Temporal Trends in Stream N Concentrations and Biogeochemical Responses to Disturbances in Long-Term Reference Catchments

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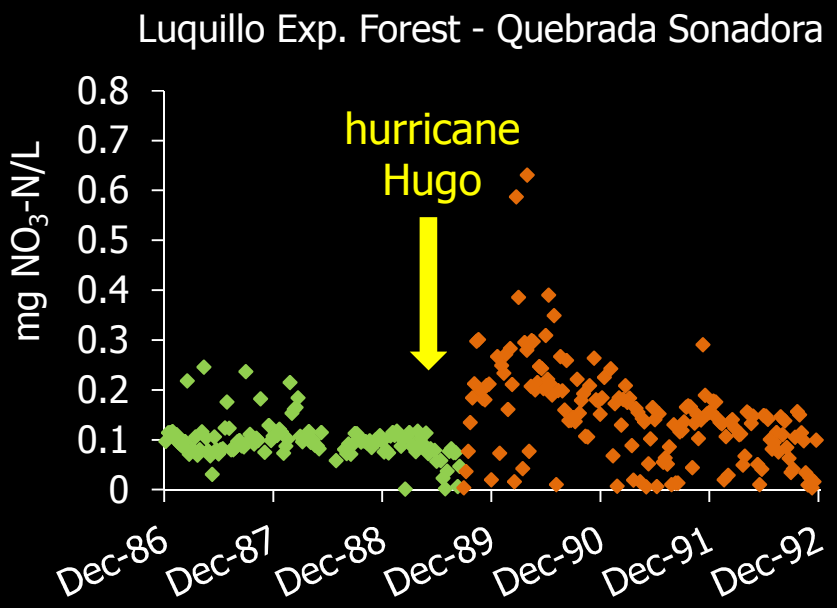
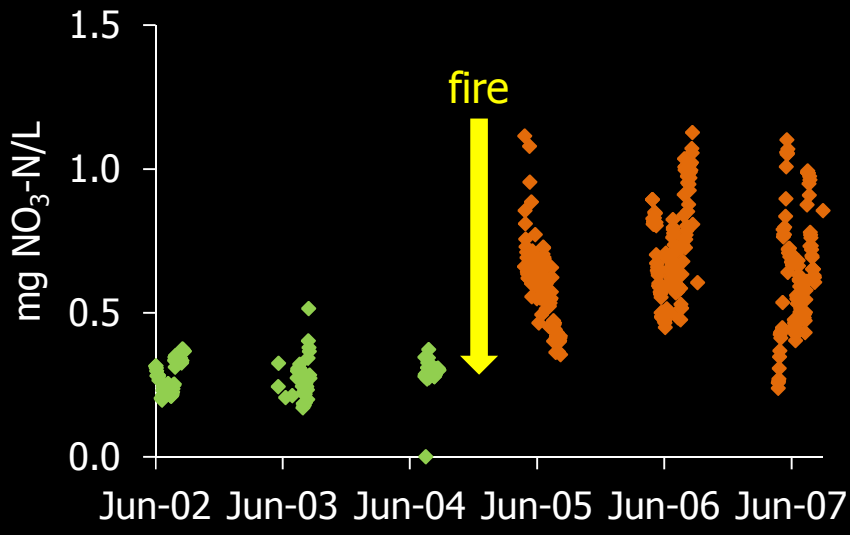
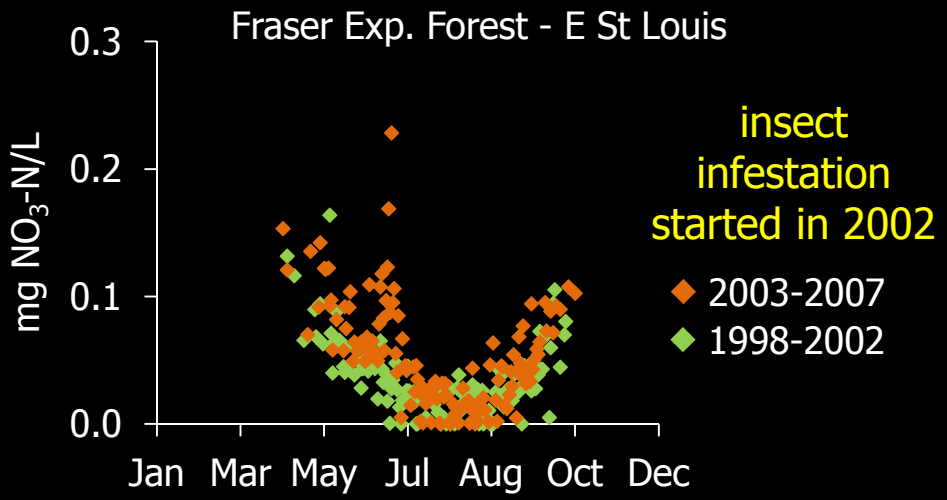
[5]Cary Institute of Ecosystem Studies
[6]University of New Hampshire

Do natural disturbances lead to similar responses?







Do natural disturbances lead to similar responses?

Reference catchments

vs.

Disturbed catchments

non stationary?

Trends in N concentrations in reference catchments across US

- without major land use changes in the last 60 years
- ≥ 12 years of data (1996-2007)
- chemistry sampling intervals < 3 weeks
- daily Q measurements

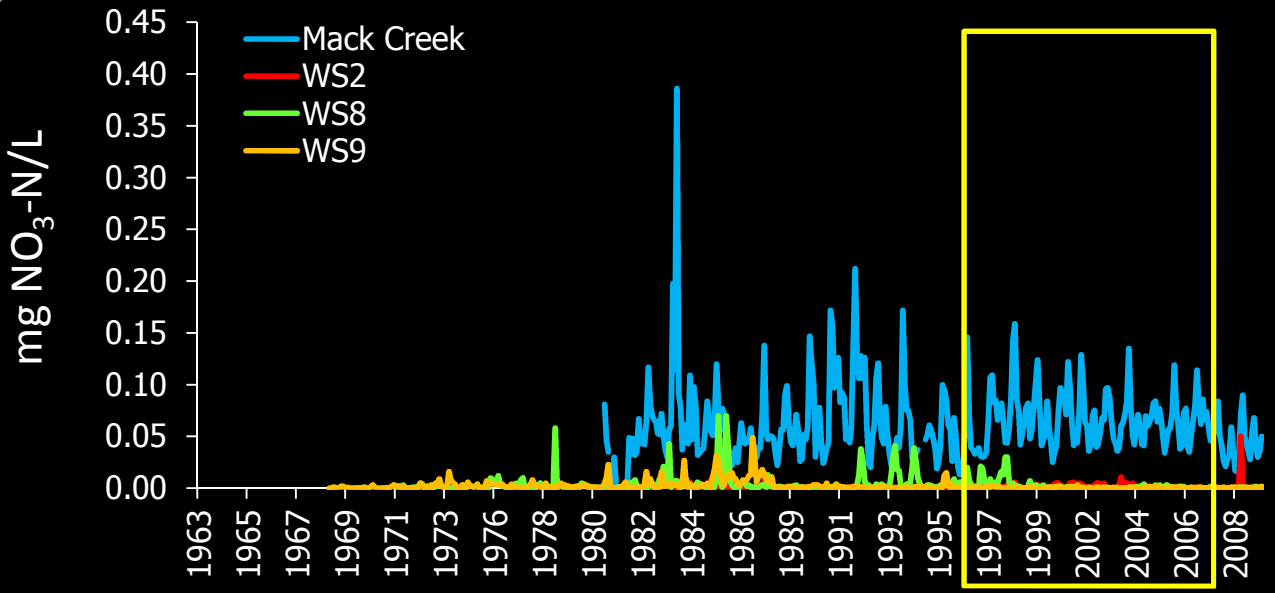
Trends in N concentrations in reference catchments across US

1. How variable are catchments within a site? Is there more variation among Experimental Forests sites than among catchments within an Experimental Forest?
2. Are there long term trends in stream NO_3 and NH_4 concentrations over time at forested reference catchments across the continental platform?
3. Are trends associated with changing deposition or discharge?

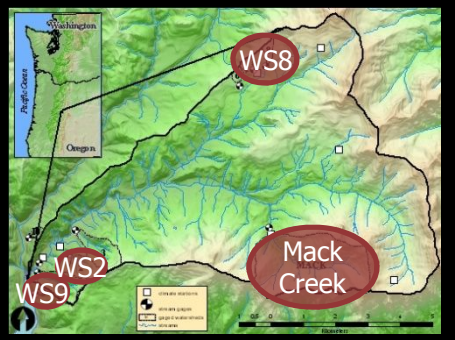
7 sites & 22 reference catchments

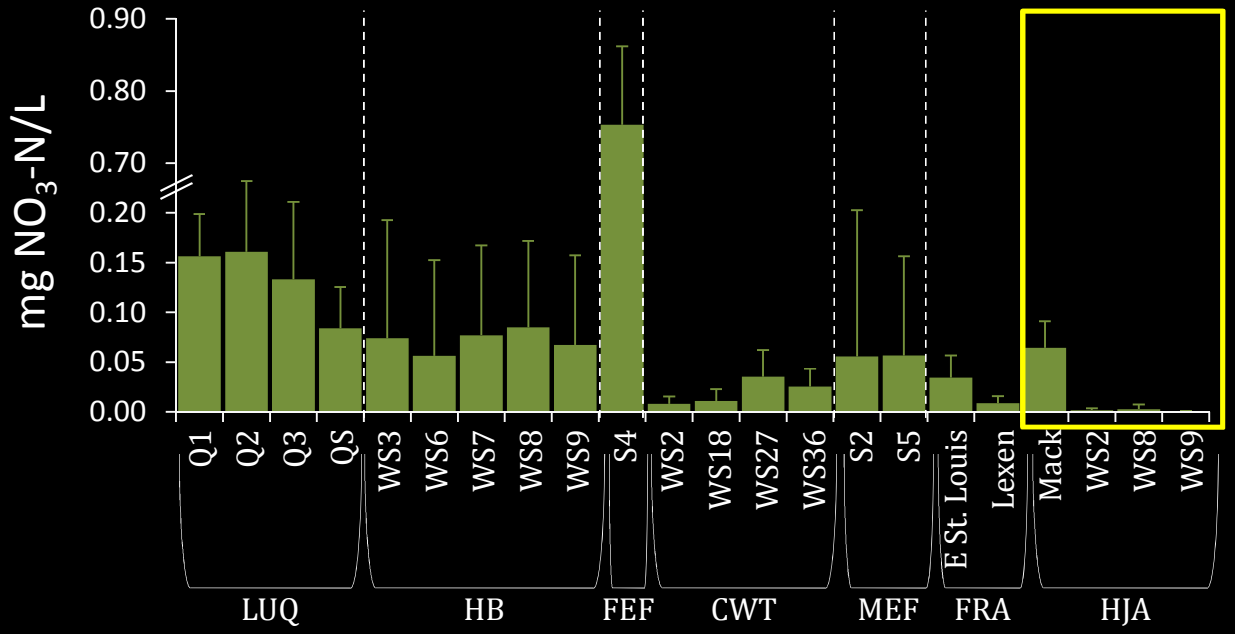
monthly flow-weighted nitrate and ammonium concentrations

