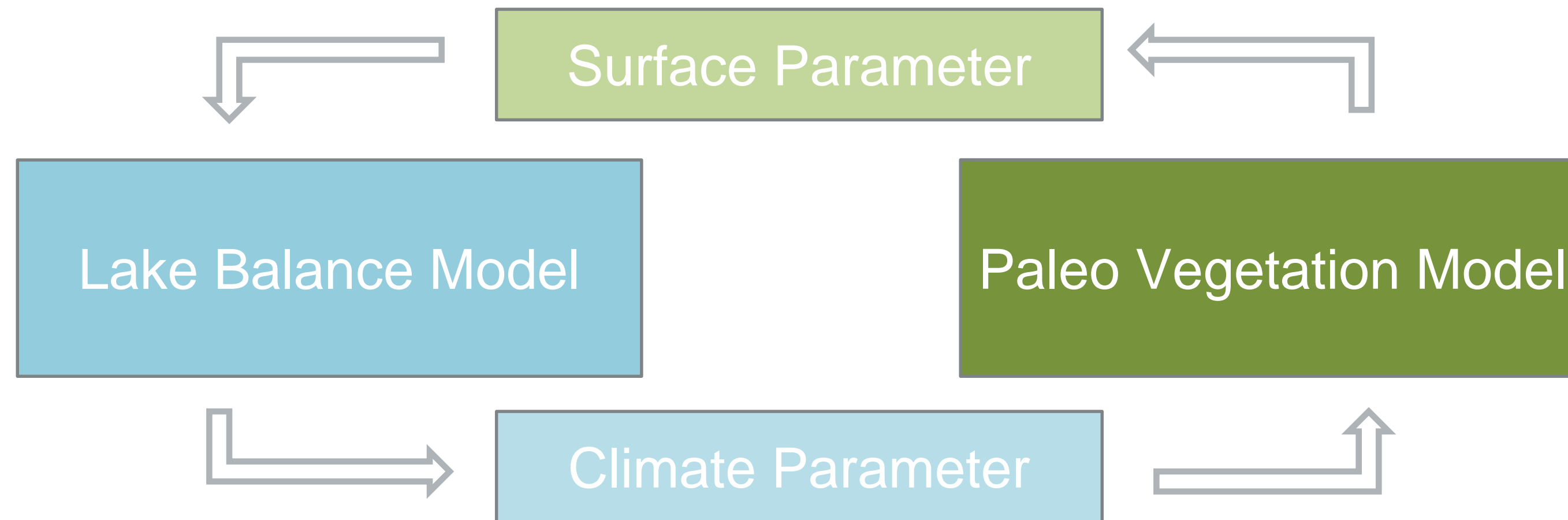
**Model** ⟺ **Proxy**

- K- Aridity Proxy reveals **dry LGM** (25 – 18 ka BP), **African Humid Period** (15 – 5 ka BP) and **dry late Holocene** (Foerster et al., 2012)

Präzession Erdachse

K [cnts/coh]

Tausend Jahre vor Heute

Elevation [asl.]
6 km
0 km
200 km

Junginger and Trauth, 2013

- **Lake Balance Model** simulates the change in the water balance **with increasing precipitation** and receives **updated vegetation surface parameters** from the **Paleo Vegetation Model** from this study

- The Paleo Vegetation Model is based on **Boosted Regression Trees** and predicts vegetation parameter based on **SRTM elevation** and **monthly GPM based precipitation** data

