

ASSOCIATION OF LARGE SCALE SPATIAL AUTOCORRELATION OF AQUATIC INSECT TRAIT DISTRIBUTION WITH CLIMATE

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CLIMATE IS THE PREDOMINENT DRIVER OF FRESHWATER ASSEMBLAGES ON LARGE SCALES (CONTI ET AL. 2013, POFF ET AL. 2010)



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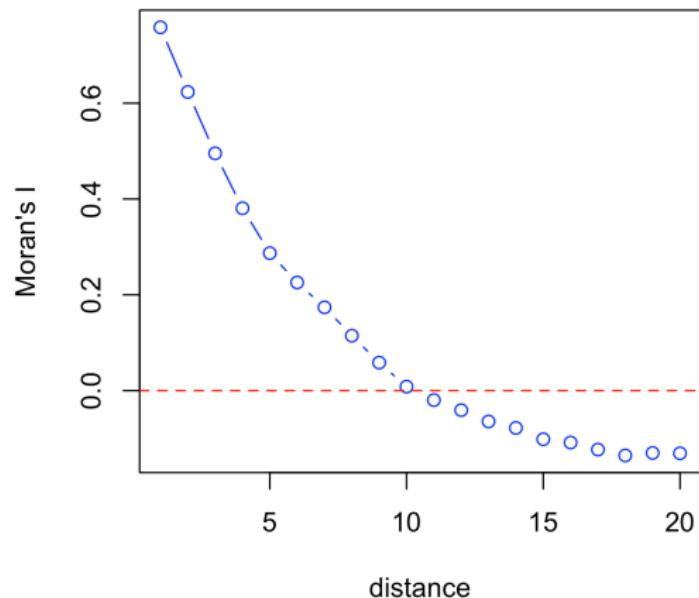


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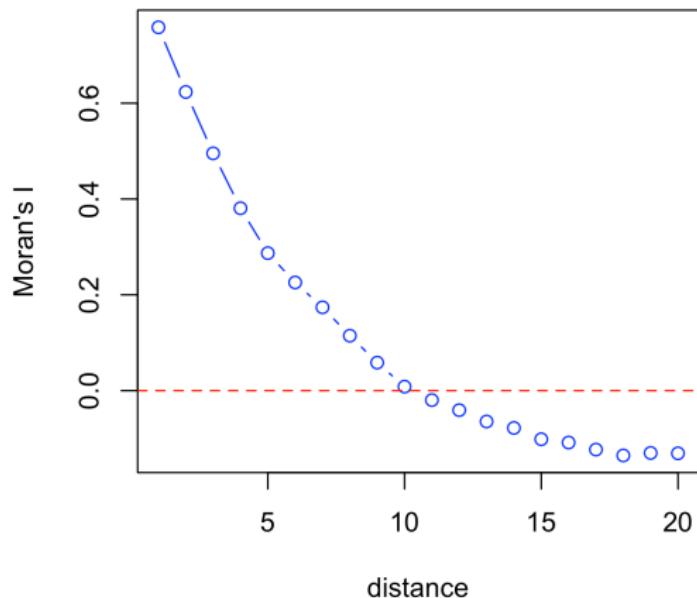
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Biological and ecological traits were associated with climate change
(Conti et al. 2013, Tierno de Figueroa et al. 2010, Hershkovitz et al. 2015)

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Insects with climate-associated traits exhibiting **strong relationship with climate in their spatial autocorrelation** are likely to **change distribution pattern under climate change** (Dray et al. 2012)

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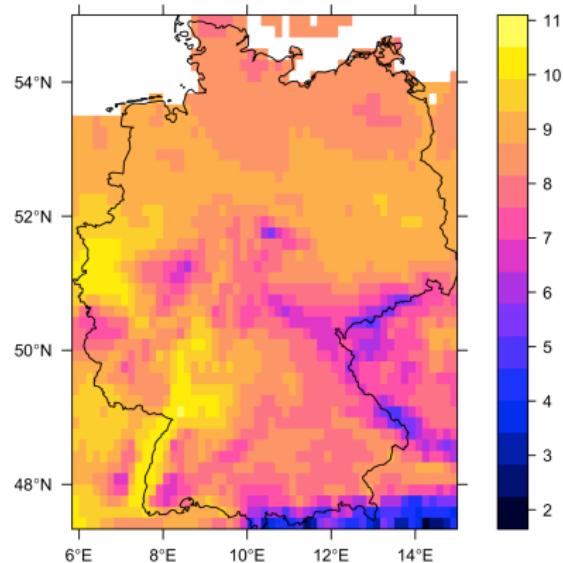
1. which climate-associated traits and organism groups show the highest potential for changing distribution pattern?
2. which are most influential climatic aspects for traits and organism groups showing highest potential for changing distribution?