Trends in N concentrations in reference catchments across US



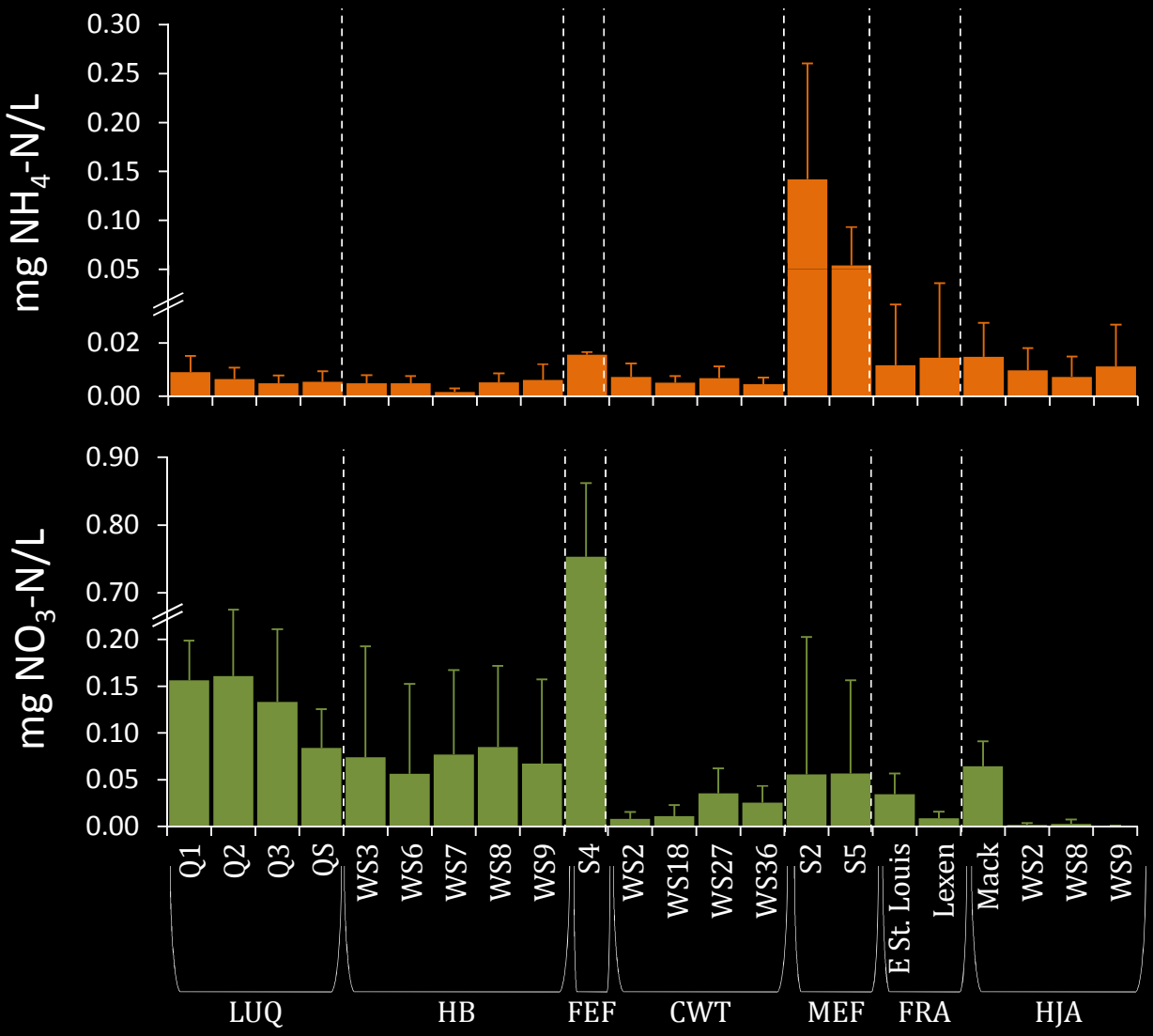
H. J. Andrews Exp. Forest





Period of 1996-2007

Trends in N concentrations in reference catchments across US

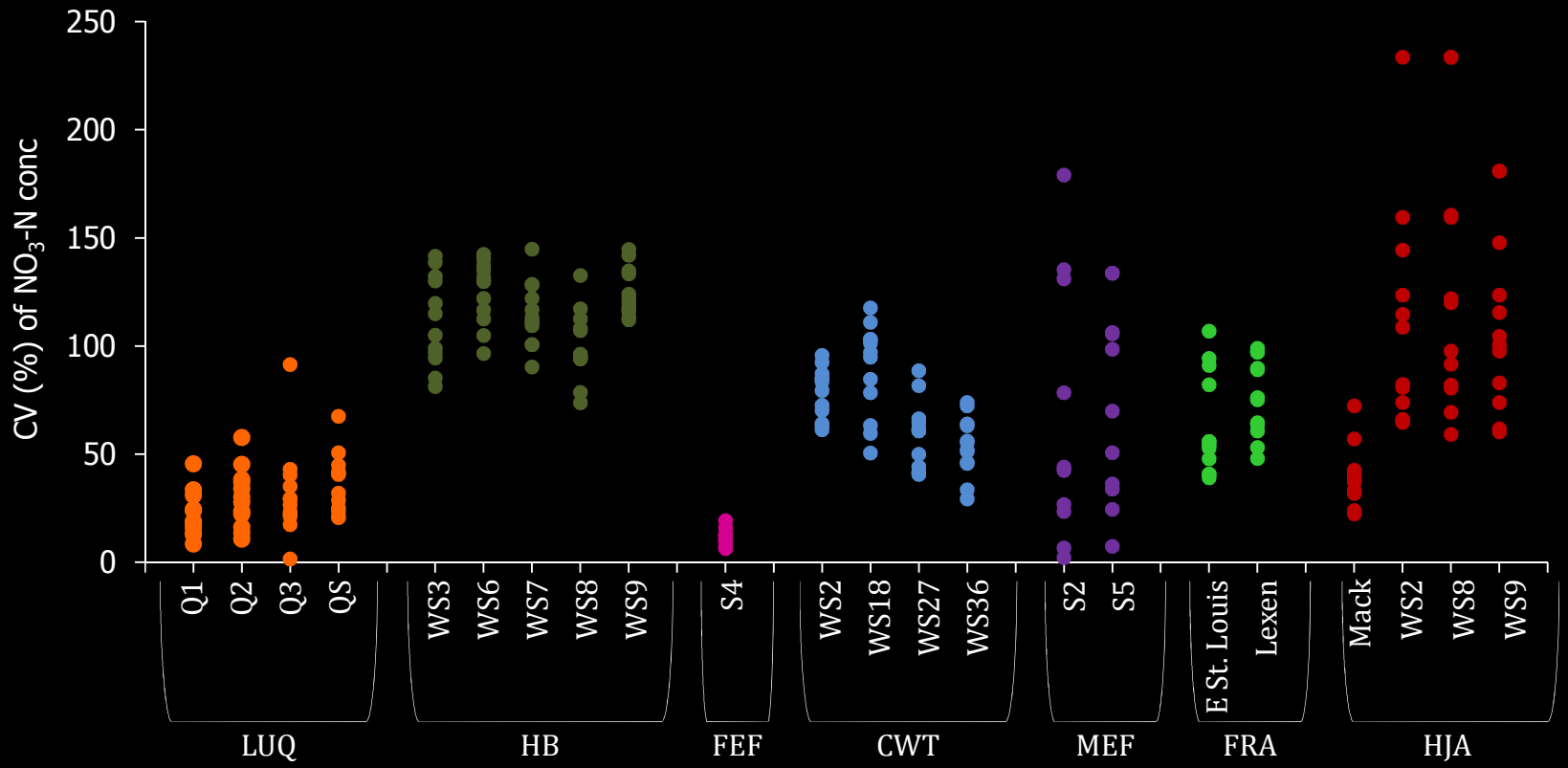


Average flow-weighted concentrations

Period of 1996-2007

Trends in N concentrations in reference catchments across US

1. Is there more variation among Experimental Forests sites than among basins within an Experimental Forest?



Temporal variation:
- intra-annual

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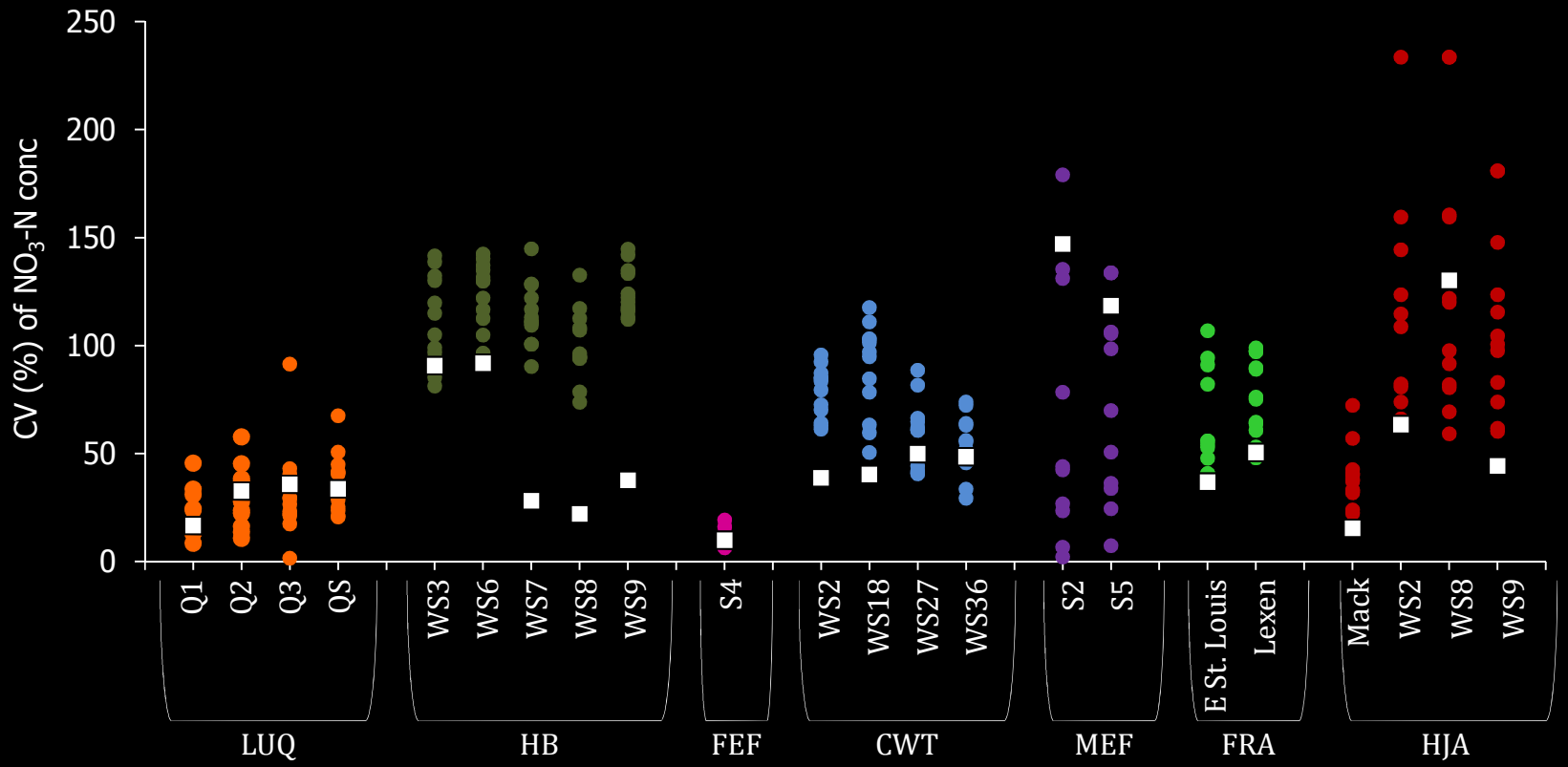