- Vegetation Parameters are: **Landcover** (e.g. forest, savanna, grassland), **Vegetation Density** (EVI, LAI), **Tree and Non-Tree Cover**
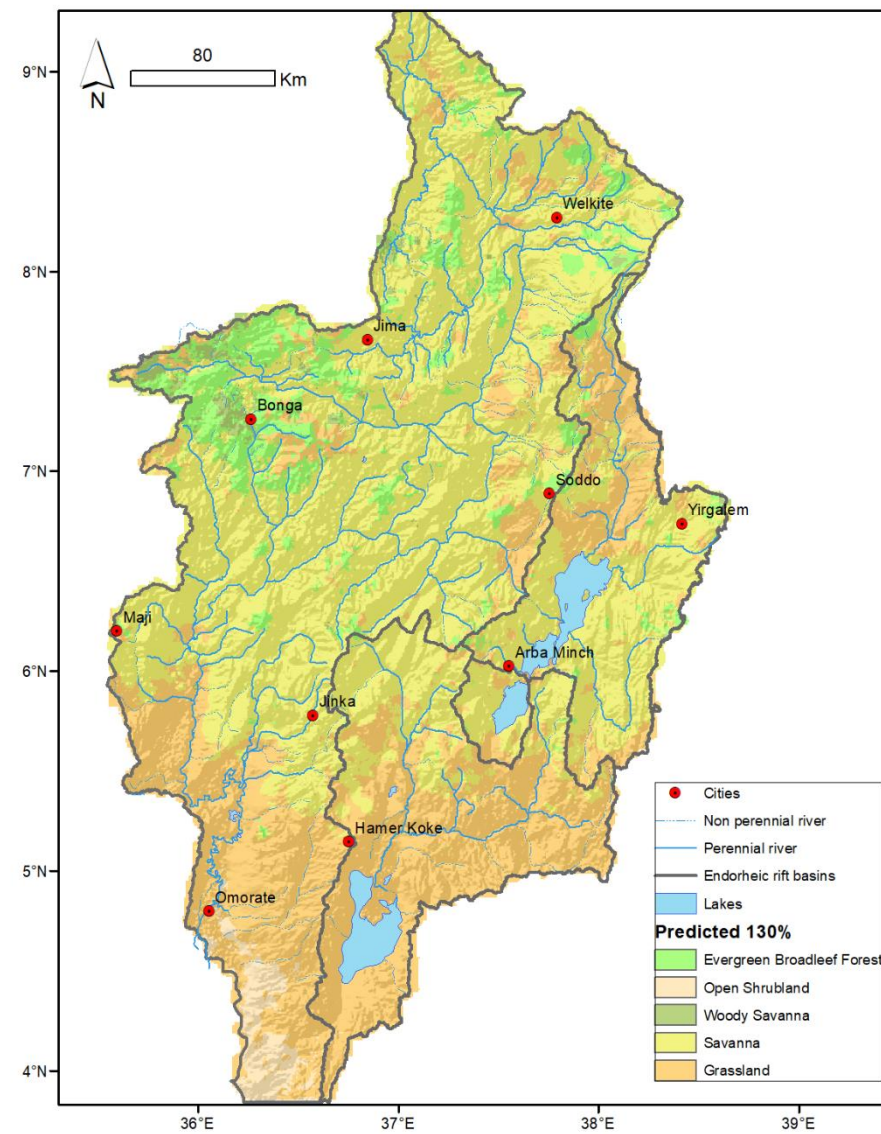
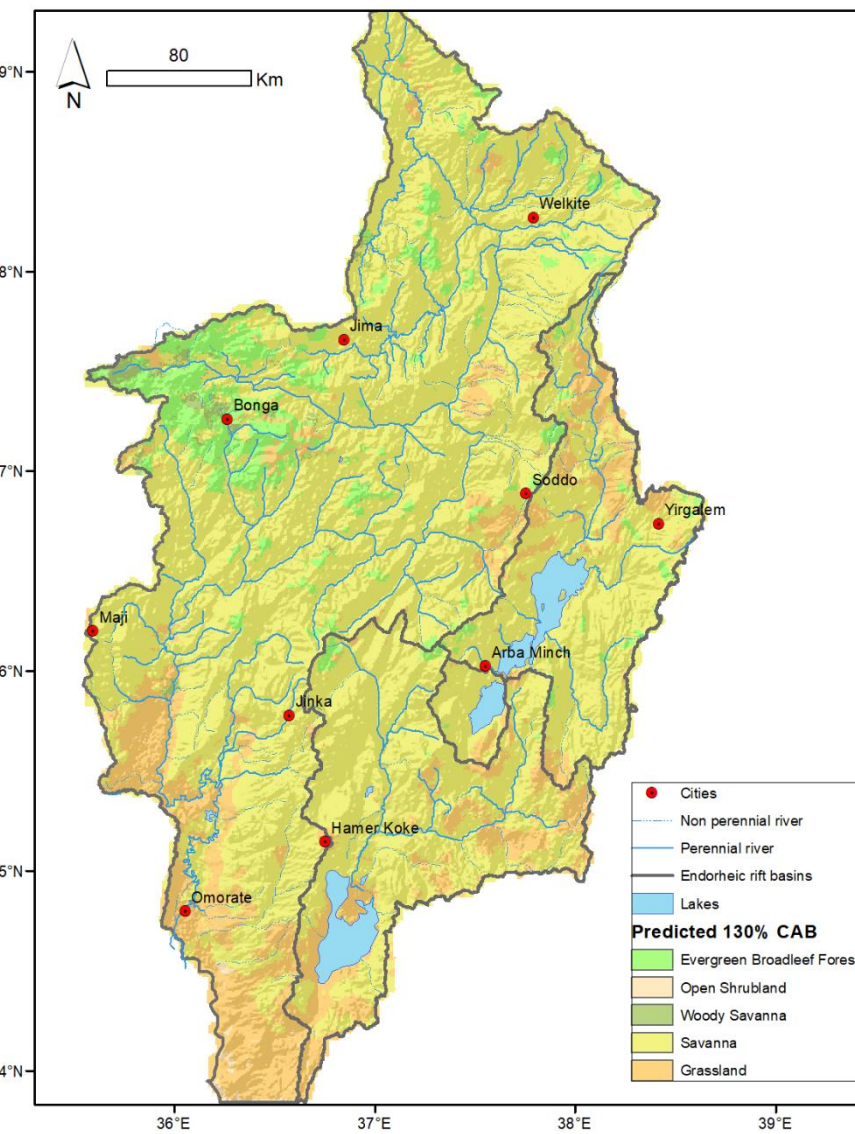**Model performance**    **Training data**    **Self predicted**
