



Predictions in ungauged basins

Comparative assessment of floods and low flow studies



EGU Leonardo 2012 – Population dynamics, Policy making and Power generation

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Viglione, A., Sivapalan, M., Blöschl, G.**



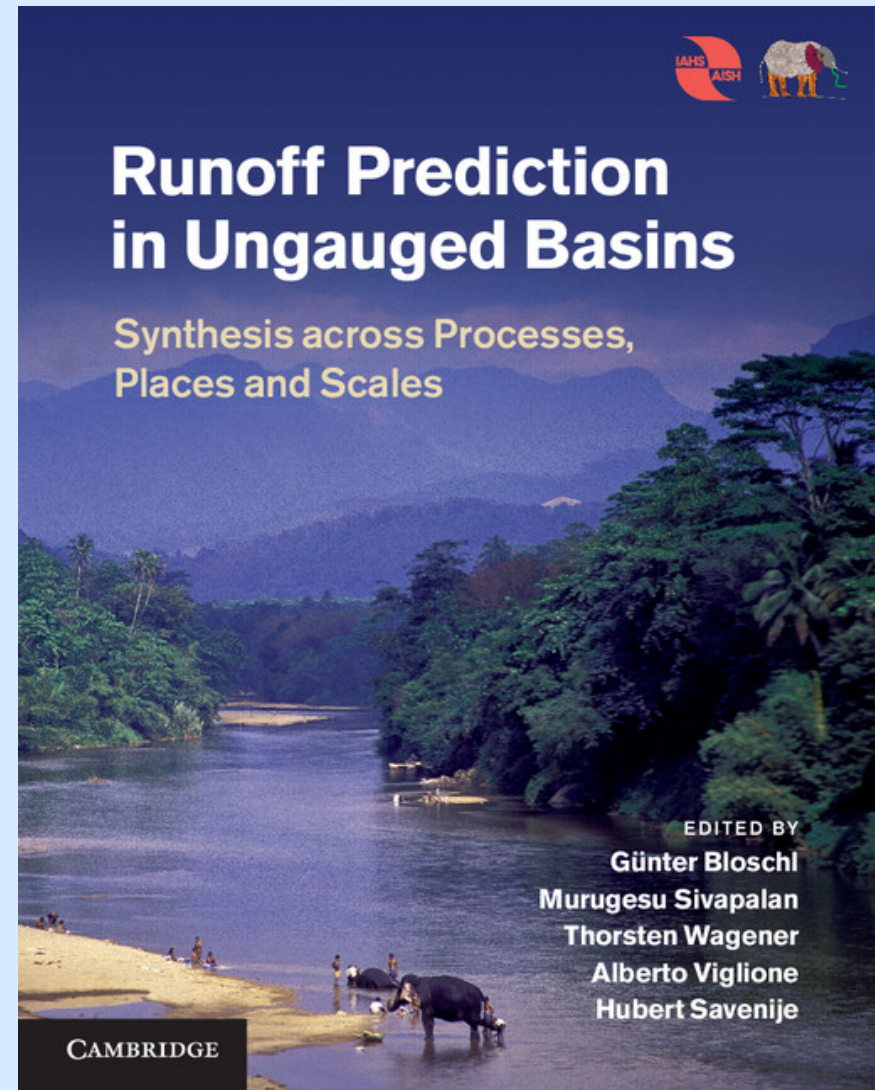


A little bit of history...

- **PUB** decade 2003-2012 as a IAHS initiative
- Final report → Synthesis across processes, places and scales
- Next decade

Panta rhei

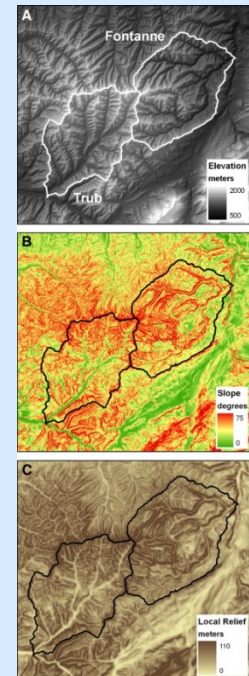
"everything flows"