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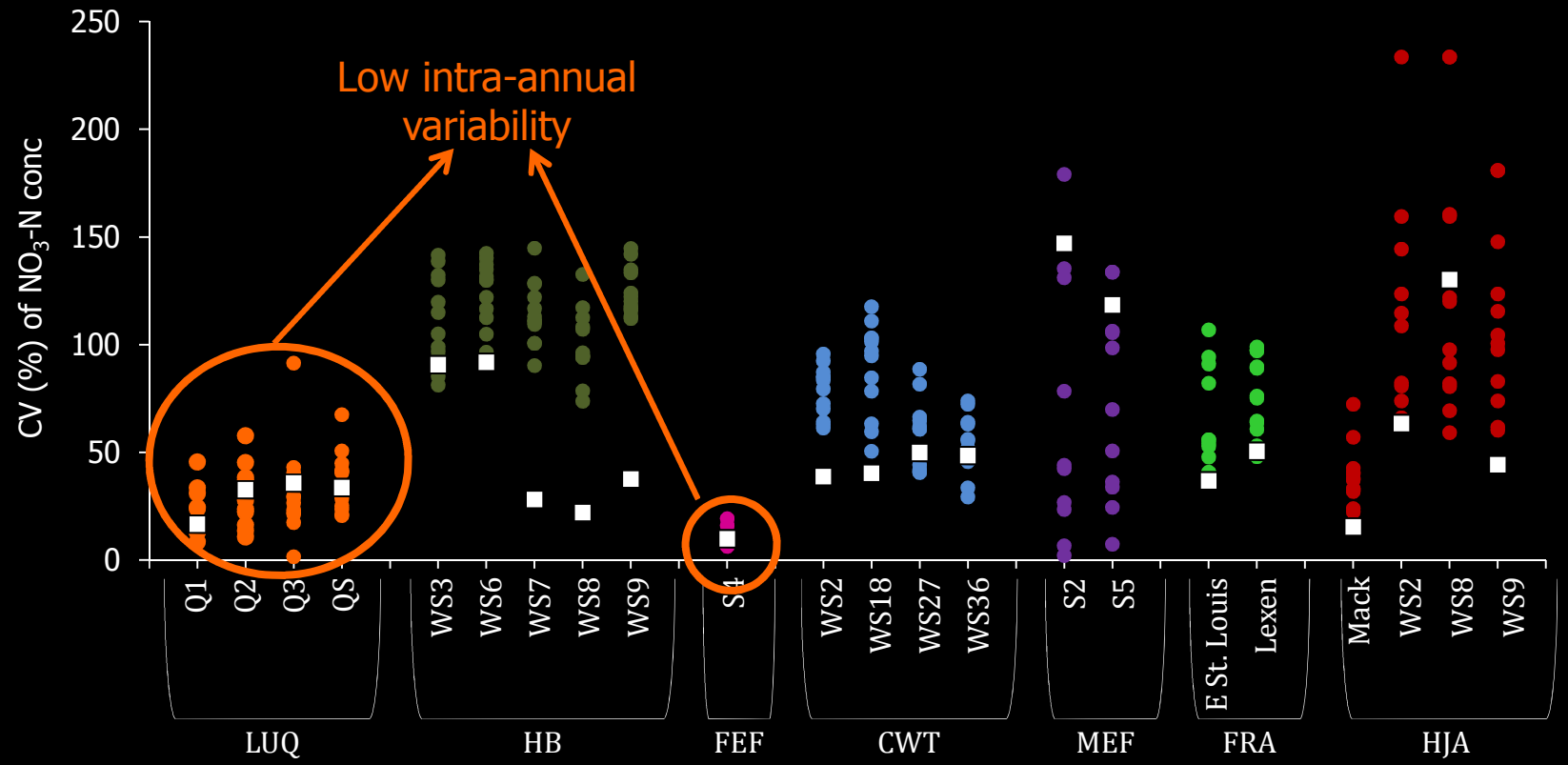

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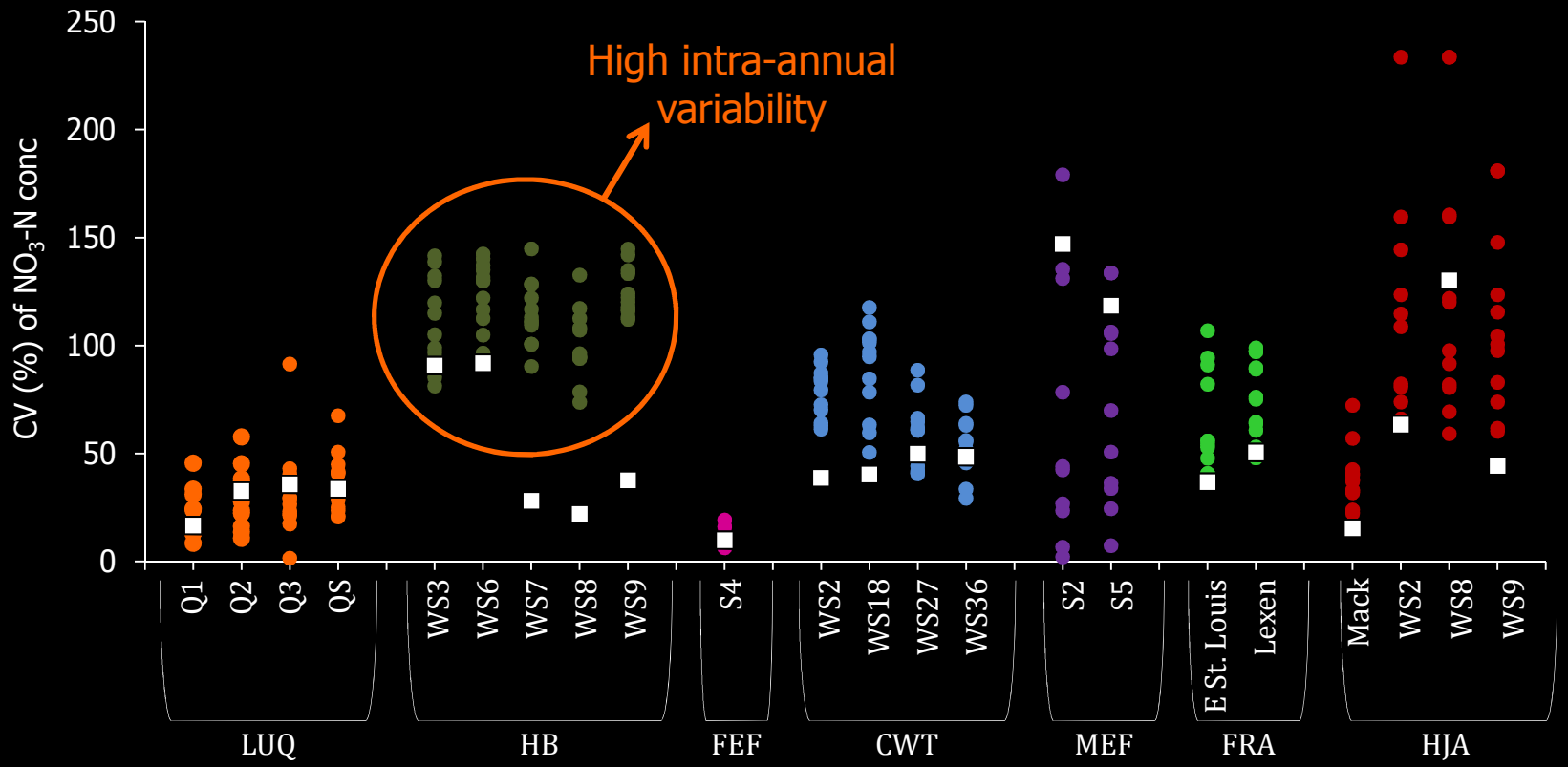

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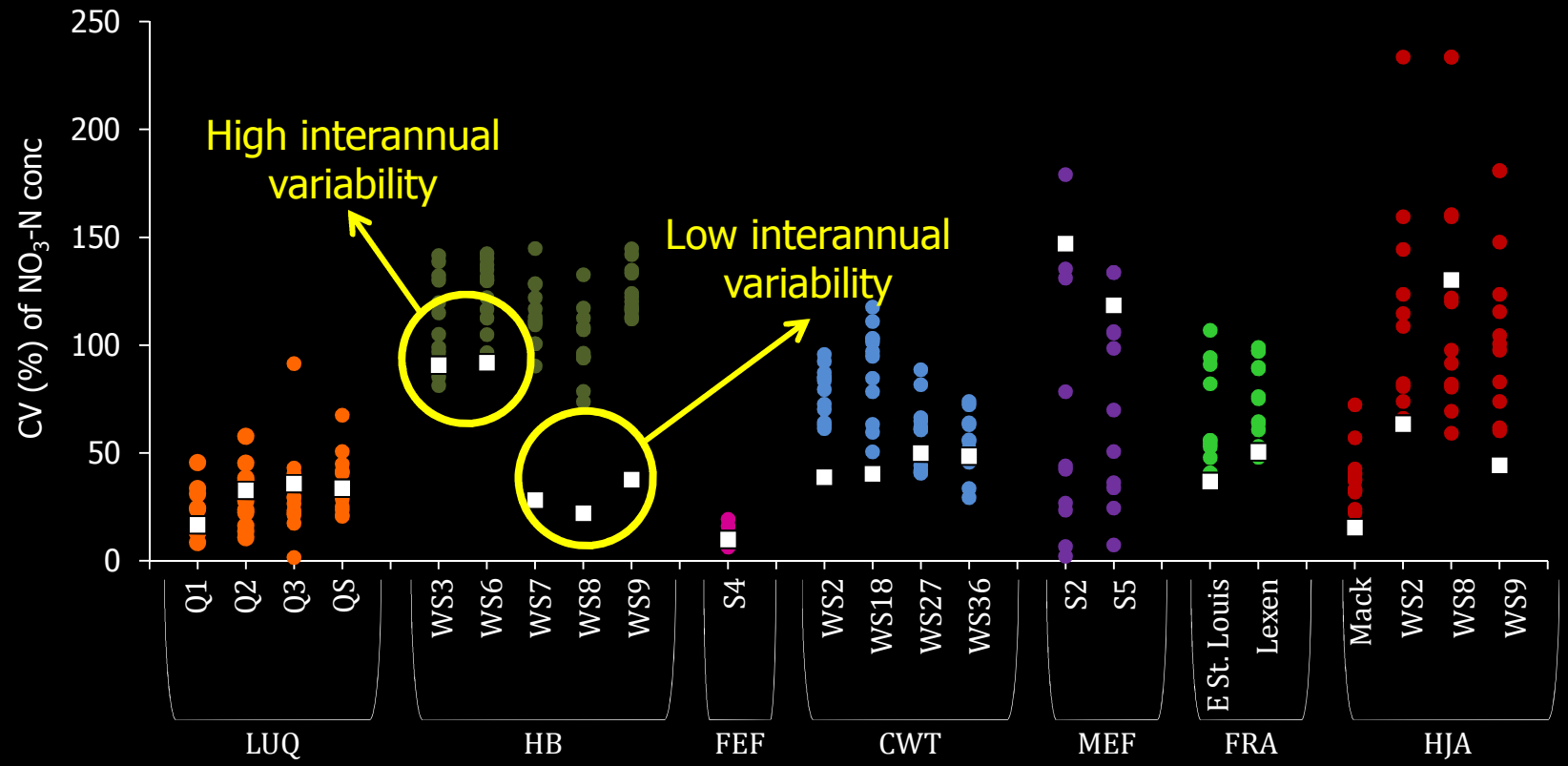

