

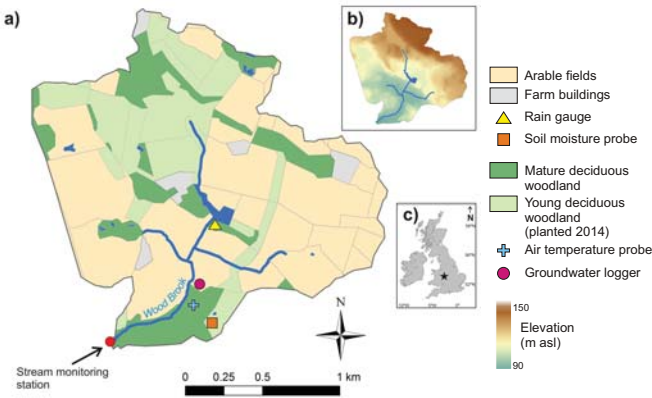
High-frequency monitoring of catchment nutrient exports reveals highly variable storm-event responses and dynamic source zone activation

Introduction

Storm events can drive highly variable behaviour in catchment nutrient and water fluxes, yet short-term event dynamics are frequently missed by low resolution sampling regimes.

High-frequency monitoring can improve our understanding of storm-event controls on catchment nutrient export. This information contributes to developing management practices to control nutrient exports from agricultural landscapes.

Study site



In situ monitoring

Hourly *in situ* measurements of streamflow, nitrate ($\text{NO}_3\text{-N}$) and dissolved organic carbon (DOC)

8 month time series (March to November 2016)



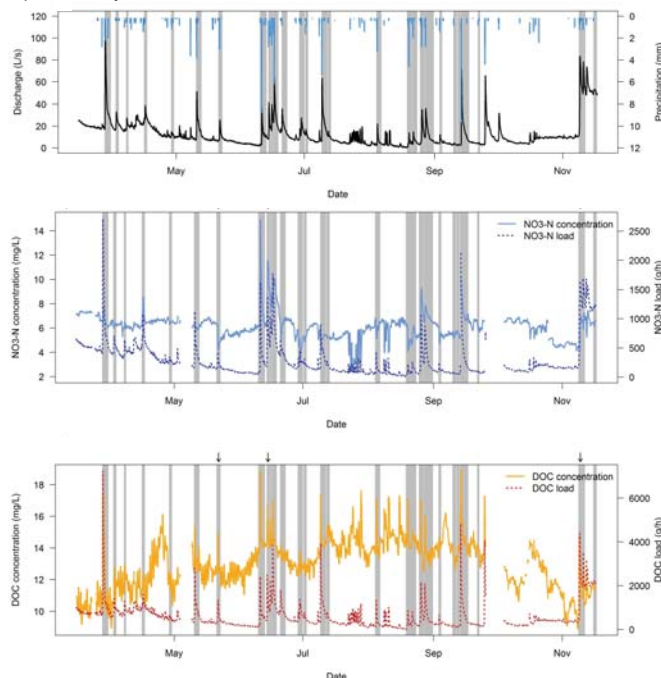
TriOS OPUS UV-VIS analyser for $\text{NO}_3\text{-N}$ and DOC

Hydro-climatology
- Precipitation
- Groundwater
- Soil moisture
- Air temperature

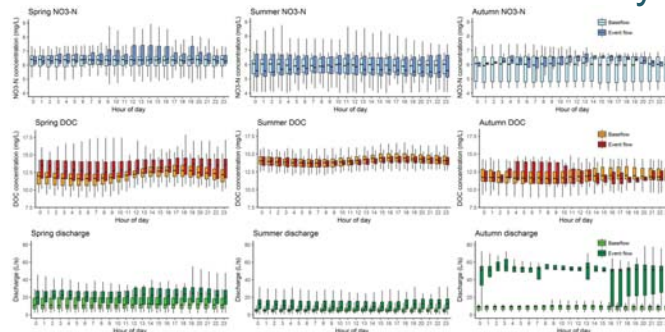
Real-time public data available at sites.google.com/site/millhastream/

High-frequency nutrient data

Time series of stream discharge, $\text{NO}_3\text{-N}$ and DOC through the monitoring period. Grey bars denote individual storm events.

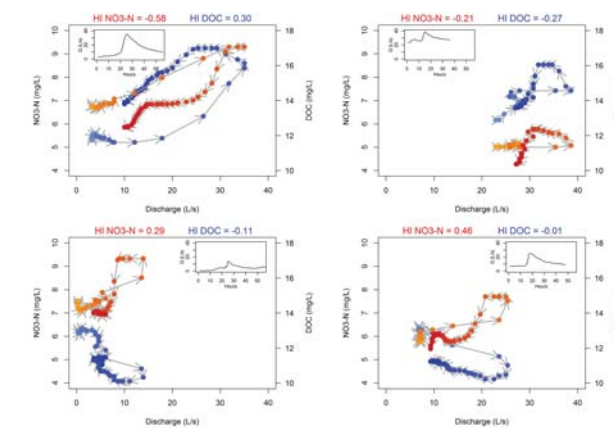


Seasonal- and event-based variability



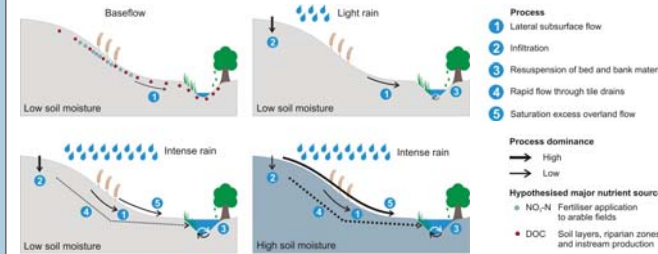
Hysteresis patterns

Examples of clockwise and anti-clockwise hysteresis patterns observed in $\text{NO}_3\text{-N}$ and DOC concentrations during selected storm events. The inset panels show the hydrograph for each event.



New process-based understanding

Results reveal key processes that control stream nutrient export under different hydroclimatic conditions.



Further information

Blaen, P. J., Khamis, K., Lloyd, C., Comer-Warner, S., Ciocca, F., Thomas, R., MacKenzie, R. and Krause, S. (2017) High-frequency monitoring of catchment nutrient exports reveals highly variable storm-event responses and dynamic source zone activation *Journal of Geophysical Research: Biogeosciences* in press

Blaen, P.J., Khamis, K., Lloyd, C., Bradley, C., Hannah, D.M. & Krause, S. (2016) Real-time monitoring of nutrients and dissolved organic matter in rivers: capturing event dynamics, technological opportunities and future directions *Science of the Total Environment* 569/570: 647-660