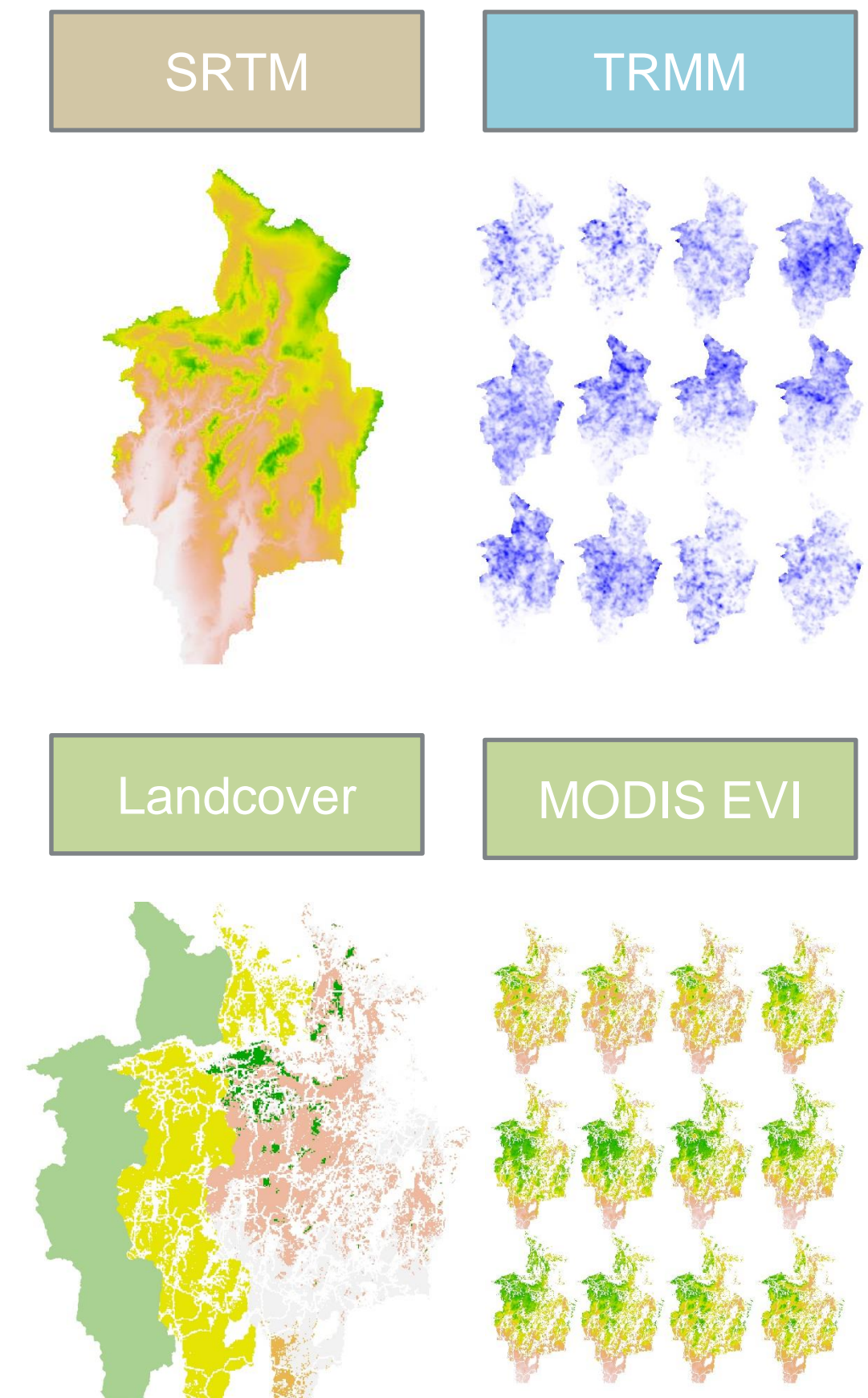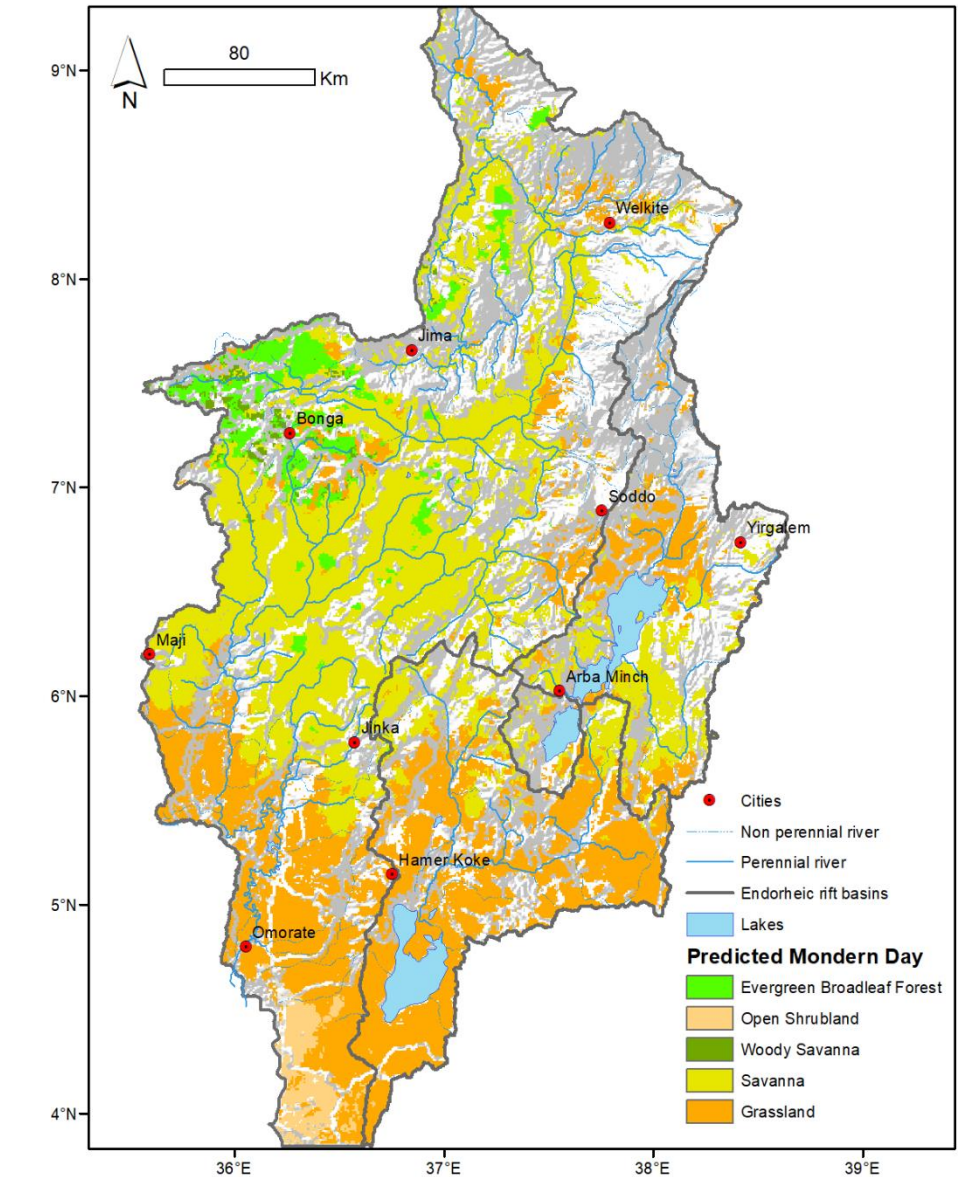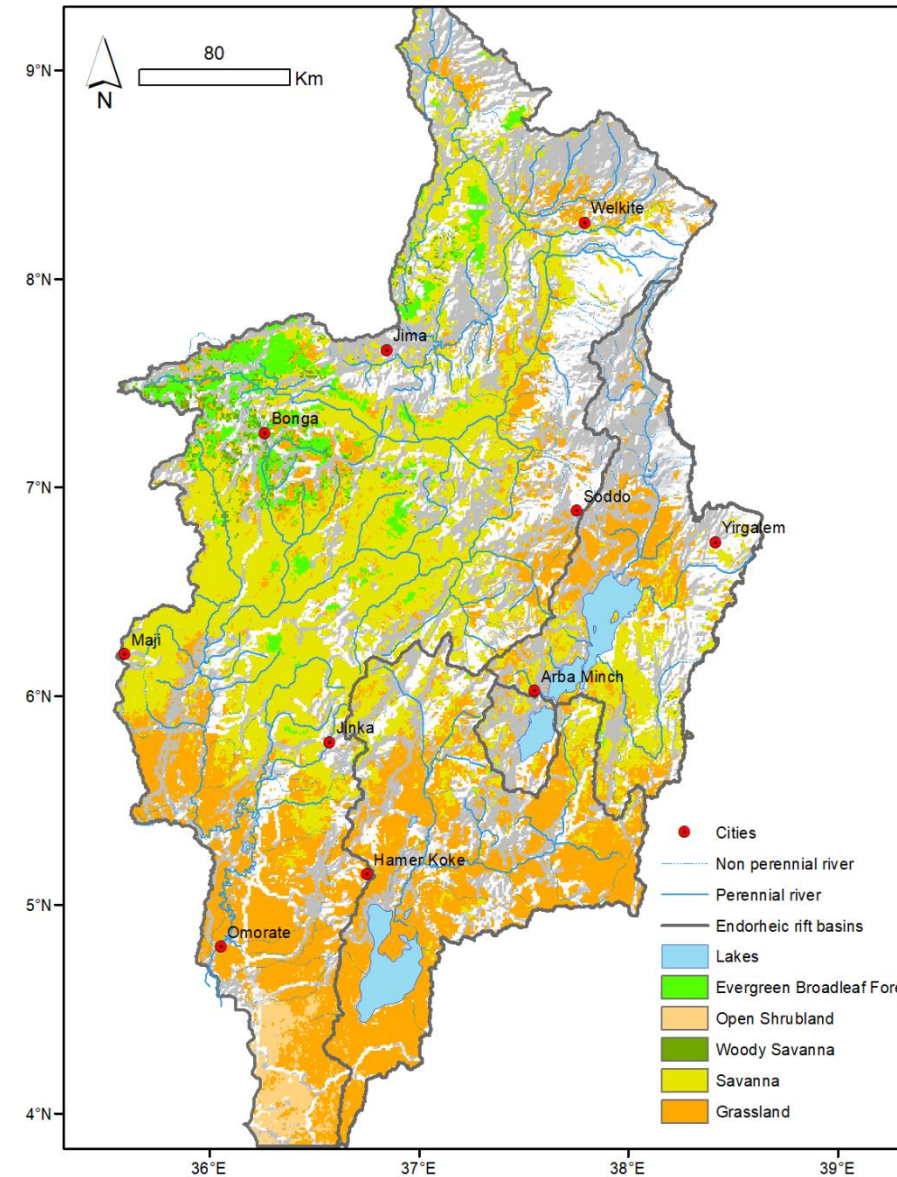