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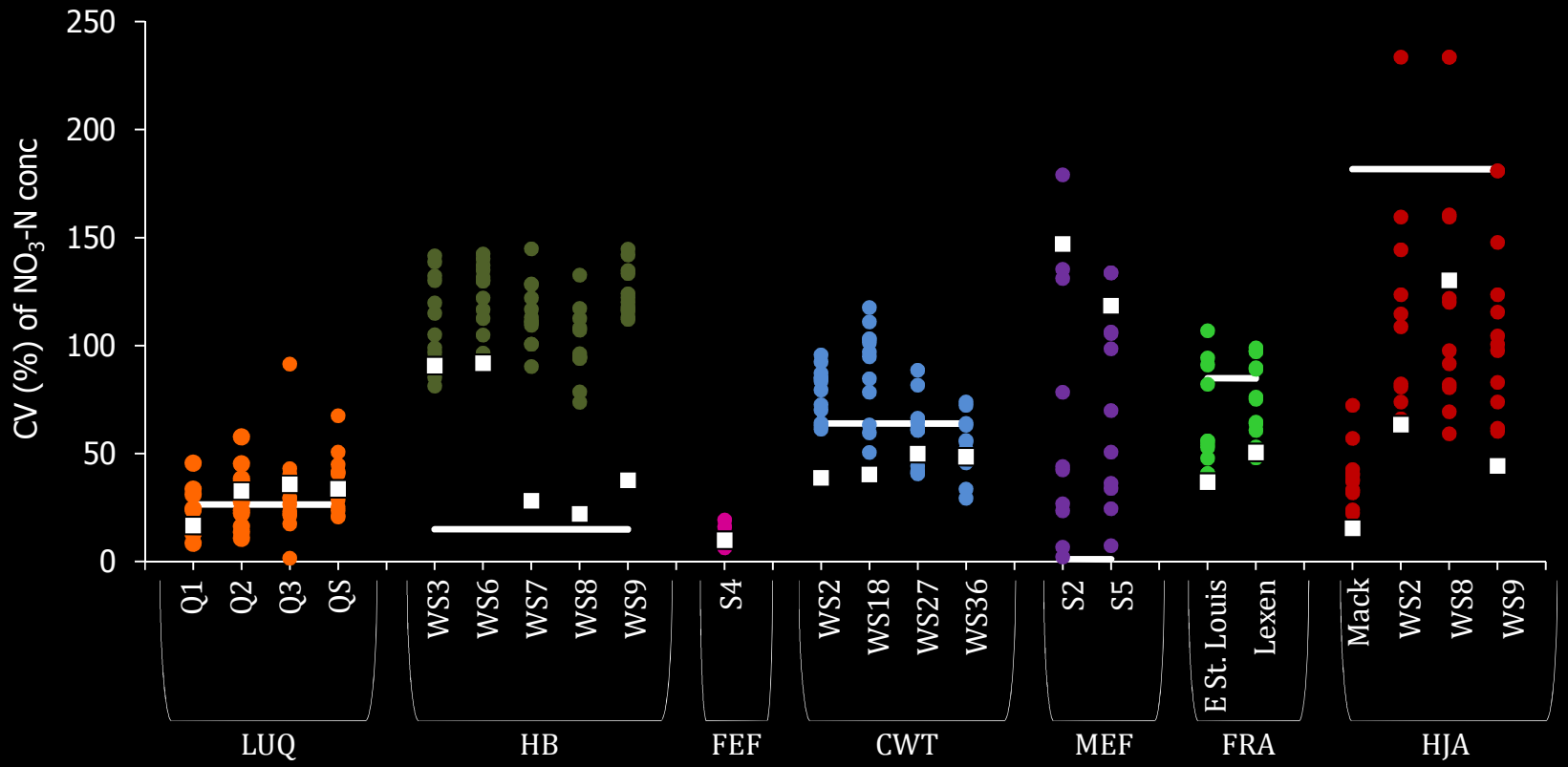

Temporal variation:
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Spatial variation:
- ——— within sites

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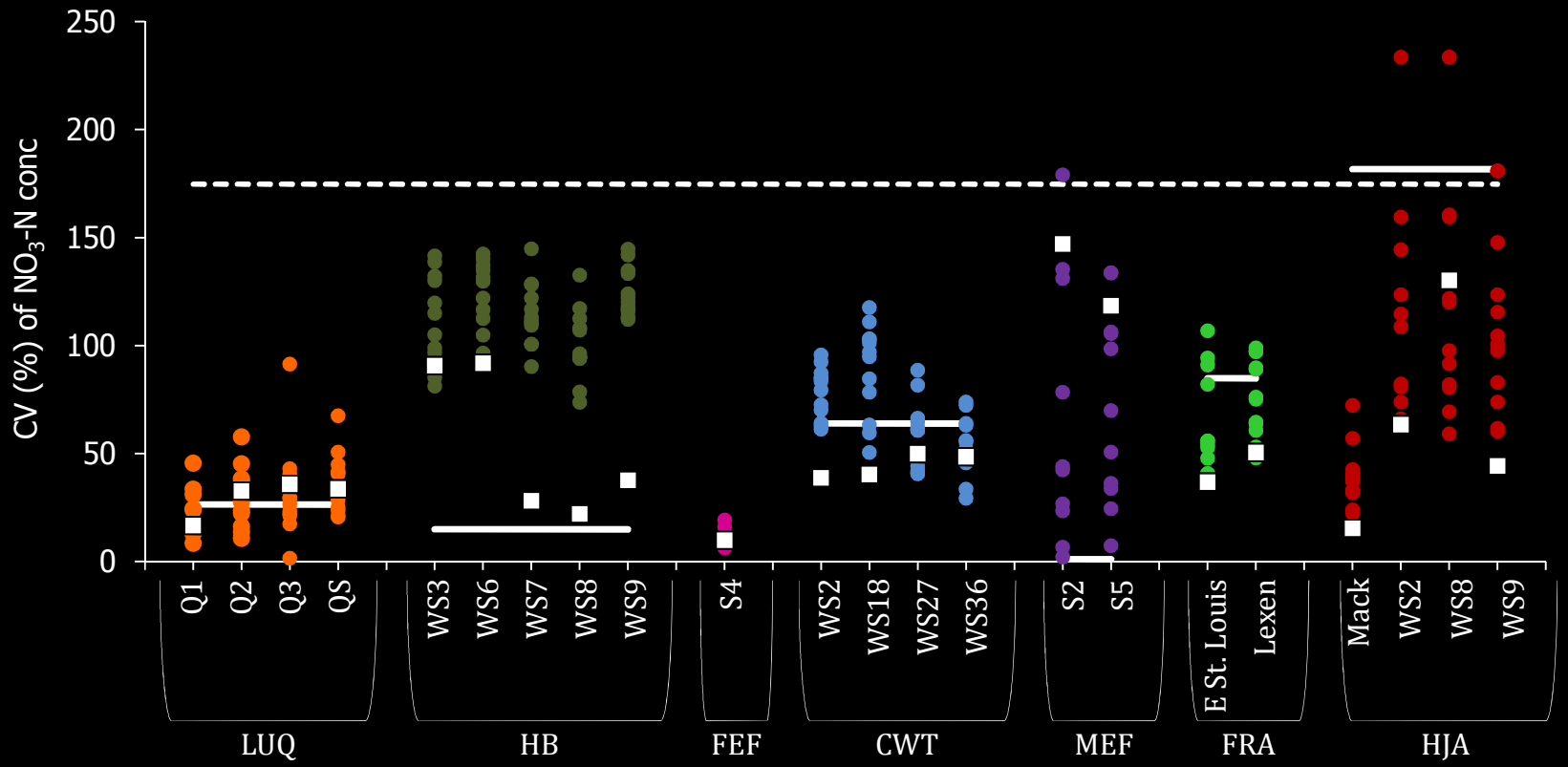

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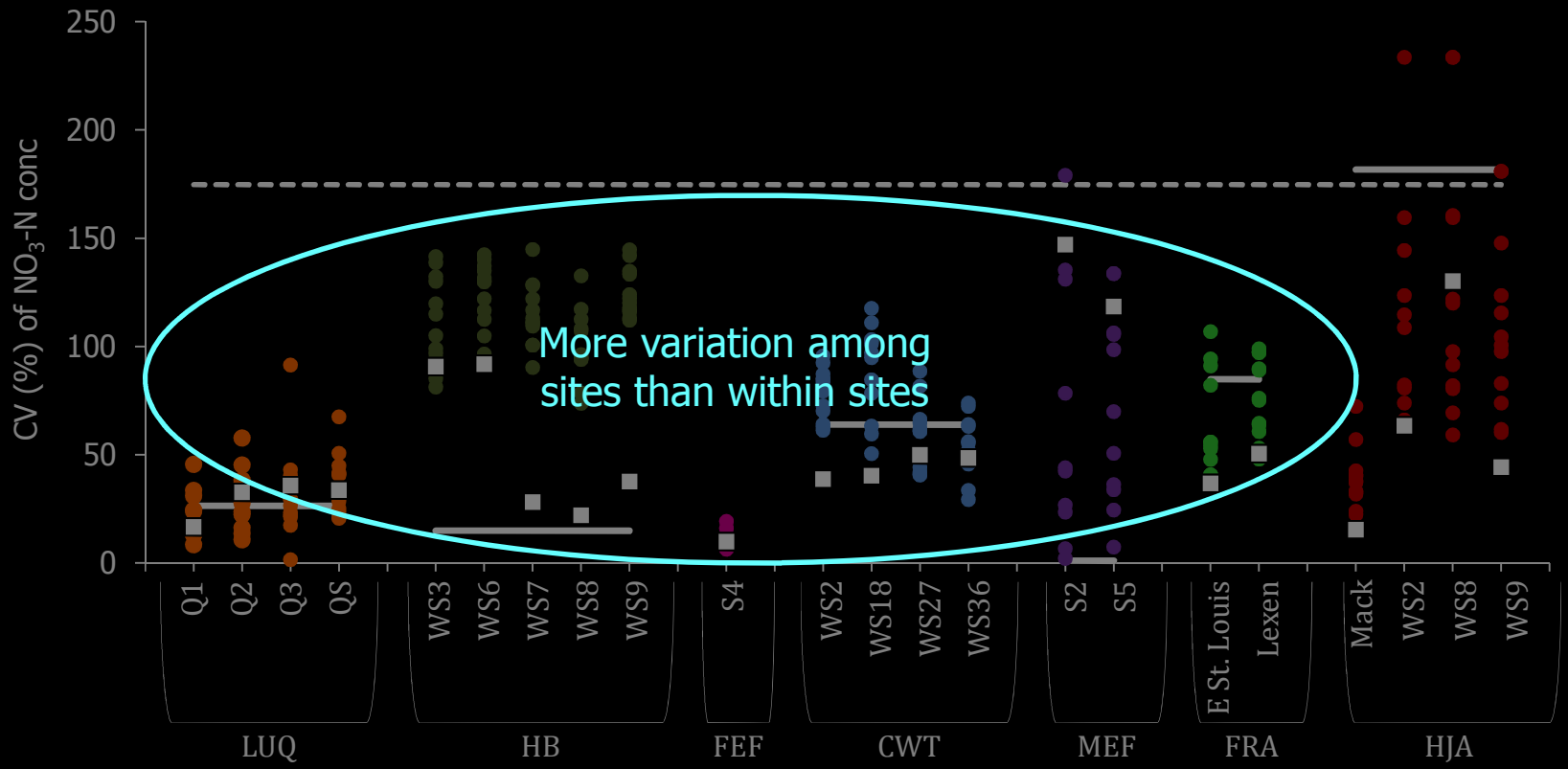

