

# Major controls of base flow soluble reactive phosphorus losses in humid temperate headwater streams

**Michael Rode, Remi Dupas, Rutuparnna Dash**

Helmholtz Center for Environmental Research- UFZ, Magdeburg  
INRA, Rennes

Additional data provided by

Brian Kronvang (Aarhus University), Heye Bogena, Roland Bol (FZJ Jülich), Per Eric Melander (Teagasc, Wexford), Sara Sandström (SLU, Uppsala), Marc Stutter (James Hutton Institute), Adam Wymore (Uni New Hampshire), Will Wollheim (Uni New Hampshire)

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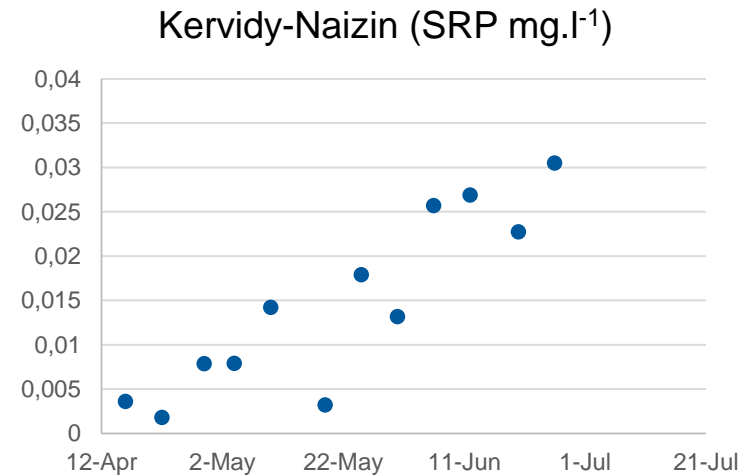
# Hypothesis - objectives

## Hypothesis:

- Biogeochemical processes could lead to P release in rivers during the summer low-flow period
- Land use has only limited impact on mean low flow SRP concentration
- Seasonal variability of SRP concentration could be controlled by hydrological regimes

## Objectives:

- Quantify the seasonal variability in Soluble Reactive P (SRP) concentration and other solutes in headwater streams free of point sources
- Specify land use impact on base flow SRP concentrations
- Identify the controlling factors of this seasonal dynamics



# Data Base and Methods

## Selection criteria of headwater catchments

- Long term SRP concentration data with minimum monthly sampling and continuous discharge data
- Free of nutrient point sources (housing, farms) in the study catchments
- Information on riparian zone and wetland soils (gley soils)