WE USED BIOMONITORING DATA FROM 4,752 GERMAN STREAM SITES
AND 35 GLOBAL BIOCLIMATIC INDICES (BISS ET AL. 2006, KRITICOS ET AL. 2012)



357,000 km²

Annual mean temperature (degree celcius)



18 km

WE SELECTED CLIMATE-ASSOCIATED TRAITS FROM 6 GROUPING FEATURES AND 5 SEMI-AQUATIC ORDERS

Grouping features

Dispersal Capacity



Maximal Body Size



Resistance to Drought



Reproductive Capacity



Current Preference



Temperature Preference



Orders

Diptera



Ephemeroptera



Odonata



Plecoptera



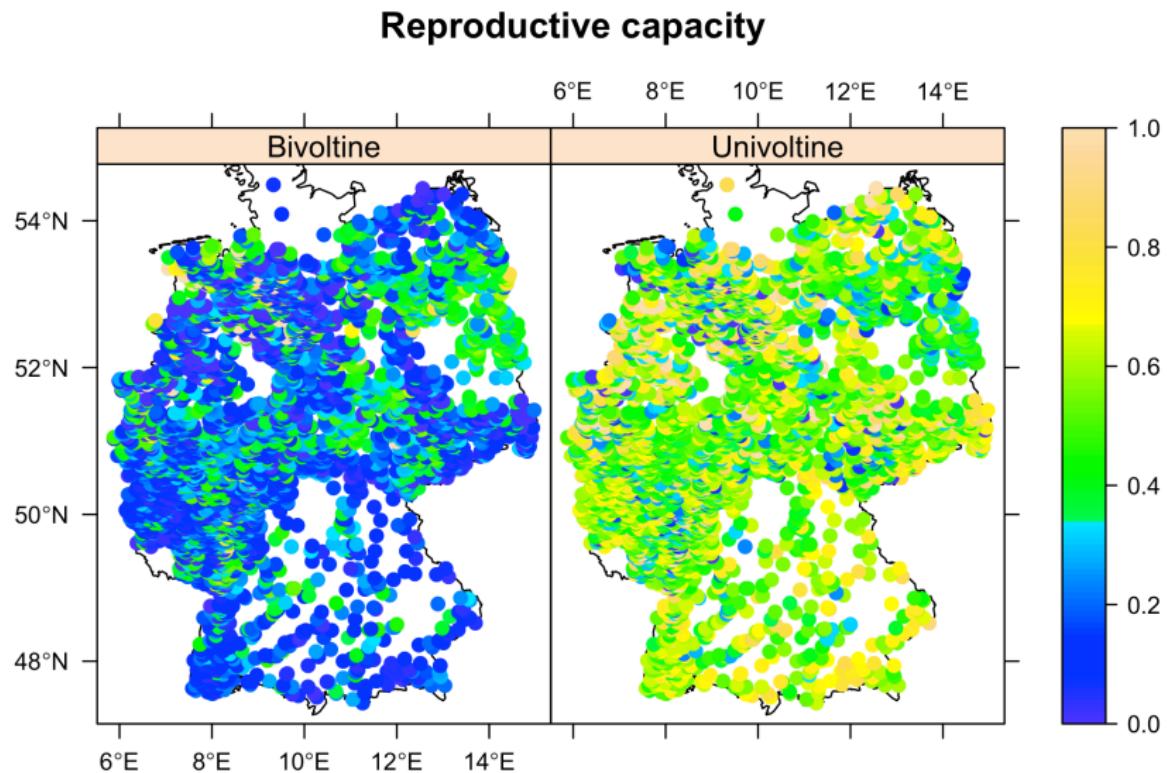
Trichoptera



Trait databases: [freshwater ecology](#) (Schmidt-Kloiber and Hering, 2015),
[Tachet](#) (Usseglio-Polatera et al. 2000)

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3. Global Moran's I in the residuals of trait-climate model
4. Relationship between abundance-weighted traits and individual bioclimatic indices

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Highest spatial autocorrelation was explained:

