

Quantitative reconstruction of land-cover change over the Holocene in temperate China and potential application

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Project: quantification of Holocene anthropogenic land-cover change in temperate China

- Vegetation has undergone substantial changes over the globe during the Holocene, mainly results from changes in climate during early and mid-Holocene and disturbance from anthropogenic activities during late Holocene.
- The goal of this project is to provide empirical land-cover data that to be incorporated into earth system simulations, in which vegetation play direct or indirect roles. This study is contribution to PAGES LandCover 6k.

■ Pollen productivity estimates:

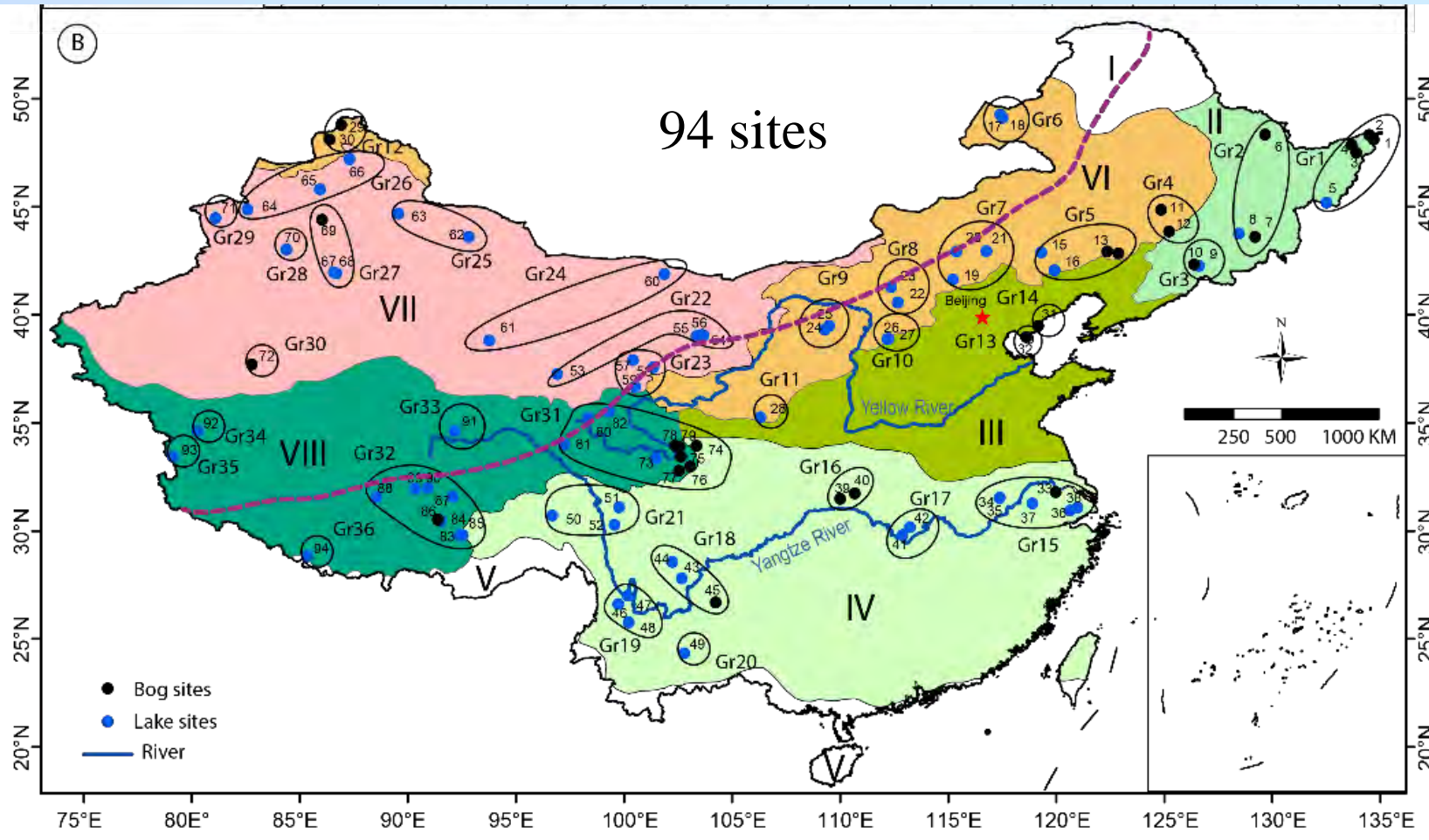
Li et al., 2017. Veg. Hist. Archaeobot.