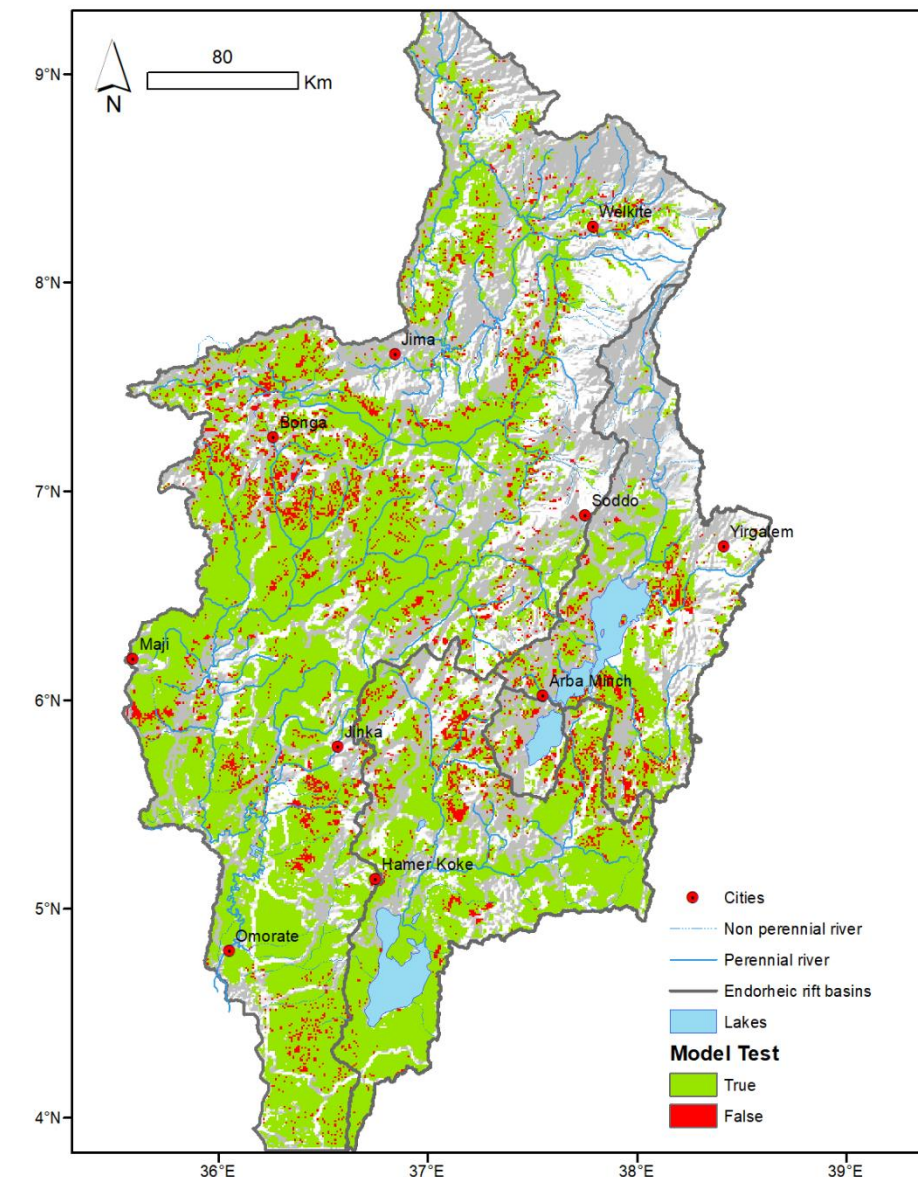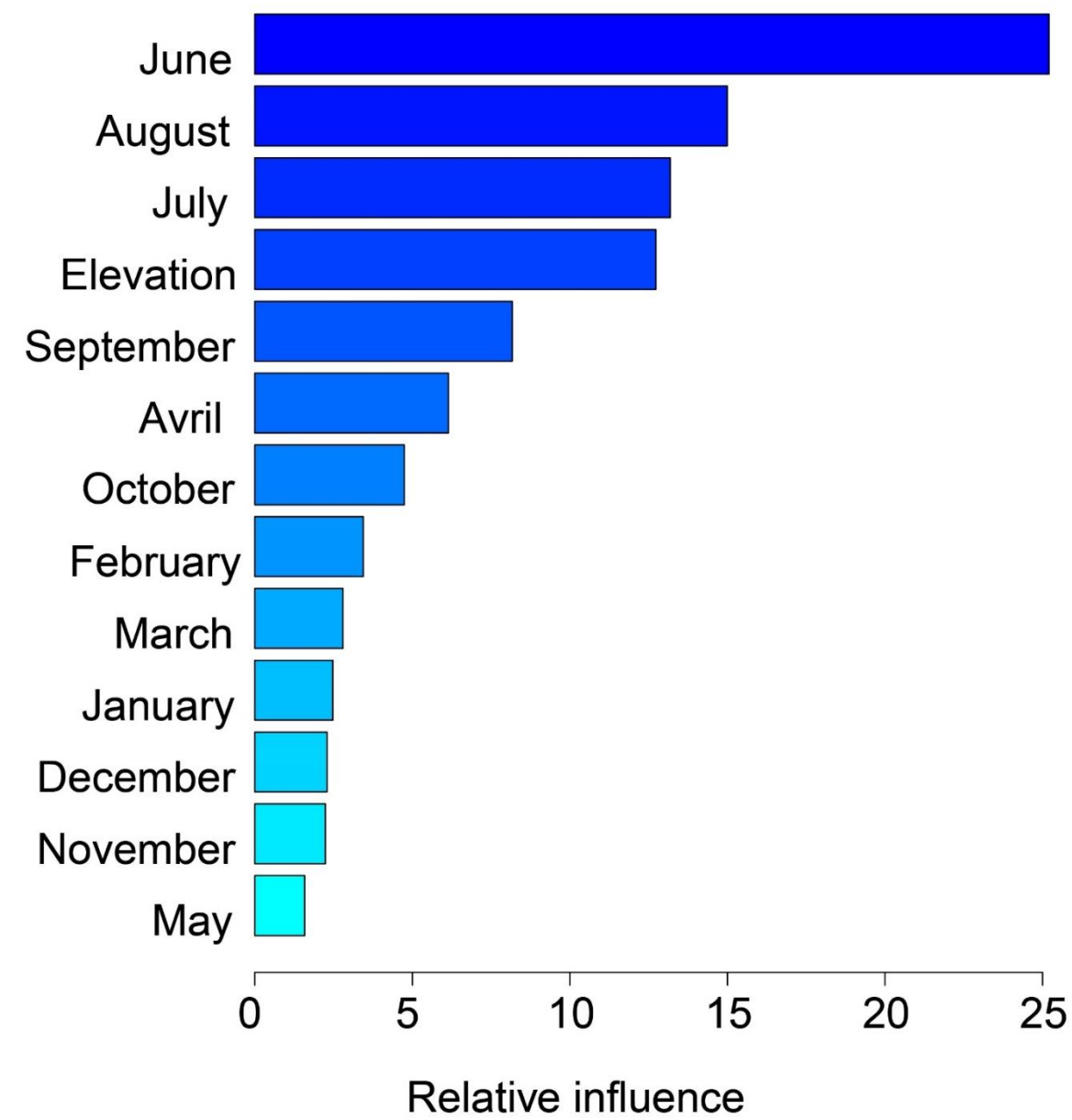
- Model Performance for Land Cover Prediction with an **AUC of 0.85**