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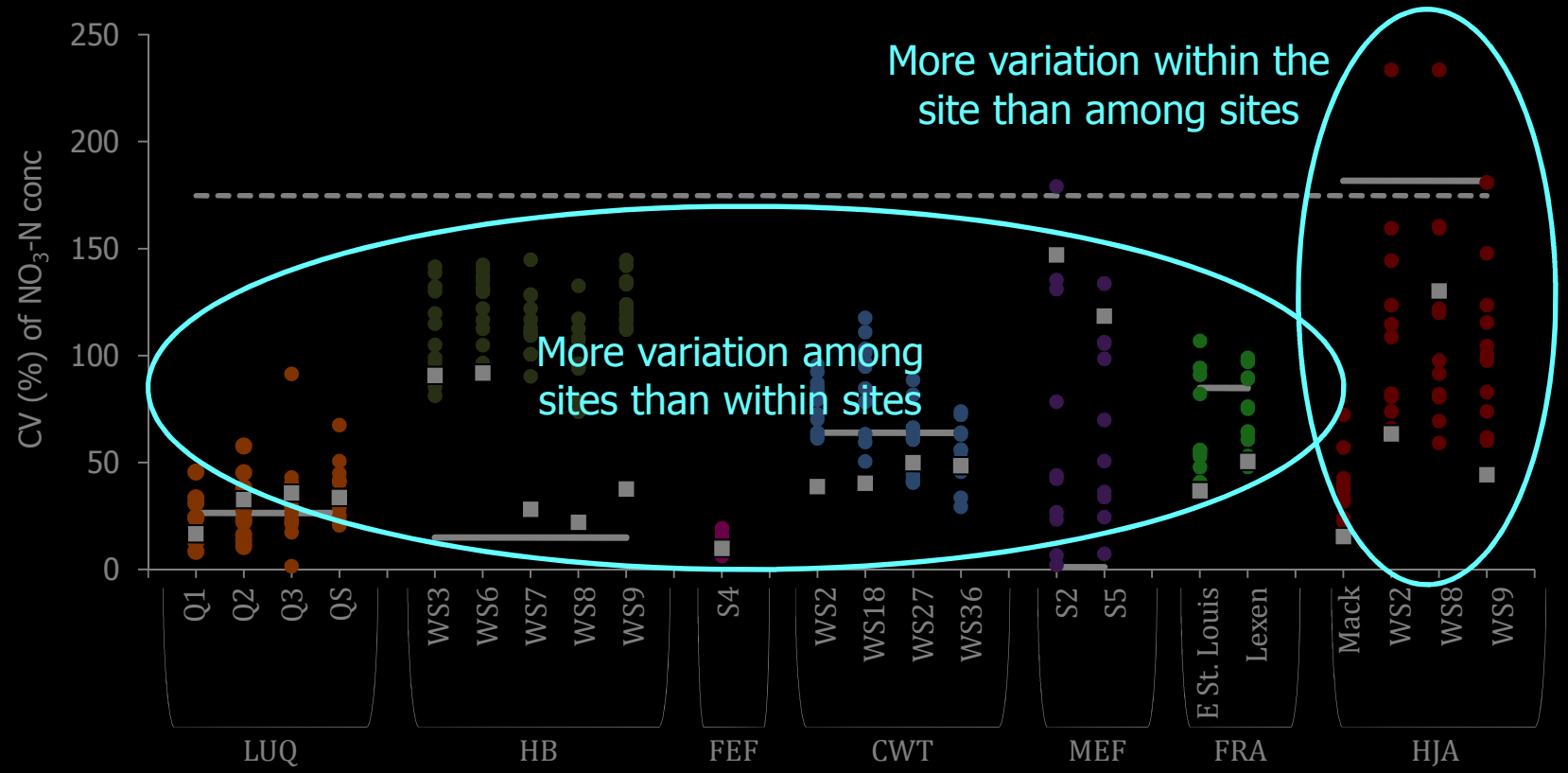

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Trends in N concentrations in reference catchments across US

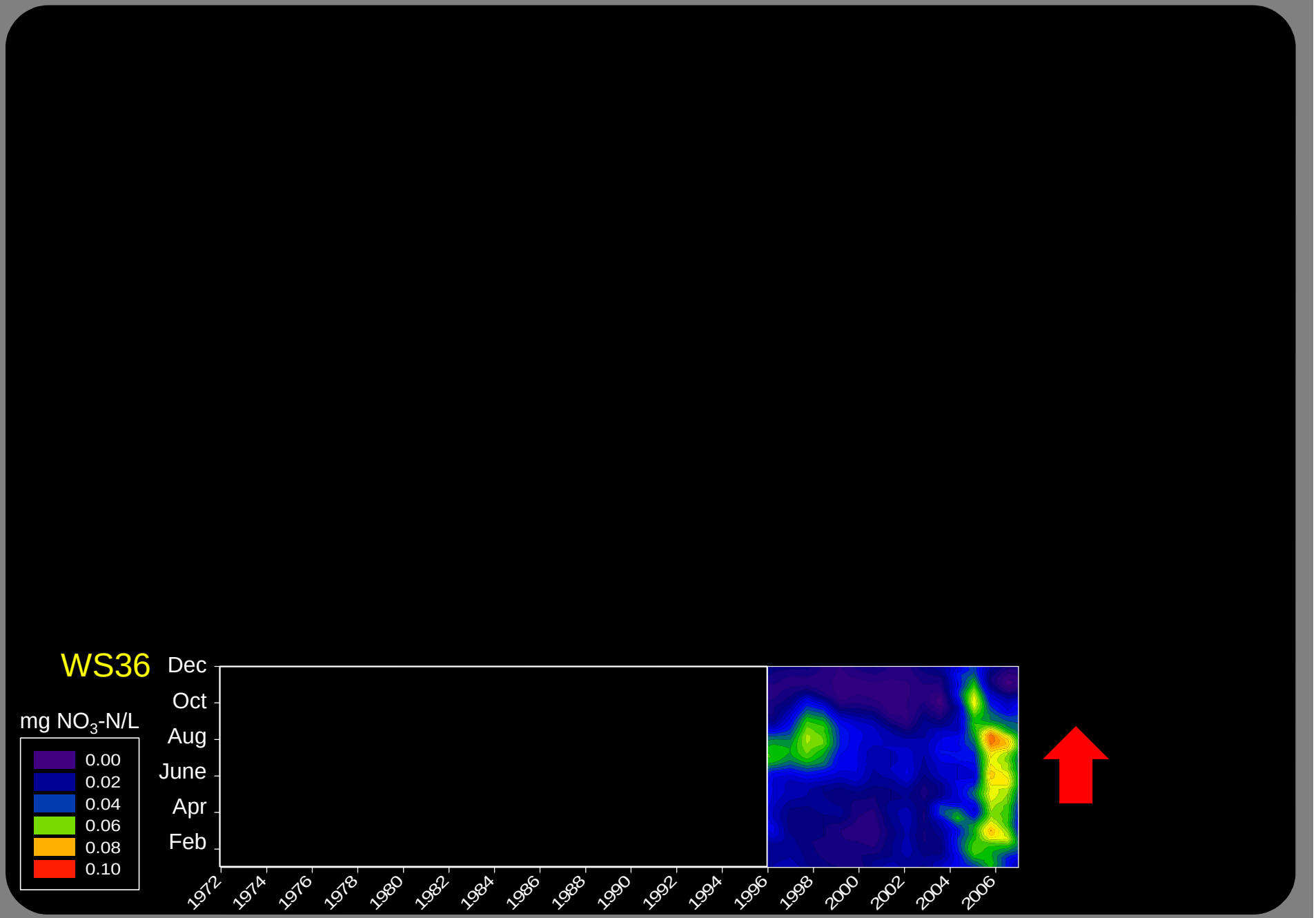
2. Are there long term trends in stream NO_3 and NH_4 concentrations over time at forested reference catchments across the continental platform?

Existence of general trends?

Catchments within a site present the same trends?

Influence of the time period considered?