Li et al., 2018. Fronti. Plant Sci.

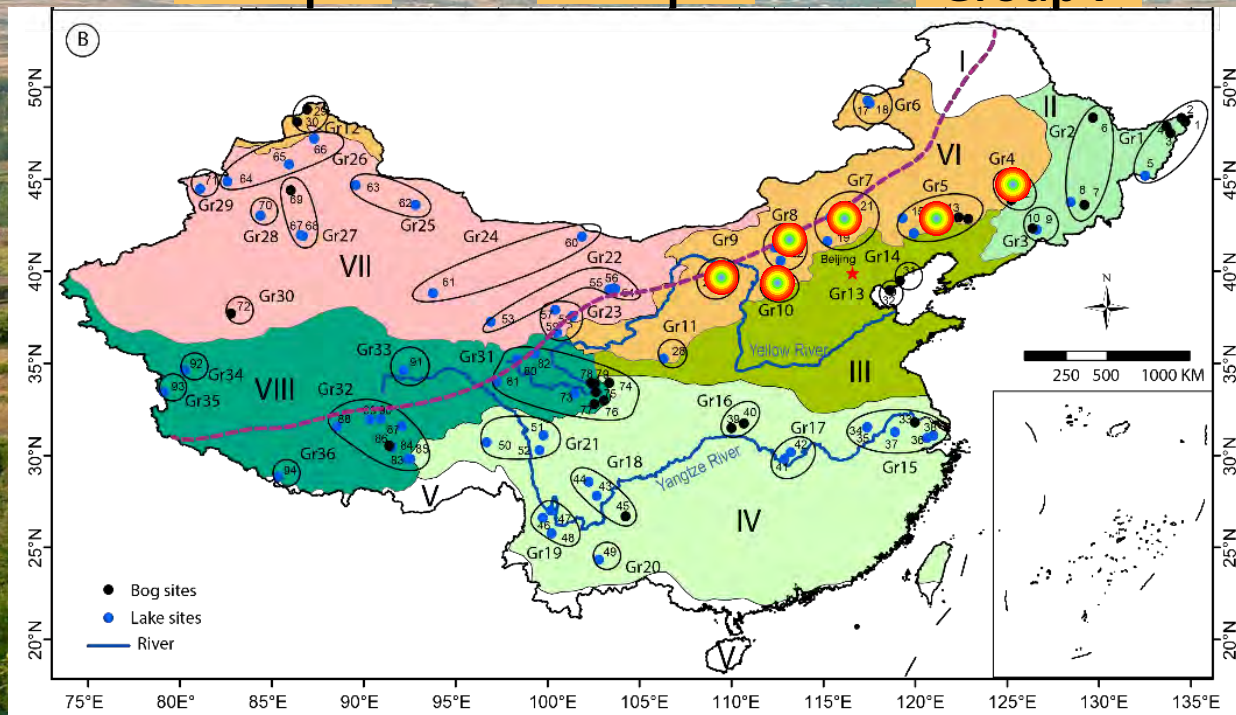
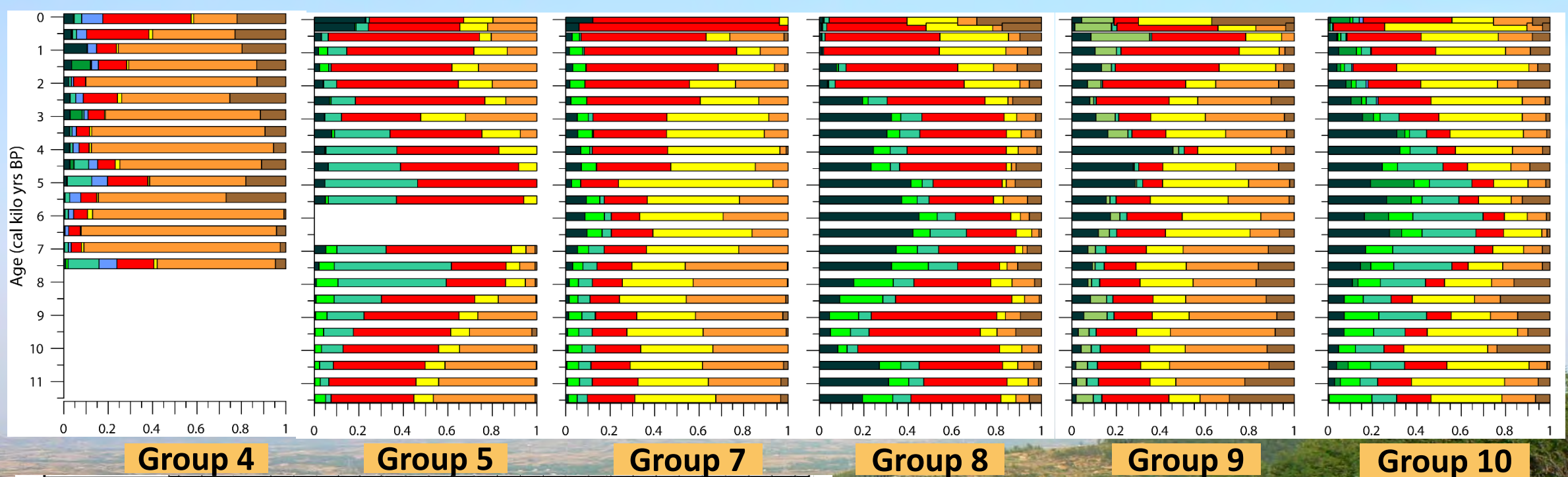
■ Land-cover reconstruction