- Most **important predictor** variables are the **northern summer rain months**

- Prediction **problems in the transition areas** between major landcover classes
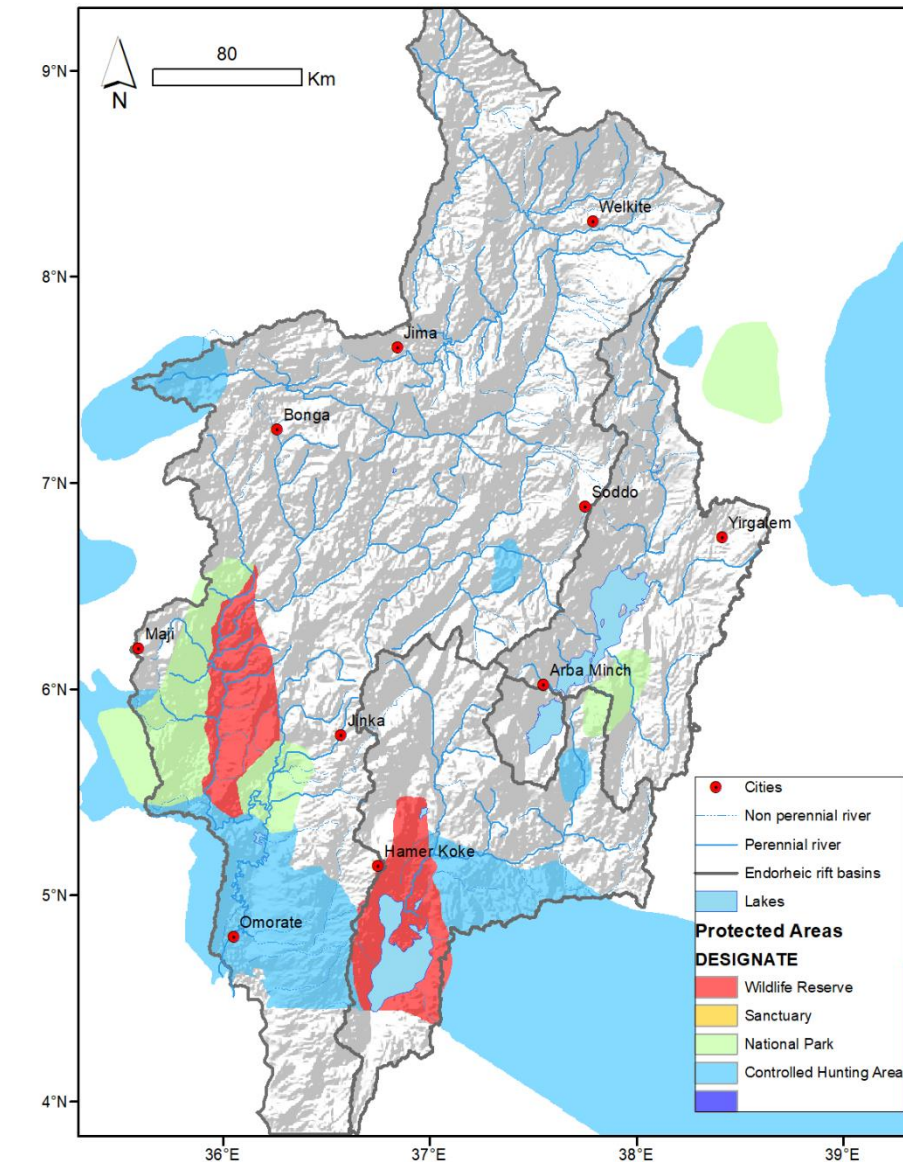
**30% average increase throughout the year**

