

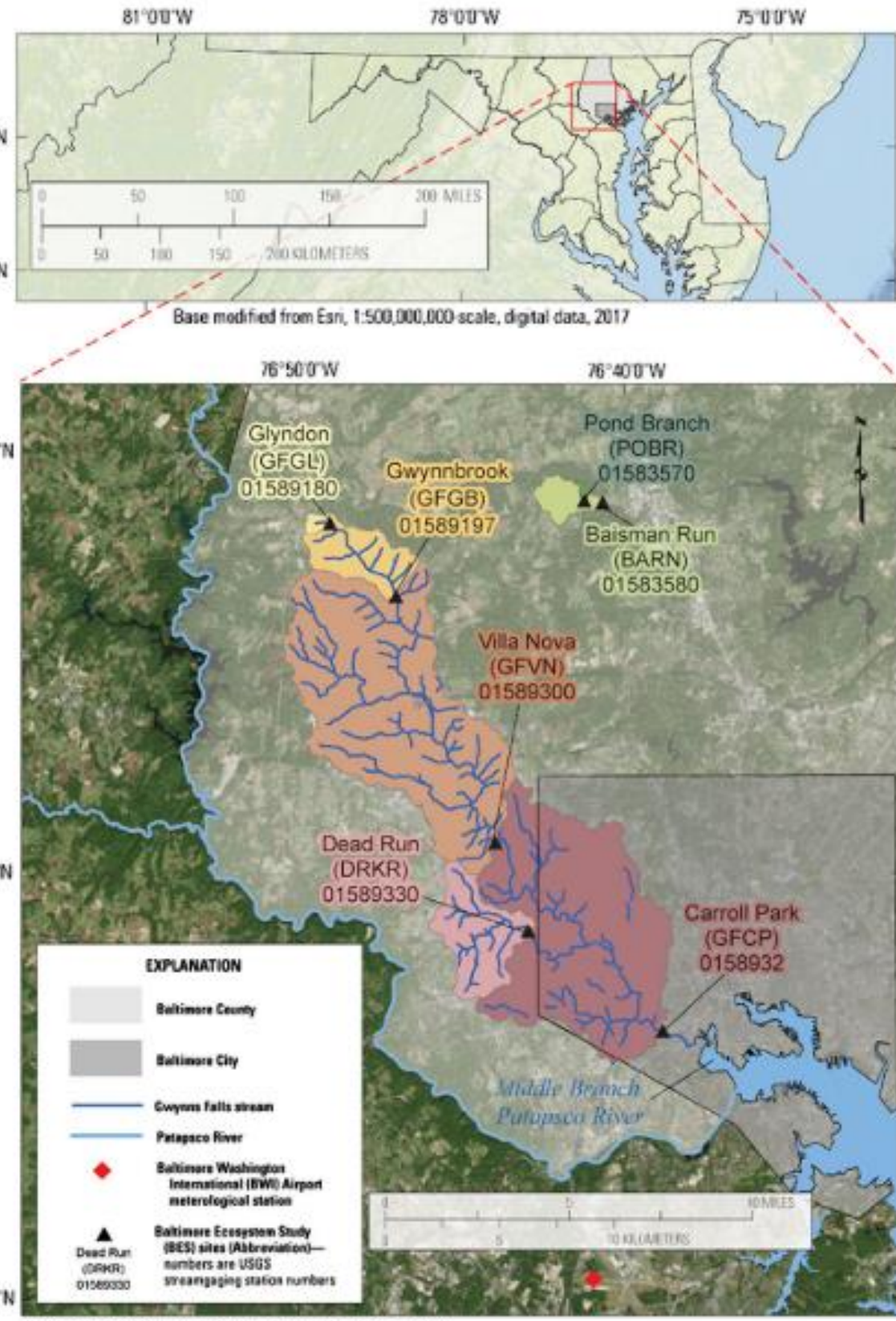
Patterns and changes in multiple solutes over 20 years of weekly measurements in Baltimore streams