Li et al., 2020. Earth-Sci. Rev.

1. Quantification of Holocene anthropogenic land-cover change in temperate China



- REVEALS model corrects bias due to differences in: pollen productivity of different plant species, dispersal ability of different pollen types, sediment basin size and type.
- Quantitative reconstruction of plant cover change over the Holocene based on 94 pollen records from lakes and bogs with temporal resolution better than 500 years.
- Interaction between climate, ecosystem and human for different ecoregions in northern China.

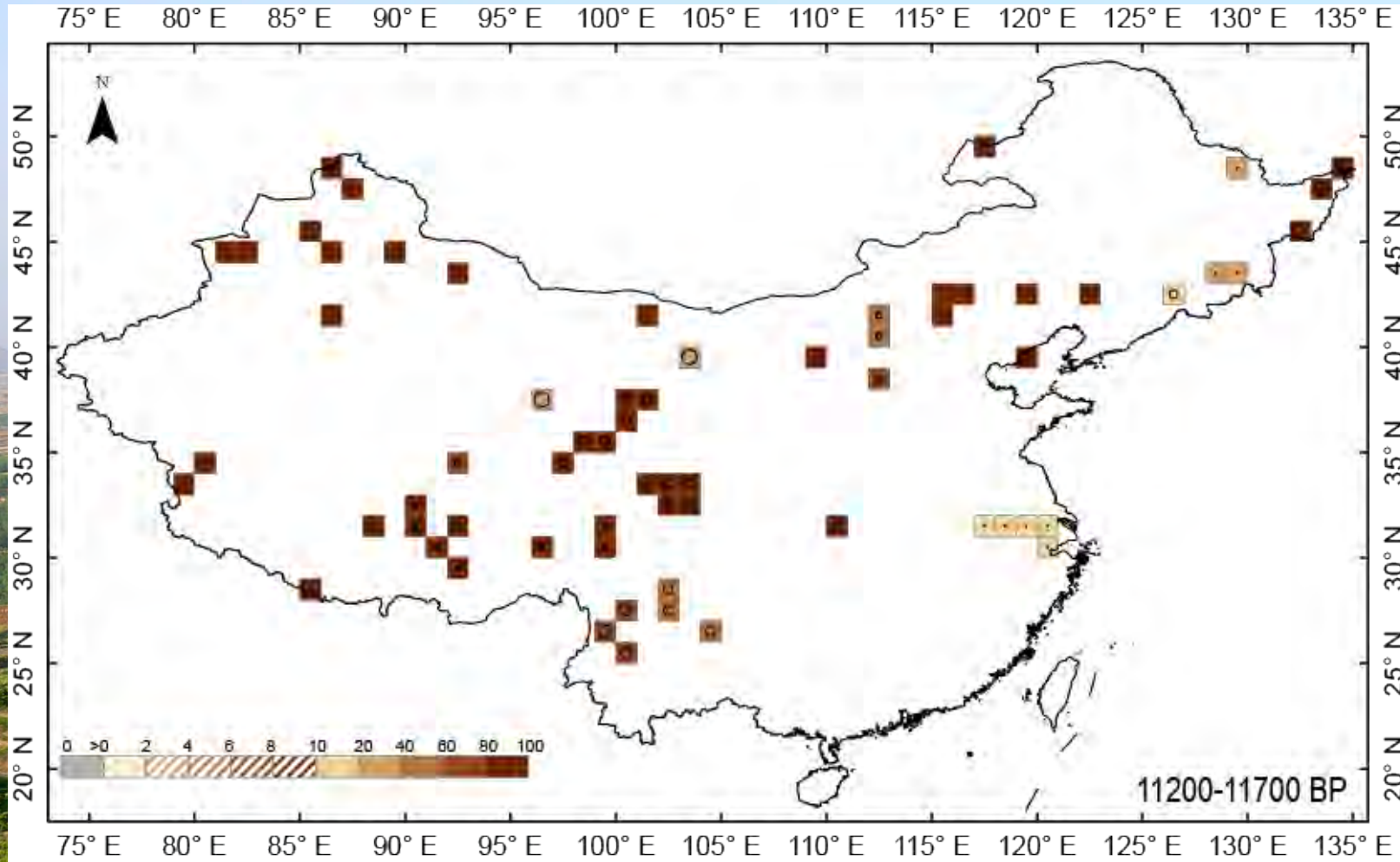


Pinus Cupressaceae Larix Betula Group V
 Group VI Group VII Poaceae Cyperaceae Rosaceae

The REVEALS reconstructions provide new insights on the total tree cover and tree composition compare to pollen percentages.

Li et al., 2020, Earth-Sci. Rev.
<https://doi.org/10.1016/j.earscirev.2020.103119>

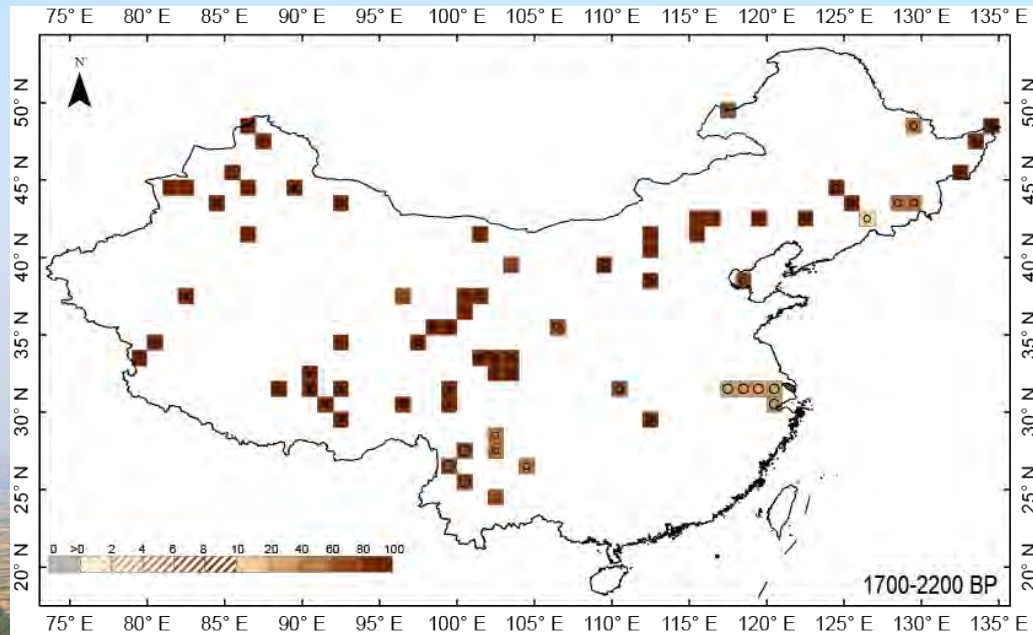
2. Gridded vegetation reconstruction in northern China