**30% average increase between June and September**
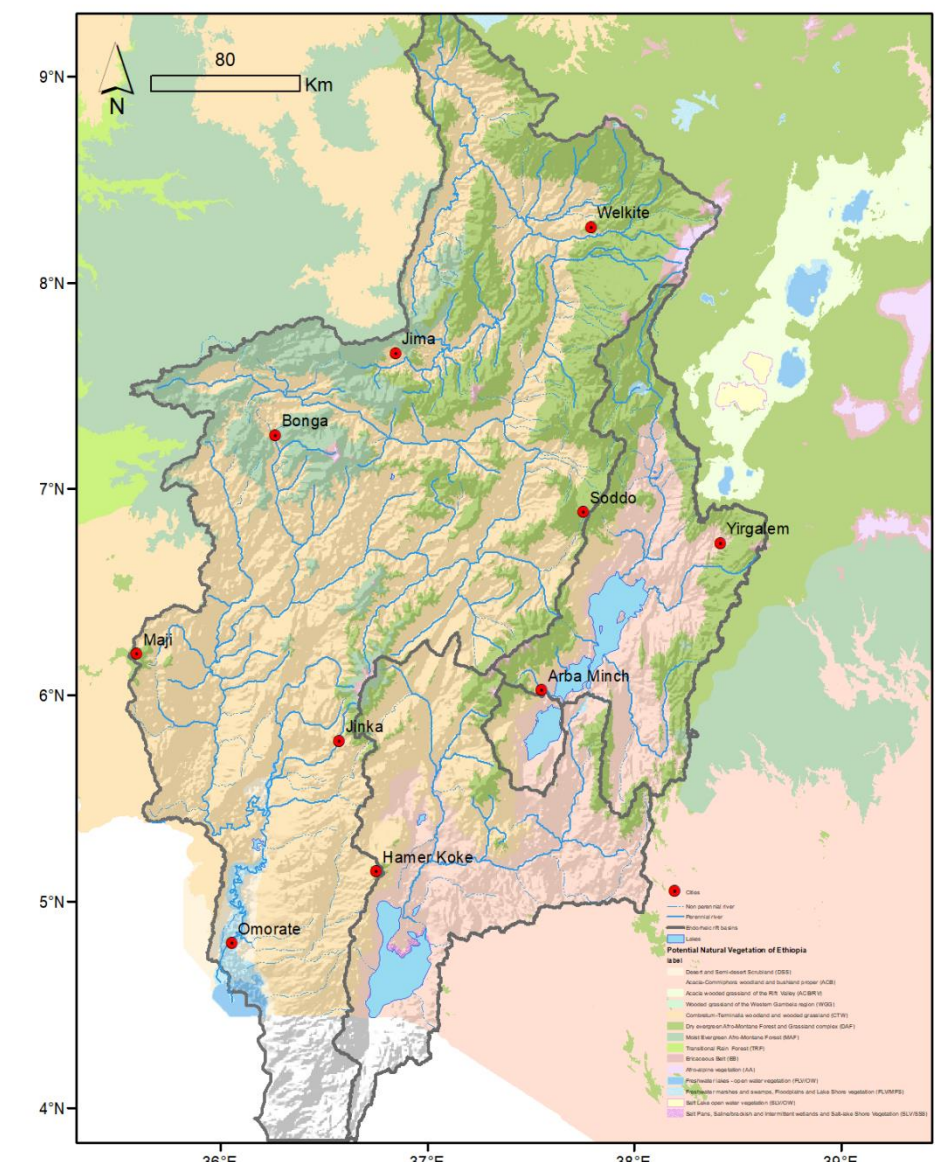
**human influence**

**potential natural vegetation**

- First results show a **southwards expansion of the savanna**

- **Extensive savanna cover** if additional **summer-months rain** occure

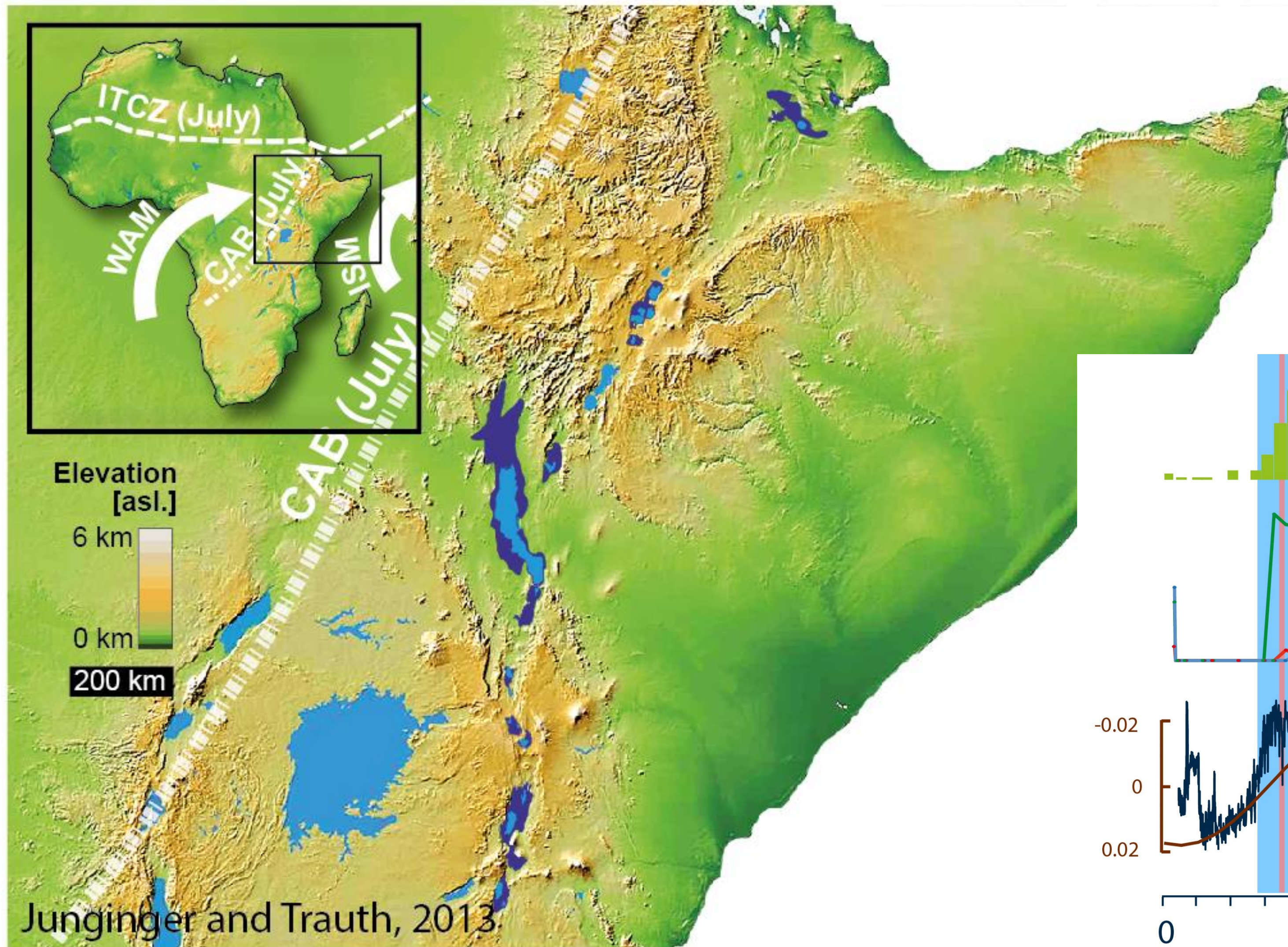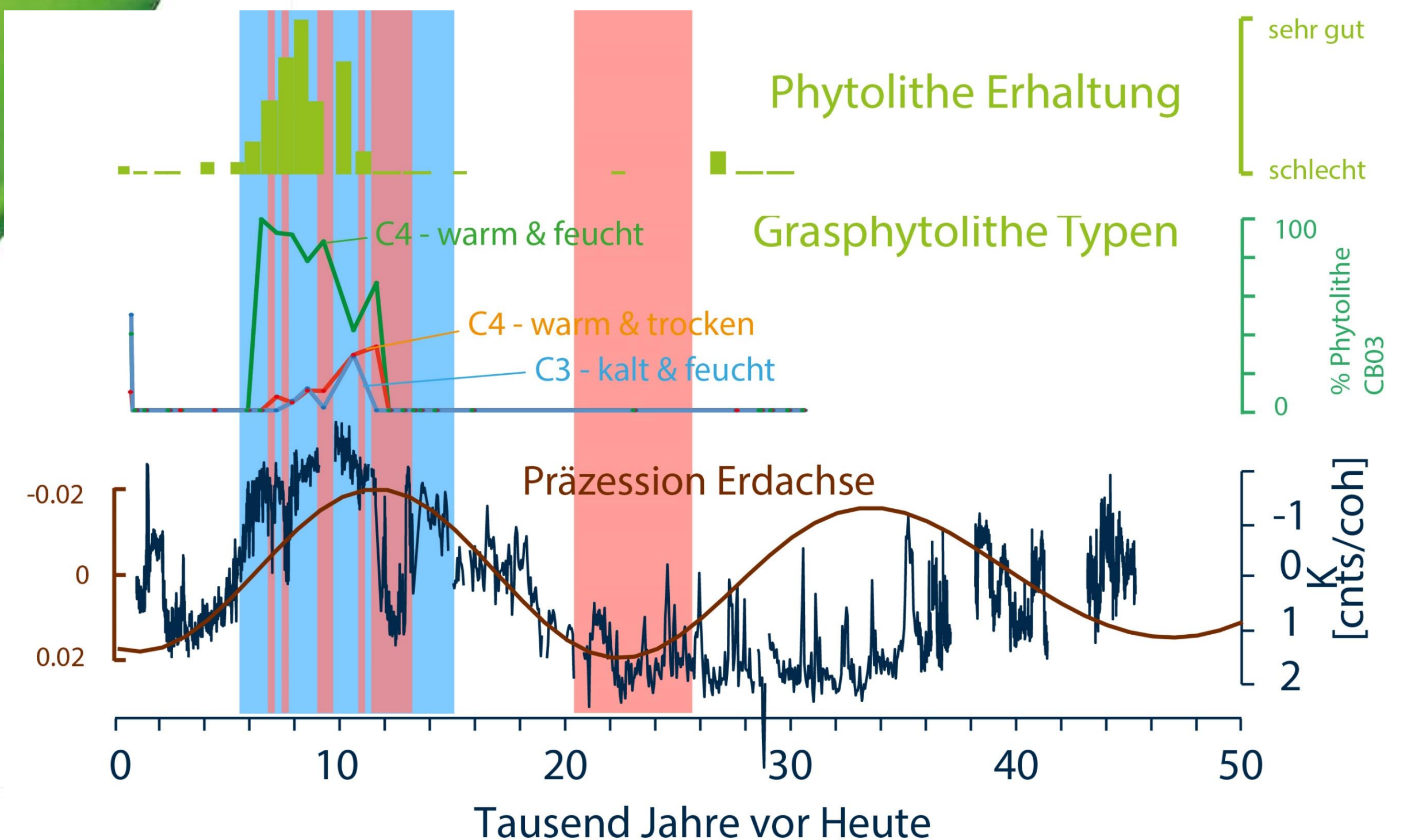- Further testing of **modern day influence** on vegetation cover due to modern day **land use**

- **Link to species level and phytoliths** will based on modern day natural potential vegetation

First Phytoliths Proxy Results and Ongoing Work

- Phytoliths preserved **during AHP**

- C3 and xeric peak **after YD**

- stepwise increase of mesic grass types **during AHP**

# Conclusions and Outlook

**Quality assessment** modelling based on **learning algorithm** works

PVM provides **spatial** paleo-environment **reconstructions**

Updated **precipitation threshold** for humid phases

**Multiple parameter** prediction in progress

Quantification of modern day **land use effect on vegetation** in progress

**Phytoliths** to test model and **retrace paleo vegetation** in time in progress

New method to answer **"How dry was dry during the Last Glacial Maximum?"**

**Open or Closed?** Landscape and vegetation composition for **key anthropological sites** from the highlands to the lowlands