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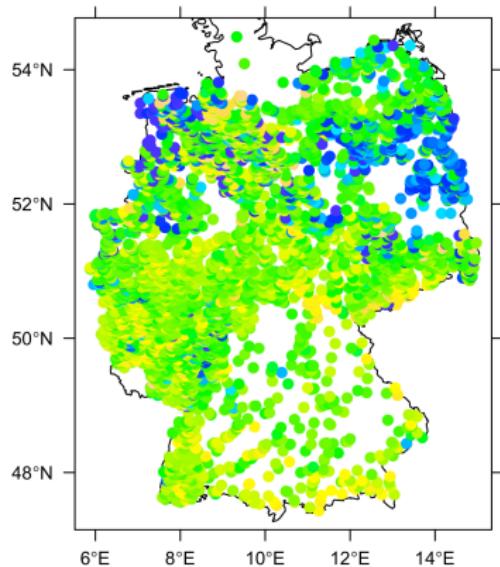
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e.g. low dispersal capacity, large body size (>4 cm), low reproductive capacity (semivoltine) and resistance to drought (egg diapause together explained 55 % of cold temperature preference)

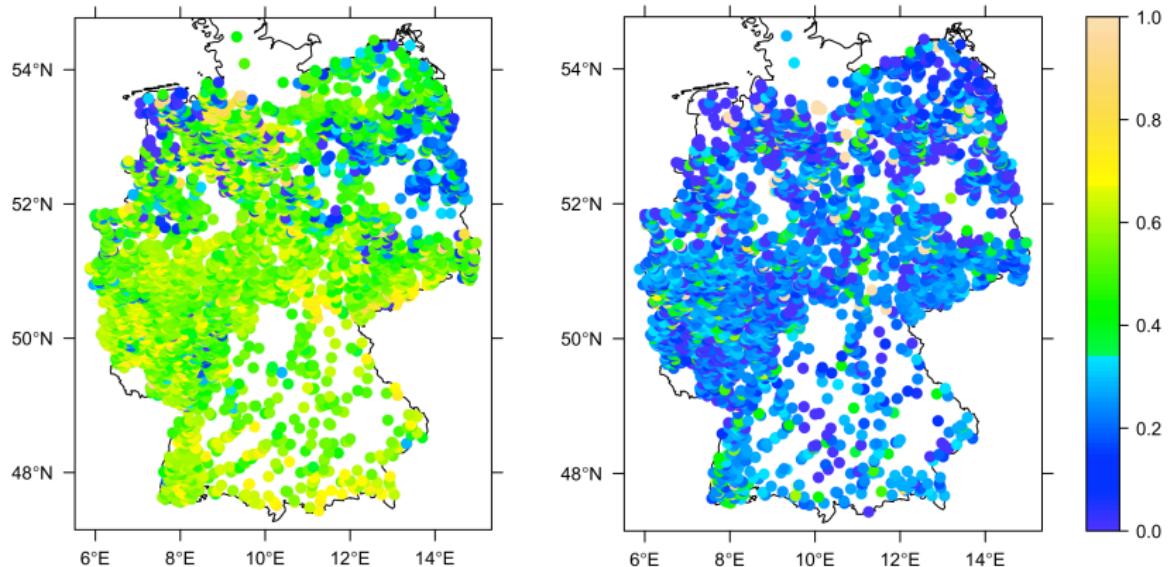
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Cold temperature preferring insects



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Cold temperature preferring insects Moderate temperature preferring trichopterans



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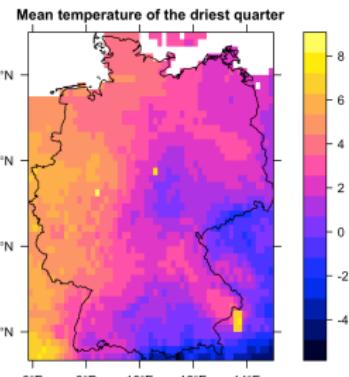
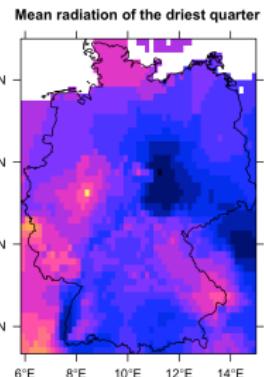
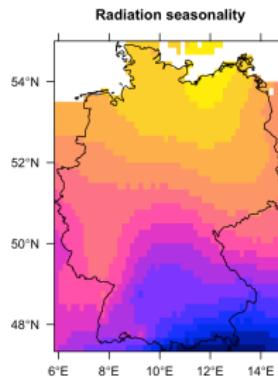
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- Moderate temperature preferring trichopterans mostly occur in
the North may extend their range (Hering et al. 2009)

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FOR MORE: BHOWMIK AND SCHÄFER 2015, PLOS ONE, 10(6): e0130025

THANK YOU

QUESTIONS?