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Chemical cocktails

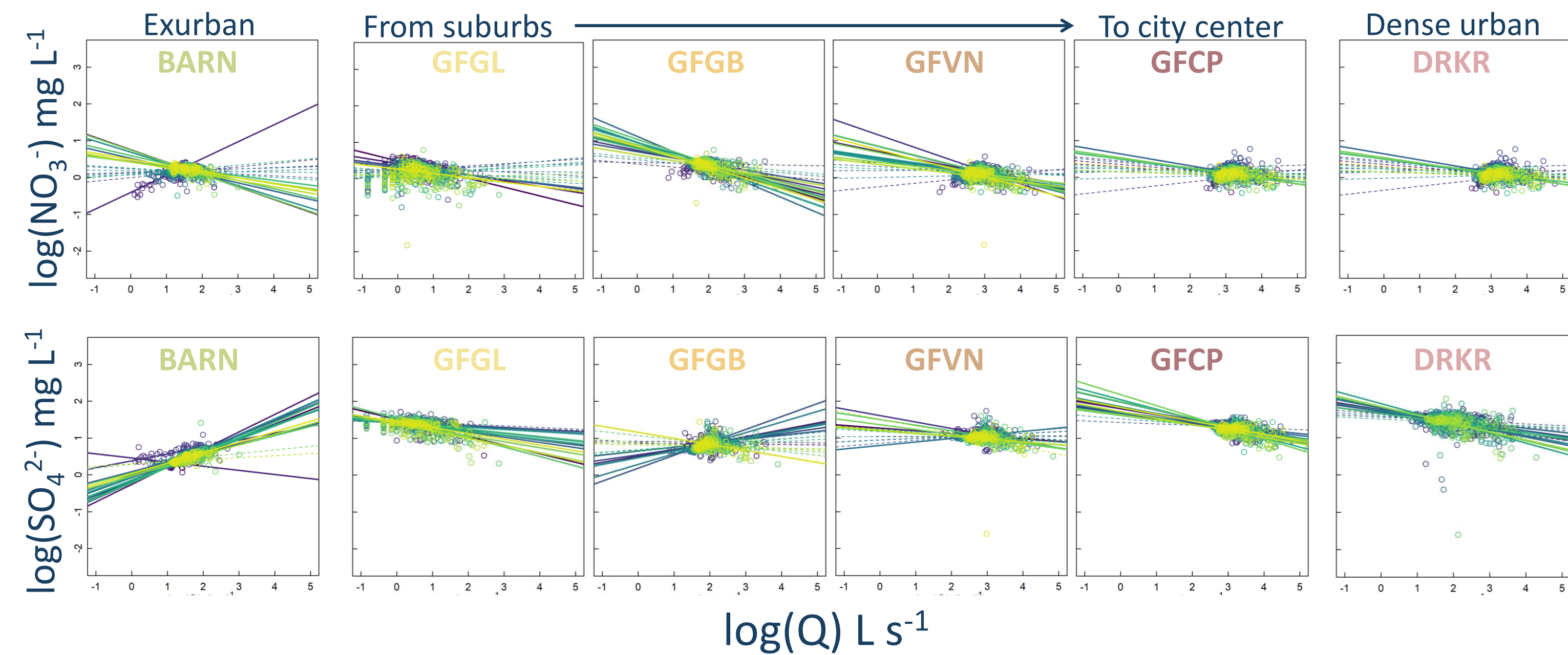
Data: Weekly water samples for 20 years (1999-2018) at each of seven sites, including chloride, sulfate, nitrate, total N, phosphate, total P, pH, and conductance. Watershed land cover ranges from forested through exurban, suburban, and urban. Nested along Gwynn’s Falls.