Trends in N concentrations in reference catchments across US



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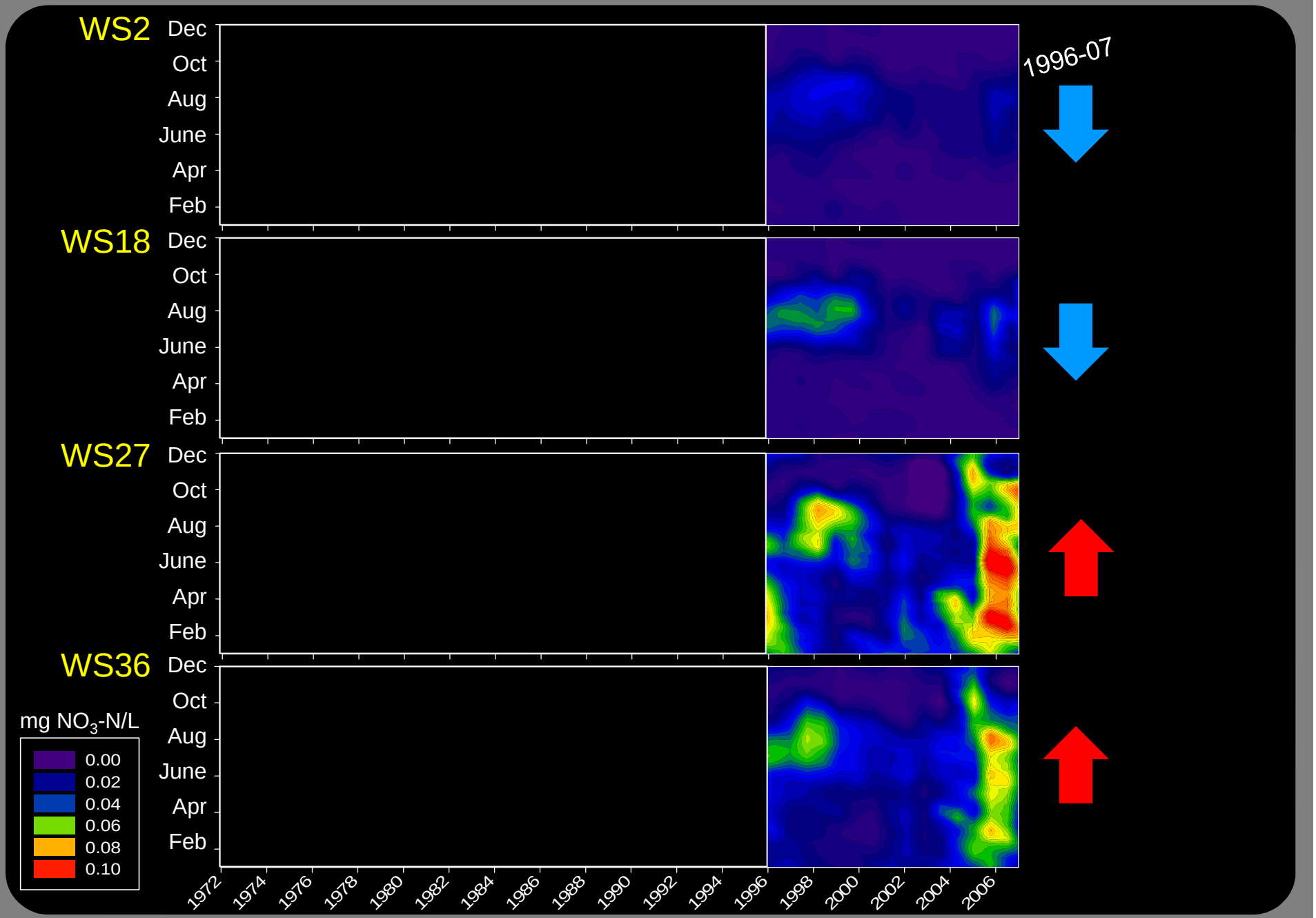
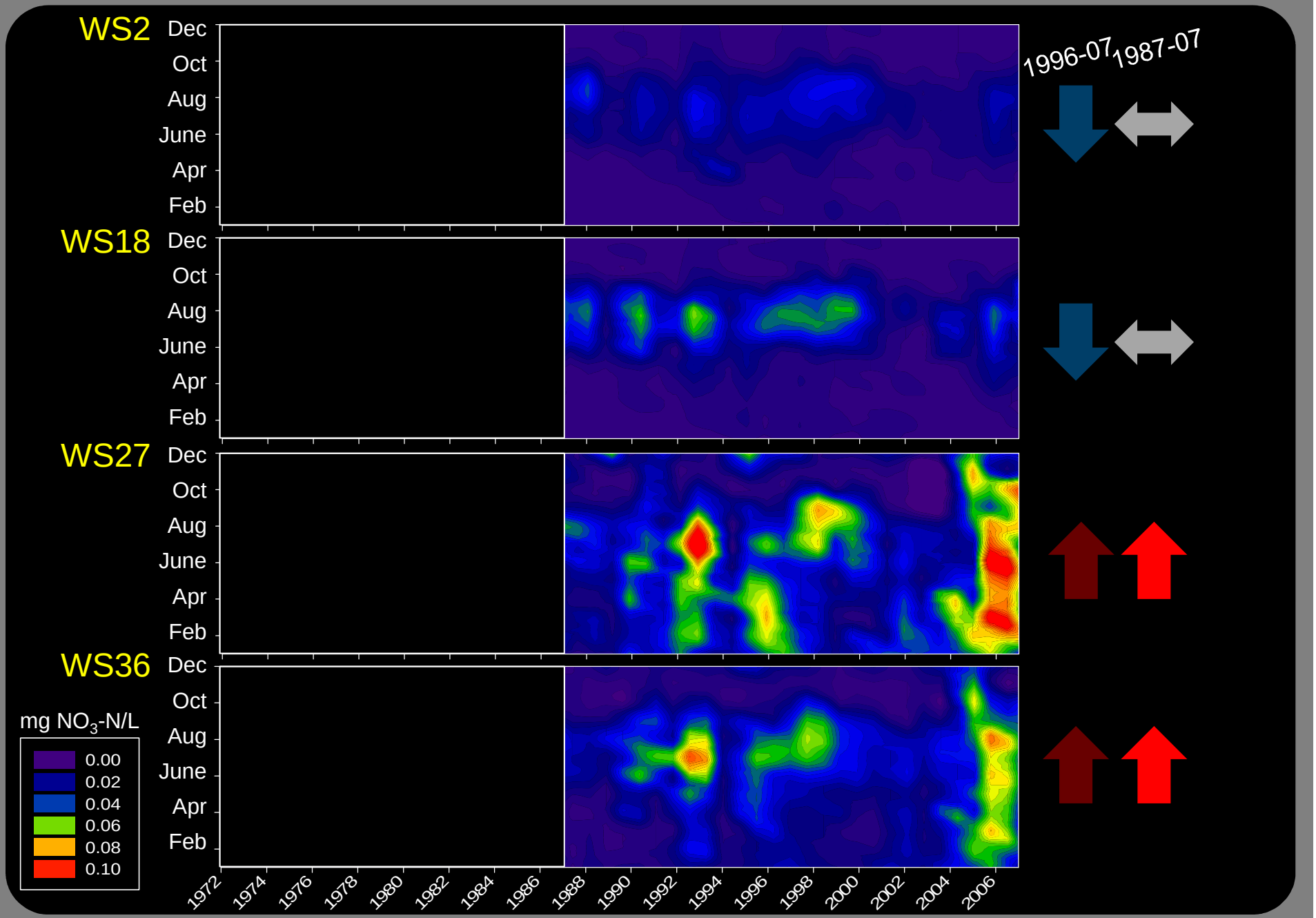


Example: Coweeta NITRATE



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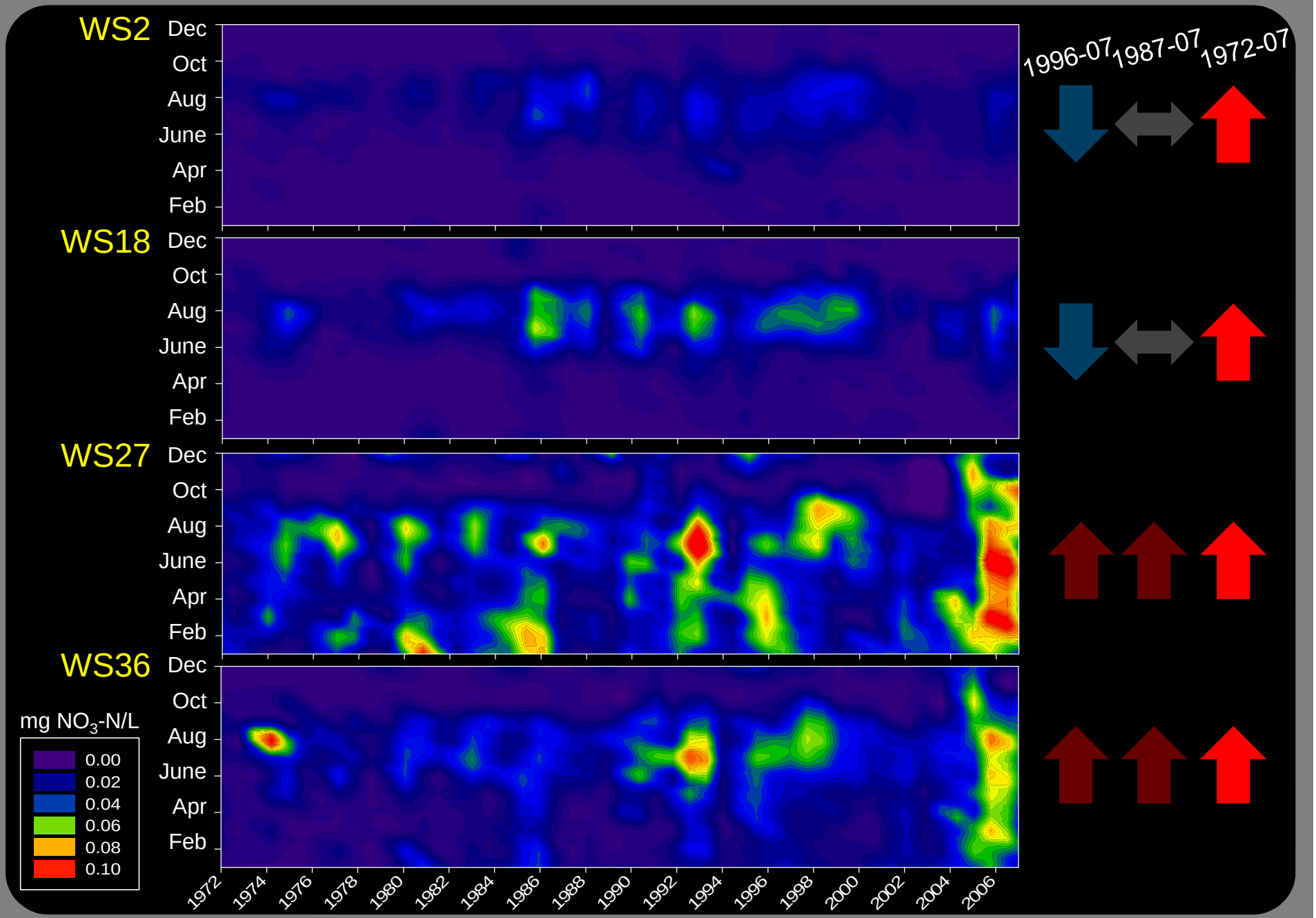
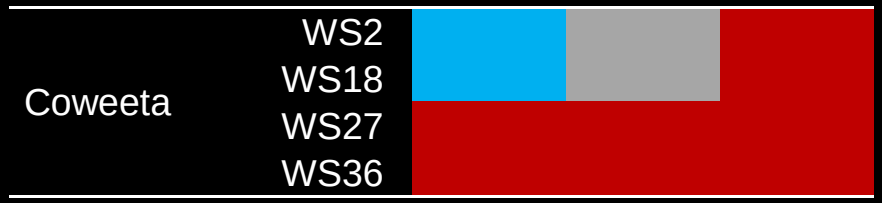
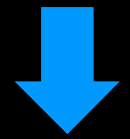