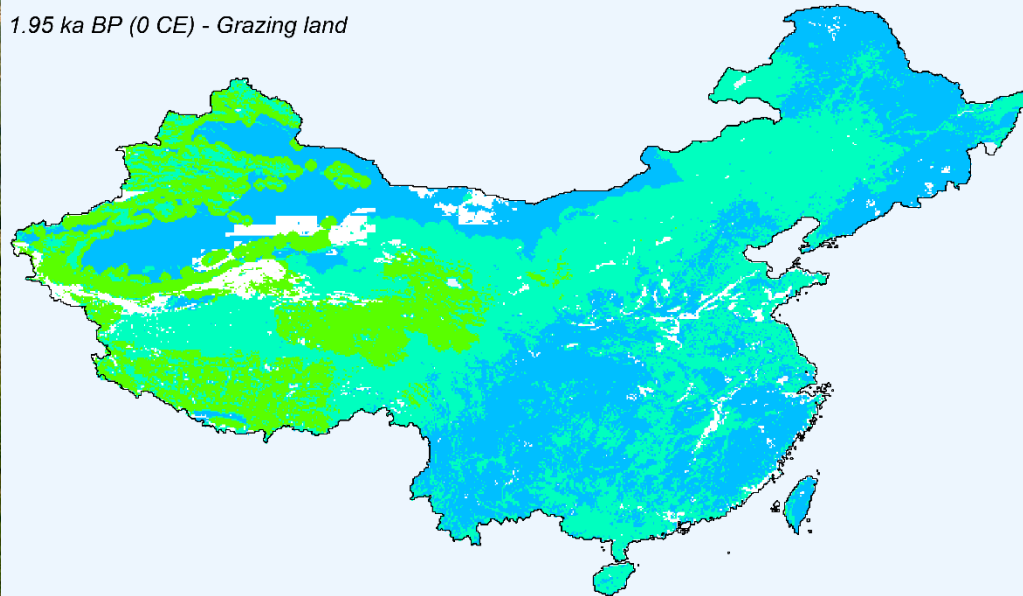
Background : Feedbacks from, e.g. vegetation and ocean, still represent a major source of uncertainties in climate modelling (e.g. Smith et al., 2016). However, continental scale vegetation reconstructions lack.

This study : Quantitative reconstructions of plant cover with error estimates of 27 taxa, 10 PFTs, and 3 LCTs for 75 grid cells based on pollen using the REVEALS model.

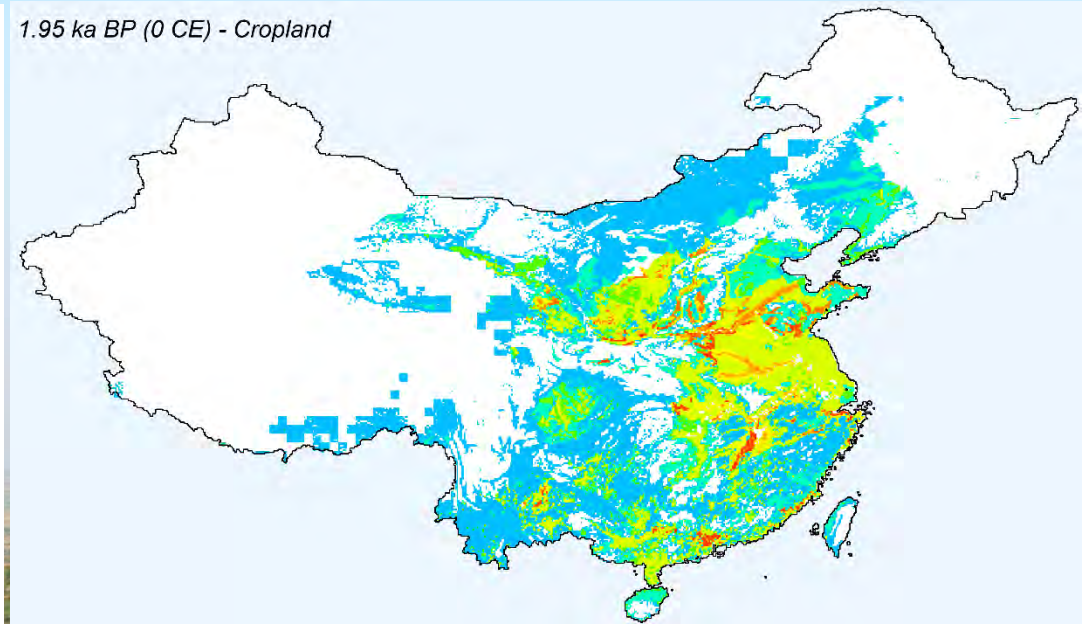
2. REVEALS Openness VS grazing and cropland from HYDE



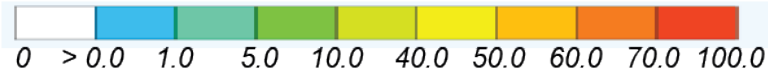
1.95 ka BP (0 CE) - Grazing land



1.95 ka BP (0 CE) - Cropland



sq.km per cell



Li et al., 2020, Earth-Sci. Rev.

<https://doi.org/10.1016/j.earscirev.2020.103119>

Li et al., (in prep.)

Take home messages

- Deforestation by humans is demonstrated in several regions
 - from around 7500, 6000 or 3000 years ago
 - openness was very large from 3000 years ago
- Compared to the REVEALS reconstruction of past landscape openness, the scenarios of anthropogenic land-cover change for China (e.g. HYDE database) underestimate open land in many areas

Acknowledgement

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Thank you for your attention!