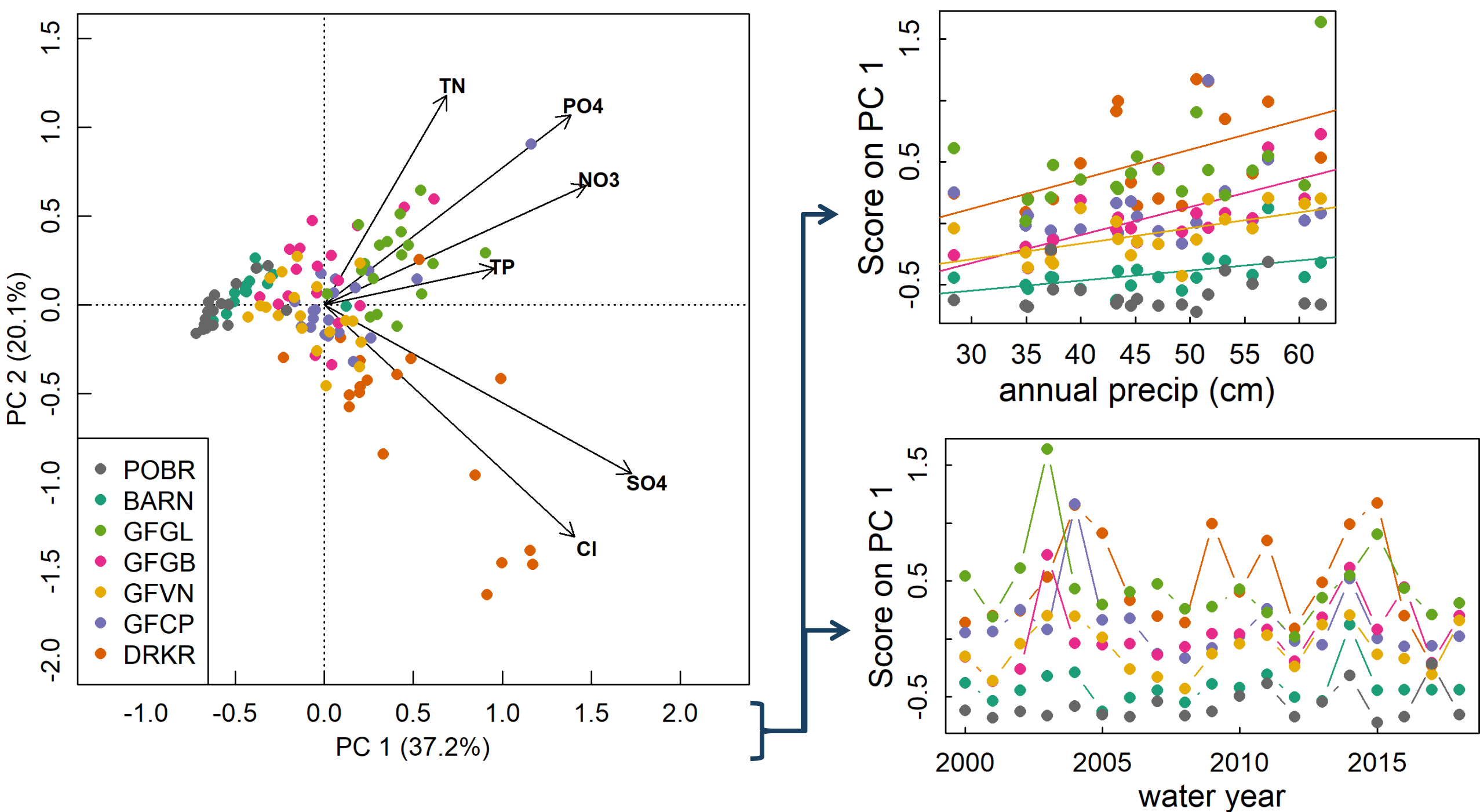
Reisinger et al. 2019 L&O

Questions: *How do solute concentrations co-vary in time and space in the streams draining Baltimore?*
How are solute concentrations related to streamflow?
How do these patterns and relationships differ with land cover and how have they changed over time?

C-Q relationships over time:



Multi-solute approach, annual concentration range:



Long-term data from urban streams allows us to see new patterns and ask new questions

Pharmaceuticals are highly dynamic – snapshots are not enough

This work is still in development – thank you for your feedback, thoughts, and insights!