Trends in N concentrations in reference catchments across US

NO_3-N

	1996-07 (12 y)	1987-07 (21 y)	1972-07 (36 y)
Coweeta	WS2		
	WS18		
	WS27		
	WS36		



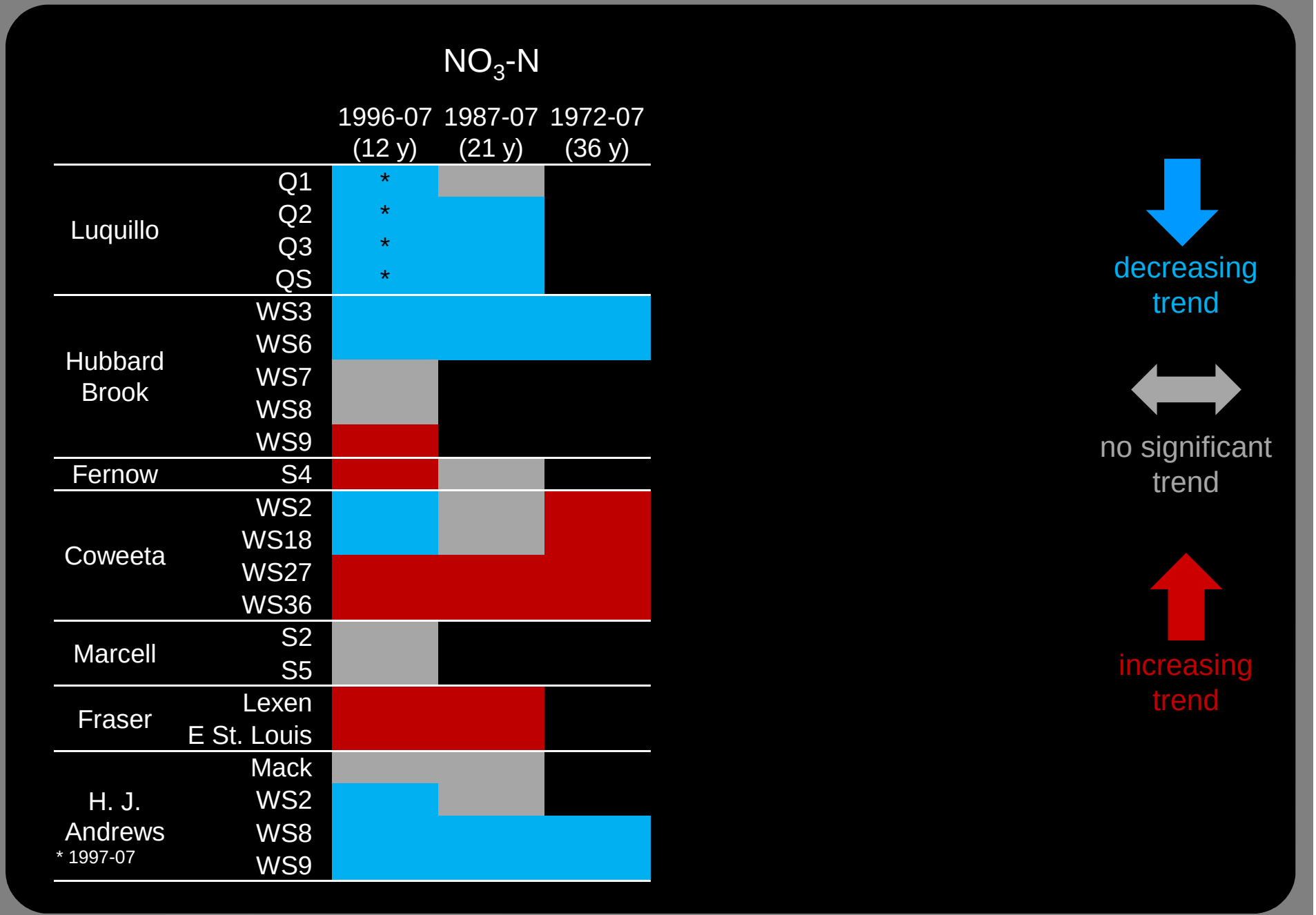


decreasing trend

no significant trend

increasing trend

Trends in N concentrations in reference catchments across US



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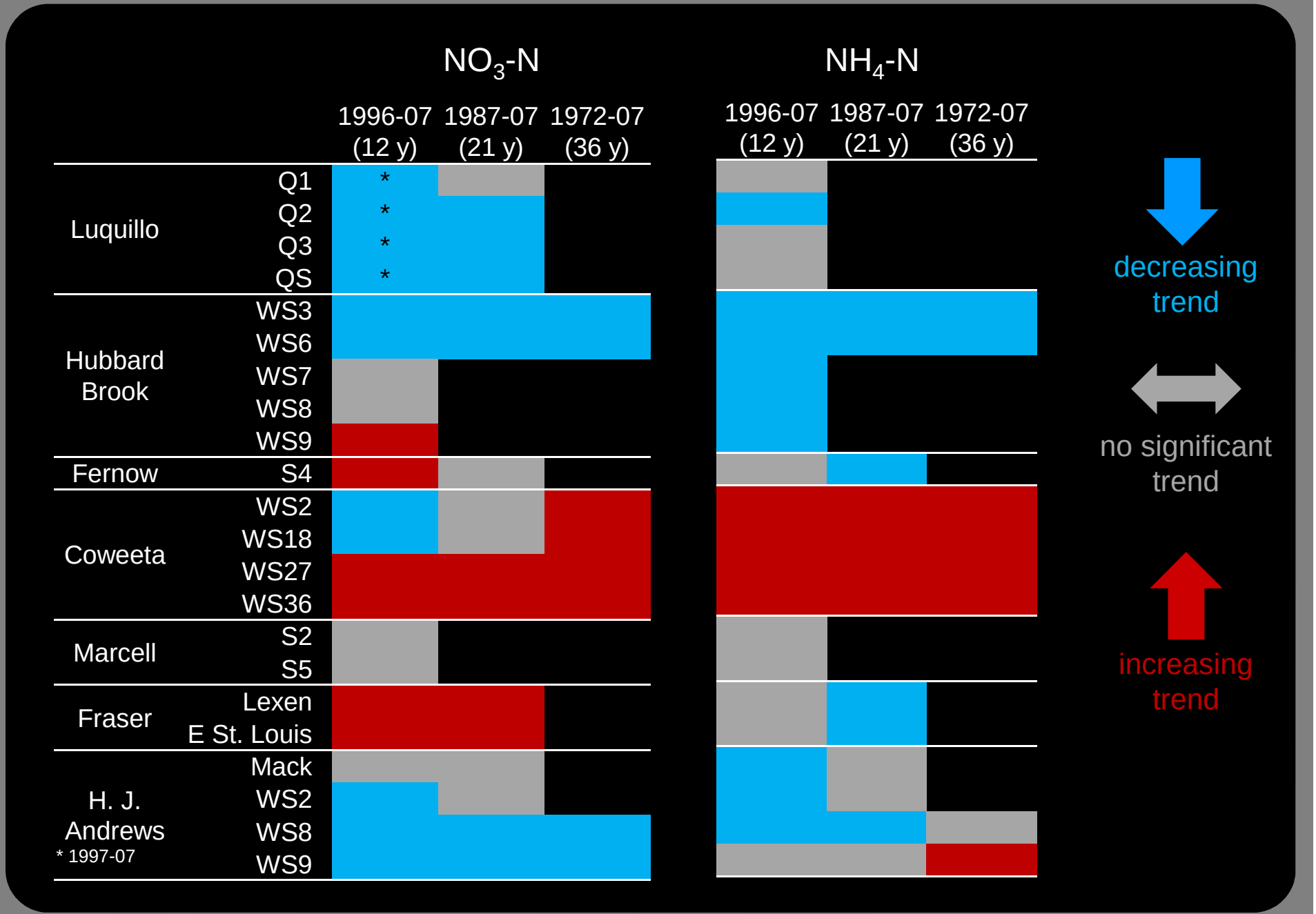

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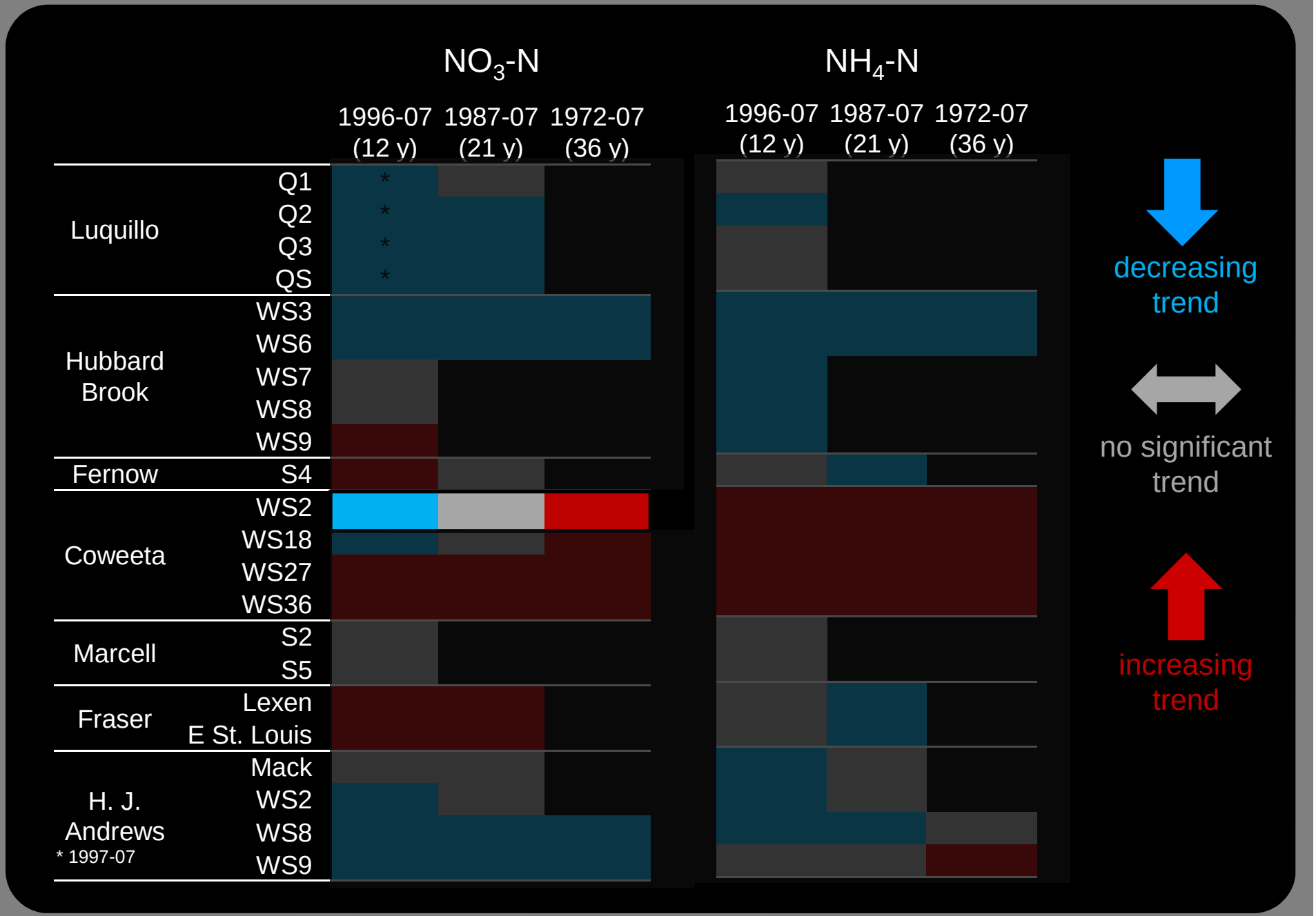

