

# Correlated biogeographic variation in magnesium across trophic levels

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## Introduction

- Some studies suggest that change of climate, such as the increase of temperature and change of precipitation may influence organism Mg and K:Mg (Reinbott and Blevins, 1994; Han et al, 2011; Sun et al, 2012);
- However, we have little understanding of the influence of climate change on terrestrial food chain.

## Question

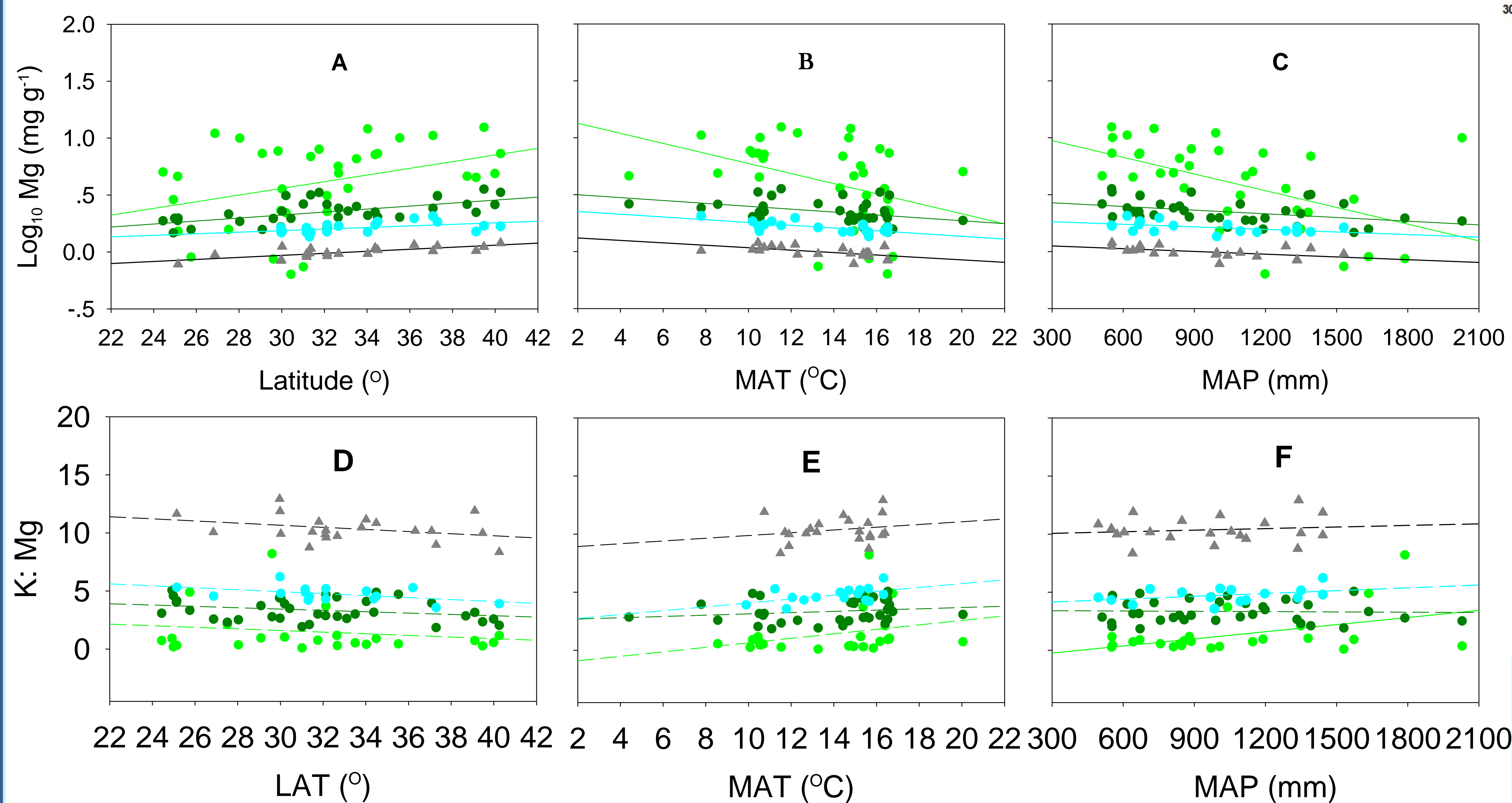
- How Mg concentration and K:Mg vary with climate across multiple trophic levels?