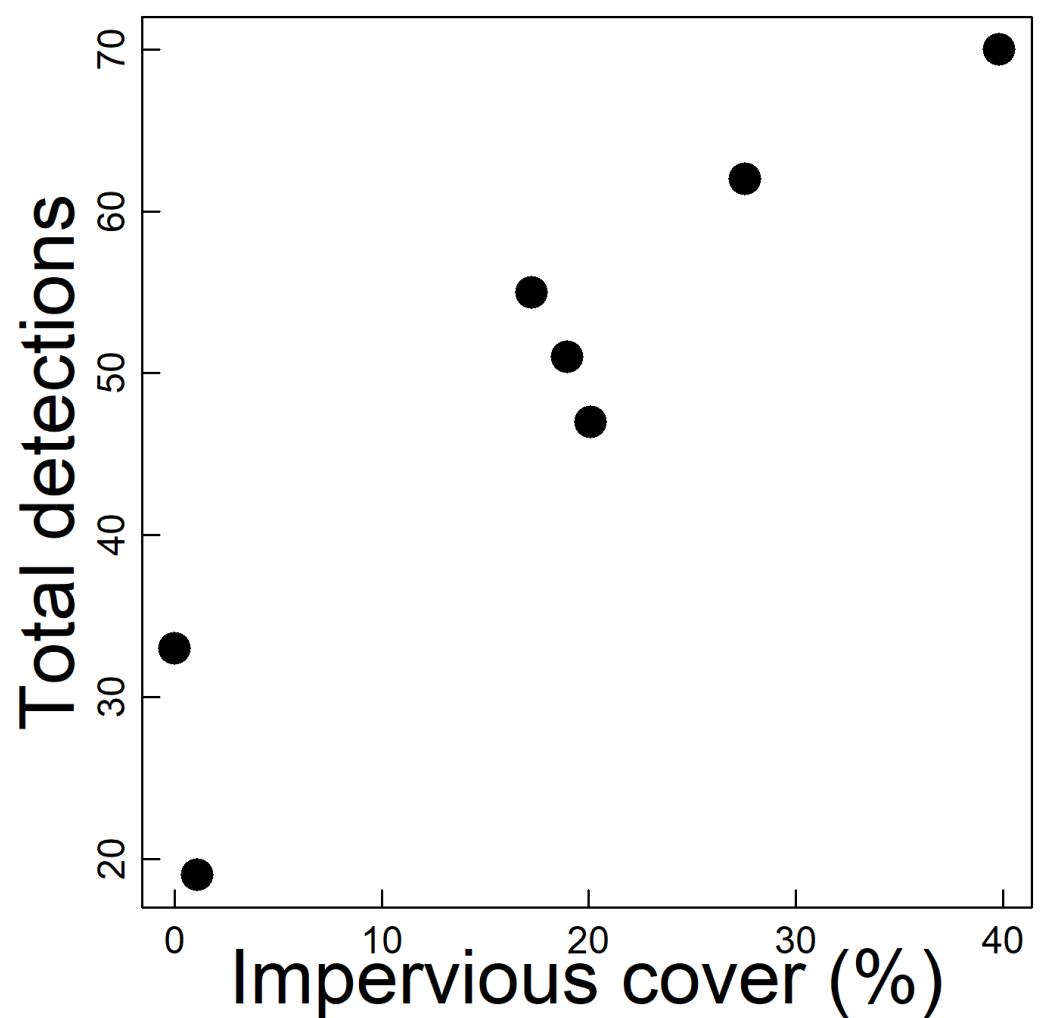
Emerging contaminants

Data: Weekly water samples for one year, screened for 92 pharmaceuticals at each of 7 sites (*no WWTP in the catchment*)