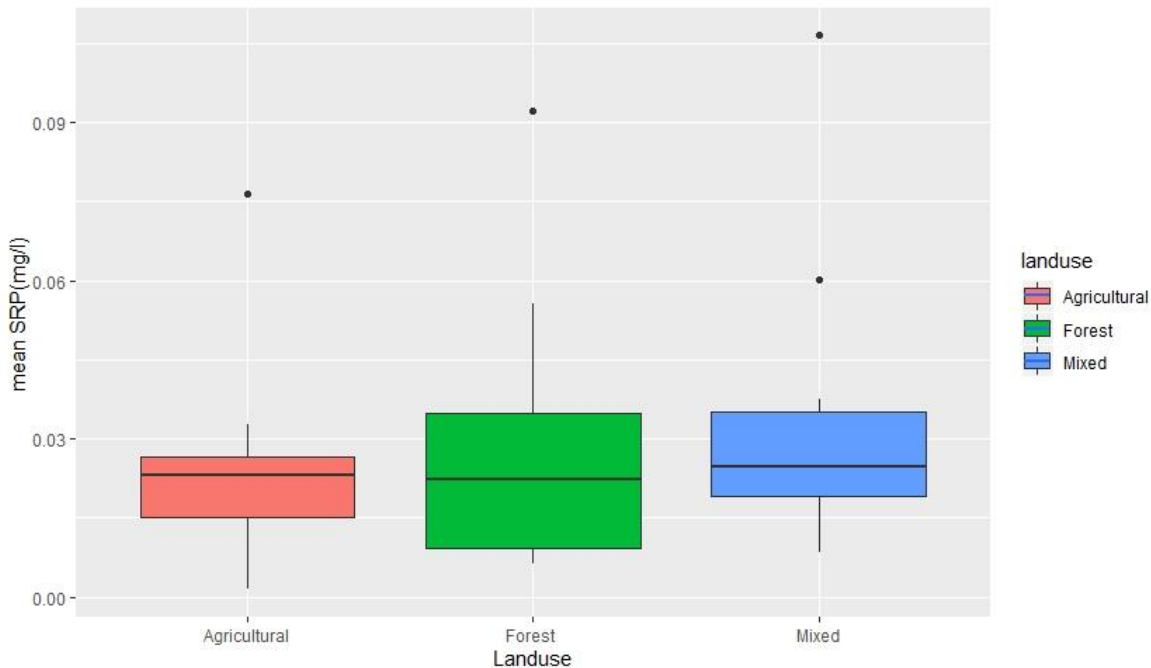
## Headwater catchments

- In total 46 headwater catchments from humid climate in western Europe and North America
- Stream time series nutrient and discharge data ranging from 2 to 20 years for each headwater (in total more than 429 years of observation)
- 13 forest, 20 agricultural, and 13 mixed land use catchments
- Catchment size ranging from 0.33 km<sup>2</sup> to 5 km<sup>2</sup>

## Methods

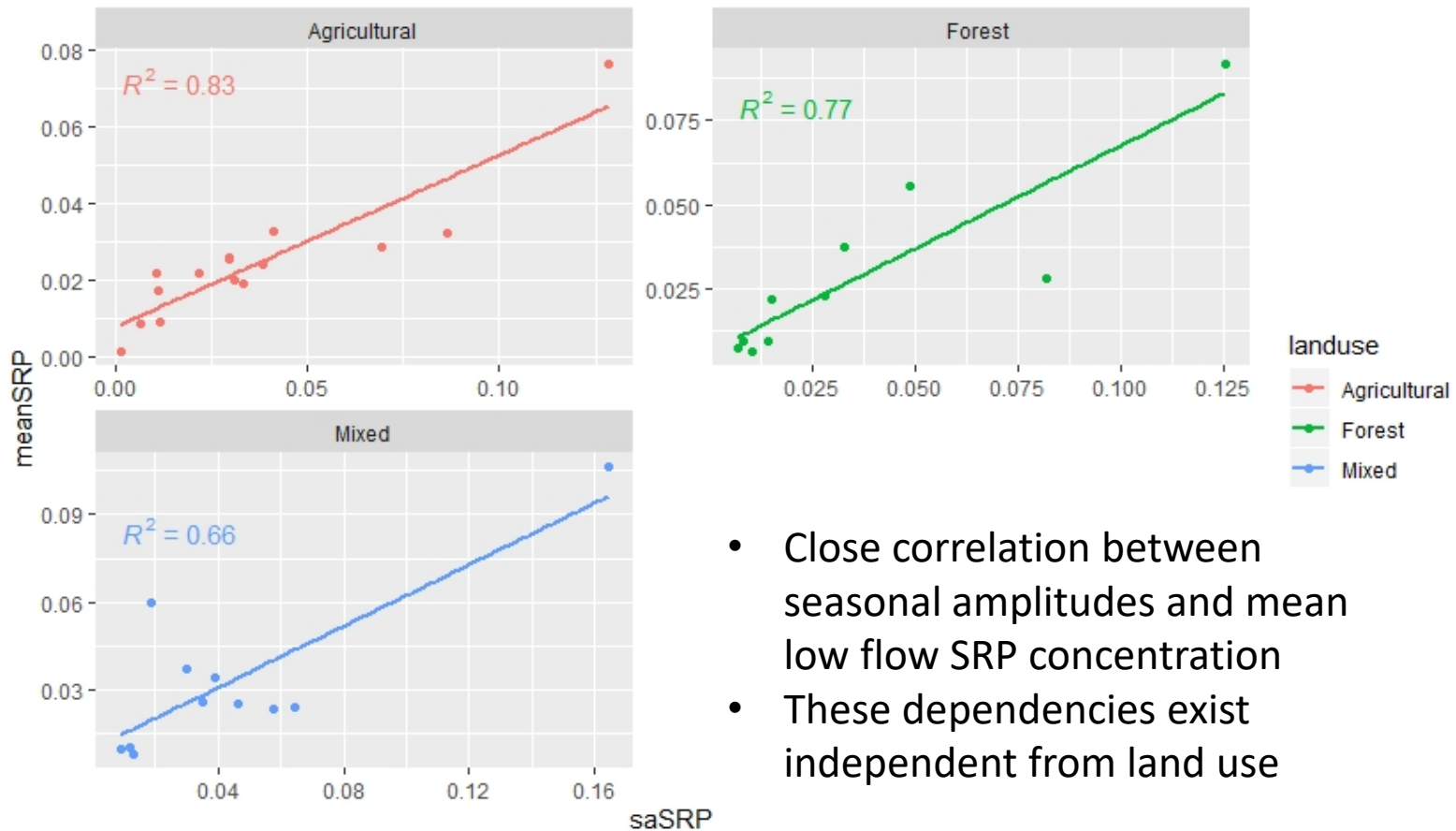
- Seasonal component analysis using Generalised Additive Models (GAM; R-code)