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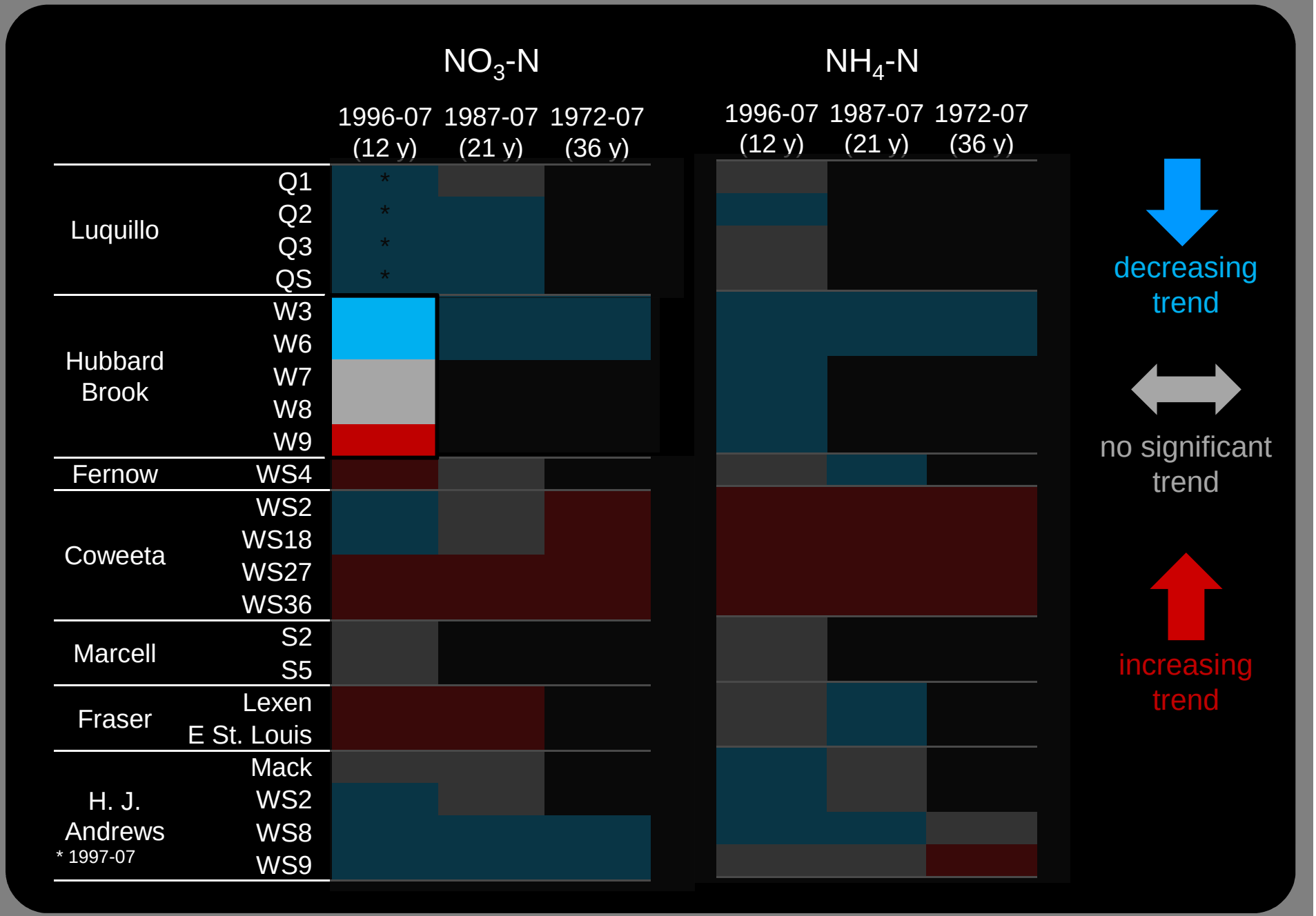

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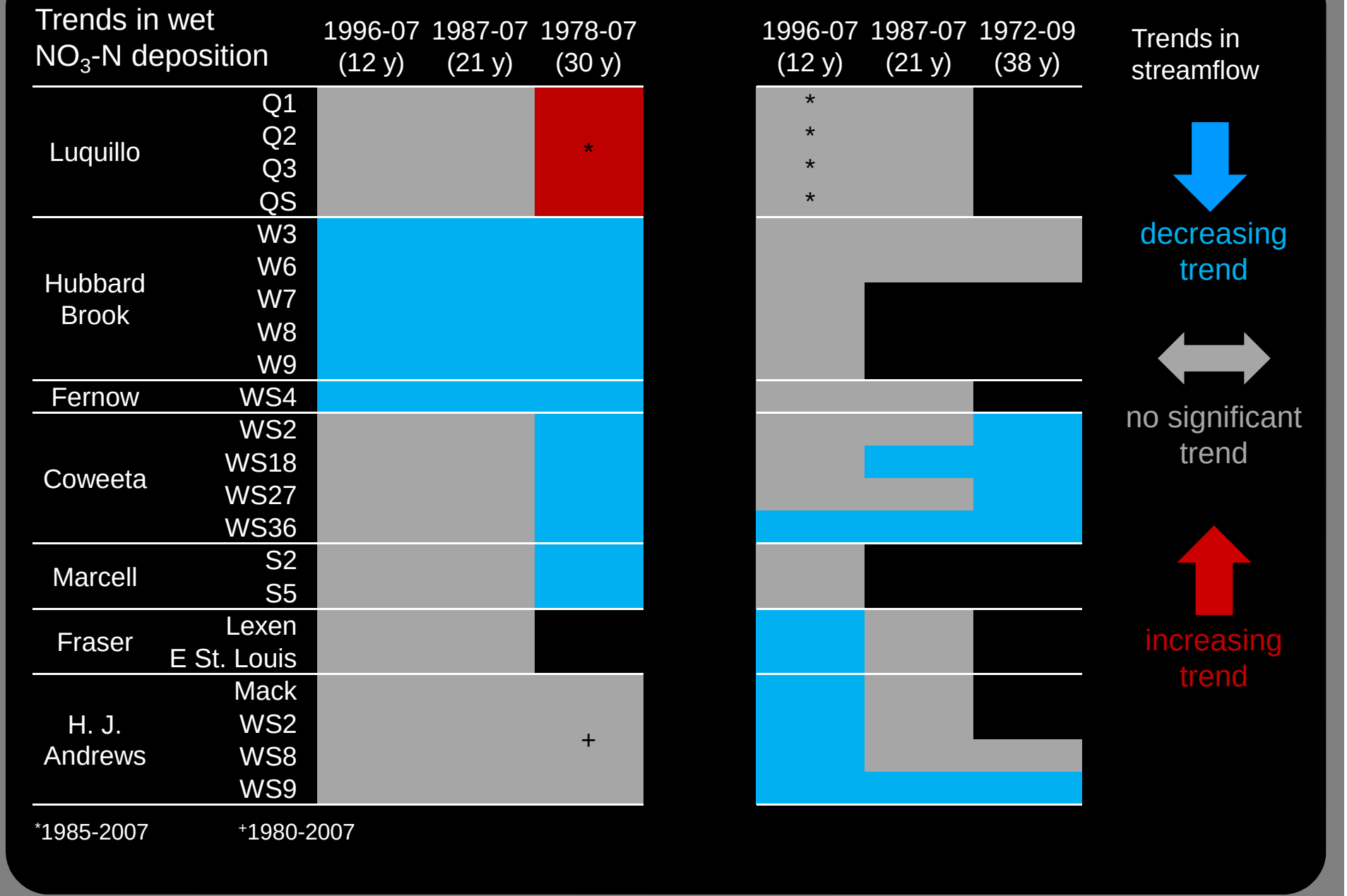


Trends in N concentrations in reference catchments across US

Is there more variation among sites than among basins within a site?

Yes, except at HJA. Stream nitrate and ammonium in reference catchments show great temporal and spatial variabilities that must be considered when evaluating loads and establishing nutrient criteria.

Are there generalized long term trends in stream NO_3 and NH_4?

No, forested reference catchments across the country show both increasing and decreasing trends in stream nitrogen.

Catchments within a site do not necessarily present the same trends.

The length of record examined can result in differing trends which highlights the importance of long-term studies.

Are trends associated with changing deposition or discharge?

Stream nitrate and ammonium increase when streamflow decreases.
Stream ammonium increases when atmospheric ammonium wet deposition increases.

Stream Chemistry Synthesis Project

Objectives:

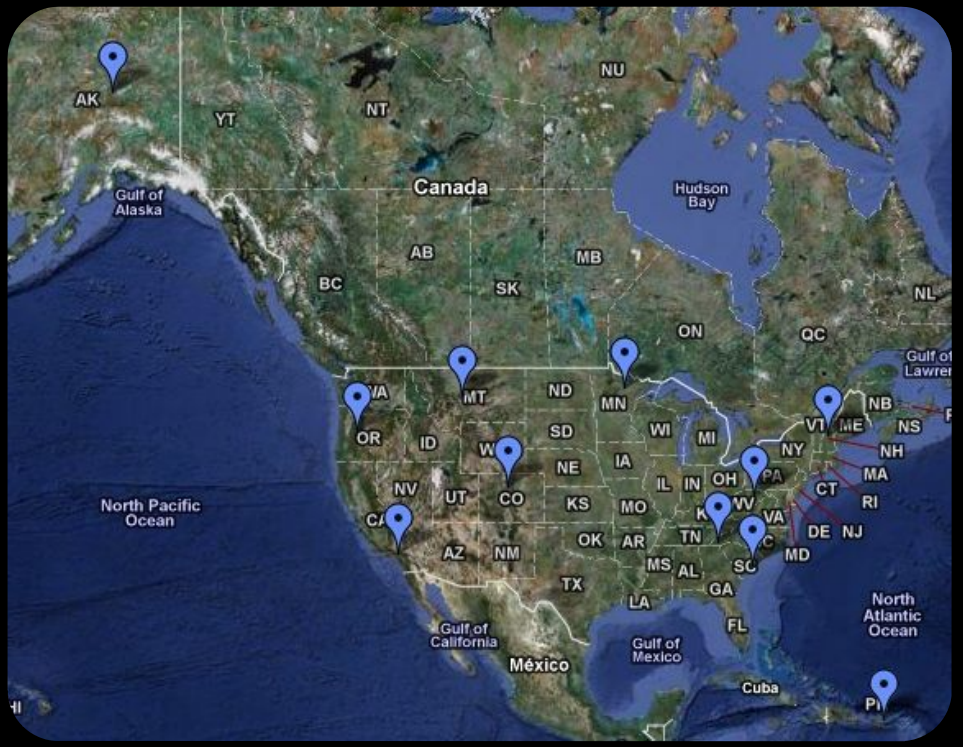
1. Comparison of long term data across sites. Synthesis papers.
2. Create a database for stream chemistry data (with standardized units, and documented analytical and sampling methods)

http://web.fsl.orst.edu/streamchem/

11 participant sites (and looking for more)!

Thursday 8-9:30 am
H3: Information systems for accessing and assessing data

"StreamChemDB: development of a web-accessible database of stream chemistry"- Effie Greathouse



Questions?