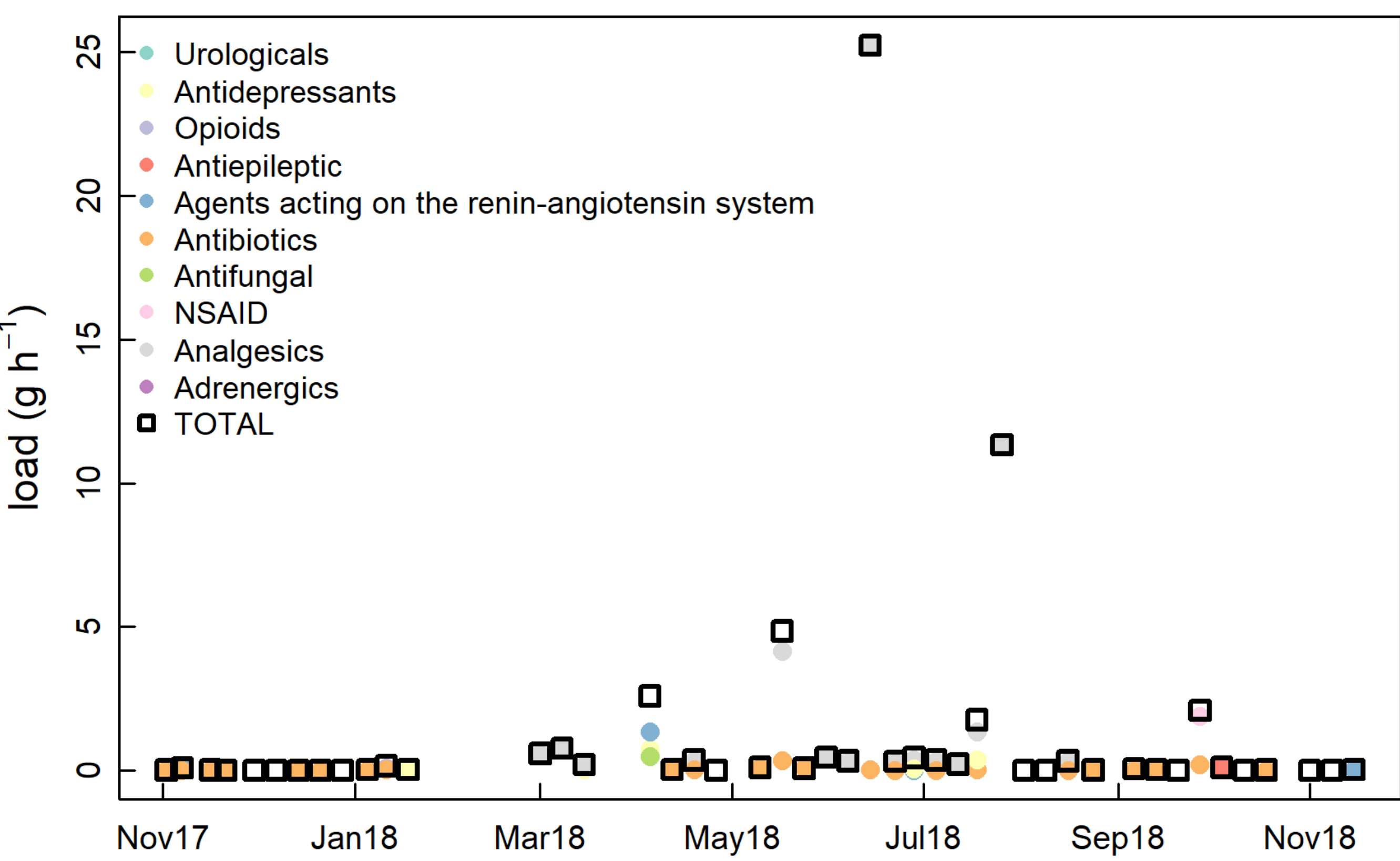
Questions: *What are the patterns between land cover and pharmaceutical concentrations?*
What is the load of pharmaceuticals delivered by this river to the Chesapeake Bay?

Initial Results:

- Detected total of 37 different pharmaceuticals across all sites
- Most frequently detected: Trimethoprim (prescription antibiotic) in 137 of 371 samples
- Highest concentration detected: 3717 ng/L Acetaminophen (OTC analgesic) in June at Carroll Park
- Pharmaceutical detection and concentration increase with proximity to the urban core



Loads to Chesapeake Bay (from Gwynn’s Fall @ Carroll Park):



- Assuming the median total concentration across the year, we estimate this stream contributes **at least 3.19 kg of pharmaceuticals annually** to the Chesapeake Bay
- On average, that means this watershed delivers annual loads of 1.17 kg **acetaminophen (2340 tablets)**, 1.18 kg **antibiotics (2665 daily doses)**, and 212 g **antidepressants (3292 daily doses)**



Want to know more about the Baltimore Ecosystem Study and/or access these data? Scan the code to visit the website!

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