## Methods

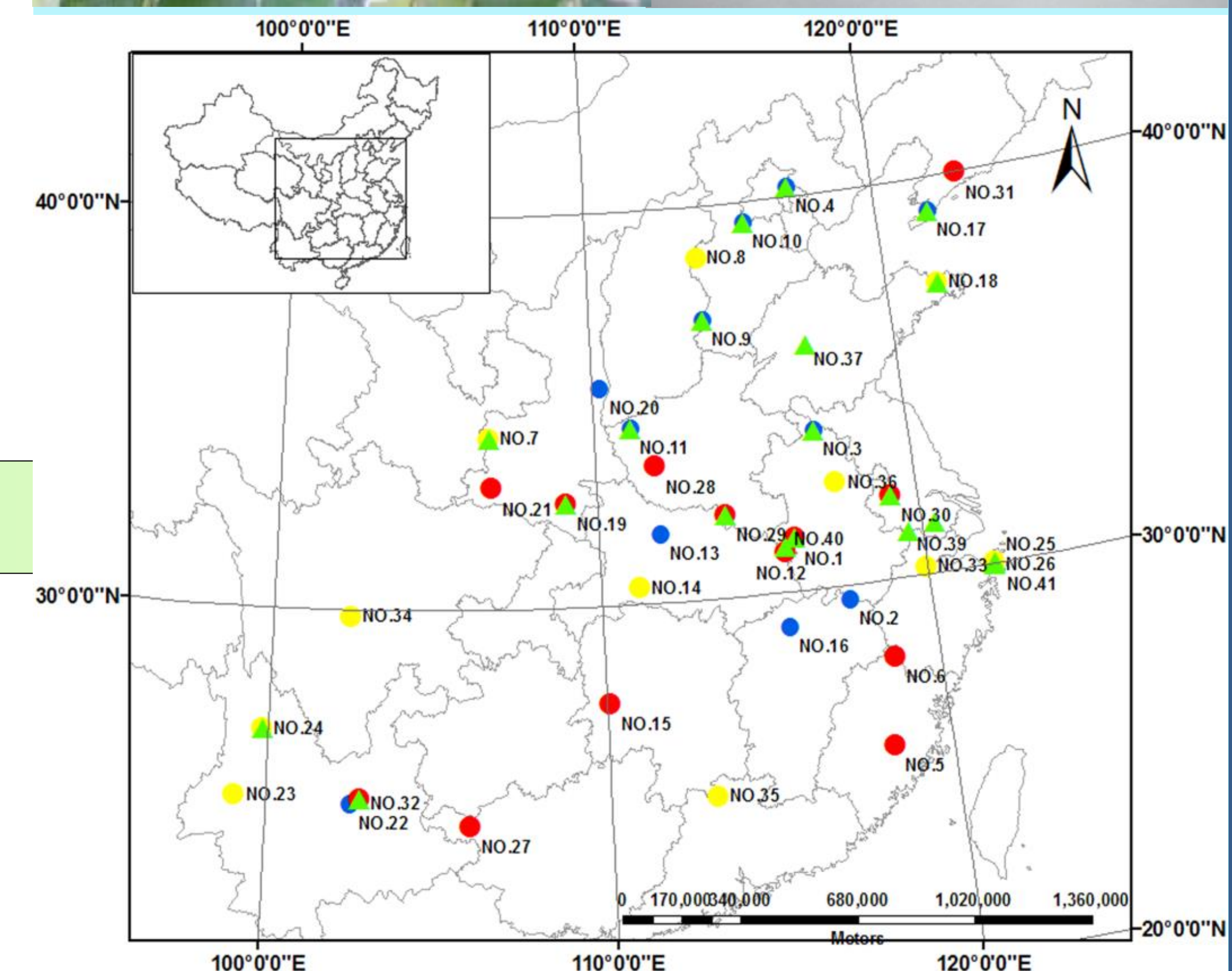
- We used macroclimatic variation induced by latitude;
- We collected samples (*Quercus variabilis* leaf, acorn and acorn predator--weevil larvae) from eastern China (c. 25 – 41°N and 99 – 123°E), and investigated how Mg concentration and K:Mg vary with climate across multiple trophic levels.



## Main Result



Trends of soil, leaf, acorn and weevil larva Mg concentration and K:Mg along the latitude (LAT: A, D), mean annual temperature (MAT: B, E), and mean annual precipitation (MAP: C, F). Full lines show significance (p<0.05) and that dotted lines delineate non-significance (p>0.05).



Distribution map of *Q. variabilis* stands sampled across eastern China. Solid circles represent soil and leaf sampling sites (yellow circles sampled in 2009, red circles sampled in 2007-2009, and blue circles sampled in 2008-2009), and the green solid triangles represent acorn and weevil larva sampling sites in 2009.

## Conclusions

- Distinct mechanisms may drive geographical patterns of Mg variation at different trophic levels, leading to different latitudinal sensitivity to climate change.
- These clear consistent patterns suggest ways in which Mg in ecosystems may vary with climate change.
- Shifts in climate may most affect final crop consumer by altering Mg concentration rather than K:Mg.

## References

- Reinbott T, Blevins D (1994) Phosphorus and temperature effects on magnesium, calcium, and potassium in wheat and tall fescue leaves. *Agronomy journal* 86: 523–529.
- Han W, Fang J, Reich PB, Ian Woodward F, Wang Z (2011) Biogeography and variability of eleven mineral elements in plant leaves across gradients of climate, soil and plant functional type in China. *Ecology Letters* 14: 788–796.
- Sun, X., Kang, H., Du, H., Hu, H., Zhou, J., Zhou, J., et al., 2012. Stoichiometric traits of oriental oak (*Quercus variabilis*) acorns and their variations in relation to environmental variables across temperate to subtropical China. *Ecological Research* 27:765-773.