# Land use impact on SRP low flow stream concentration



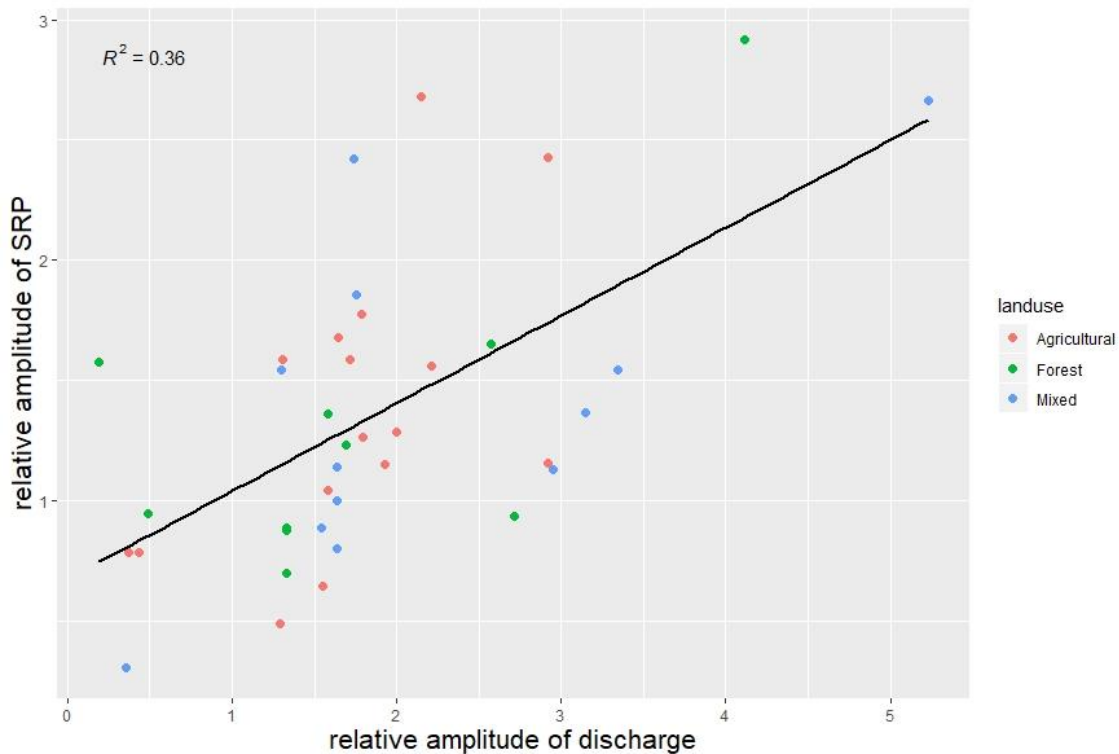
- No significant land use impact on long term mean low flow SRP concentration
- Agricultural catchments showed lowest variability in mean SRP concentrations

# Regression between seasonal amplitudes and mean SRP concentrations



- Close correlation between seasonal amplitudes and mean low flow SRP concentration
- These dependencies exist independent from land use

# Correlation between relative amplitude of discharge and relative amplitude of SRP



- Relative seasonal amplitude of SRP concentration are related to relative amplitudes of discharge
- These relations exist independent from land use

# CONCLUSION

- We observed ubiquitous seasonal SRP concentration amplitudes at low flow conditions
- Headwater streams do not show land use impact on low flow SRP concentration
- Seasonal variation (amplitude) of SRP concentration is correlated with mean low flow SRP concentration
- Discharge strongly effects seasonal variation of SRP concentration in all land use categories