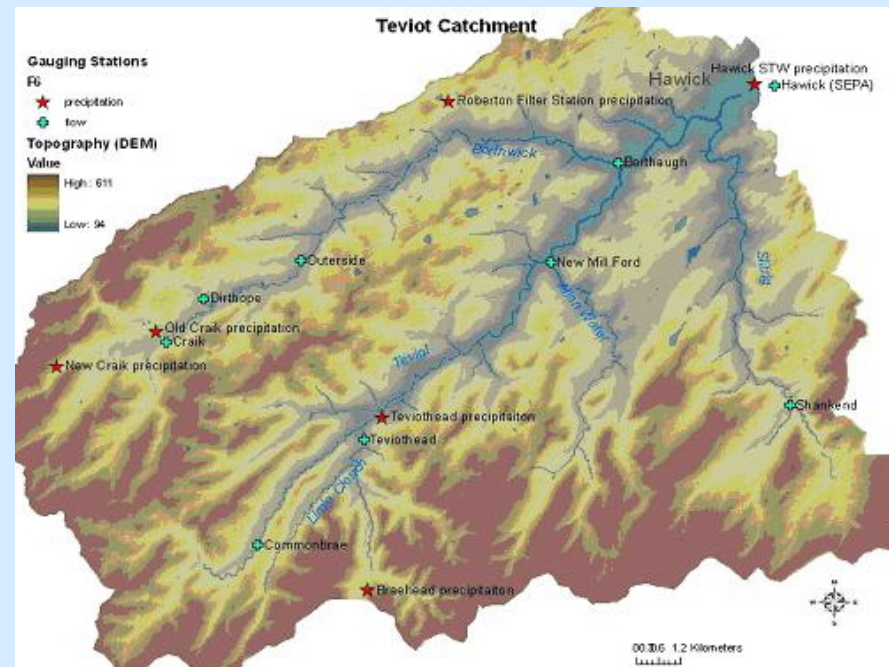
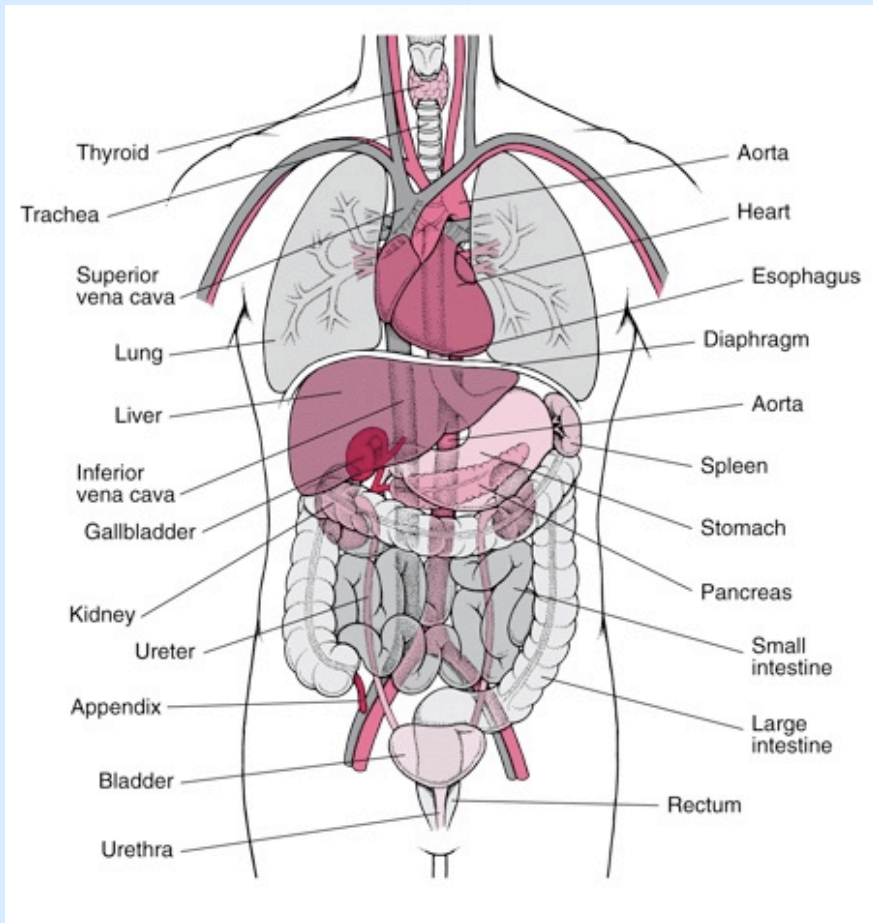
Why and how to predict?

- Need to predict the **future** based on **past observations** (societal relevance, water resources planning, ...)
- What to do in case of absence of past observations (*data*)? → PUB
- Assessment of the PUB methods via
 - comparative hydrology



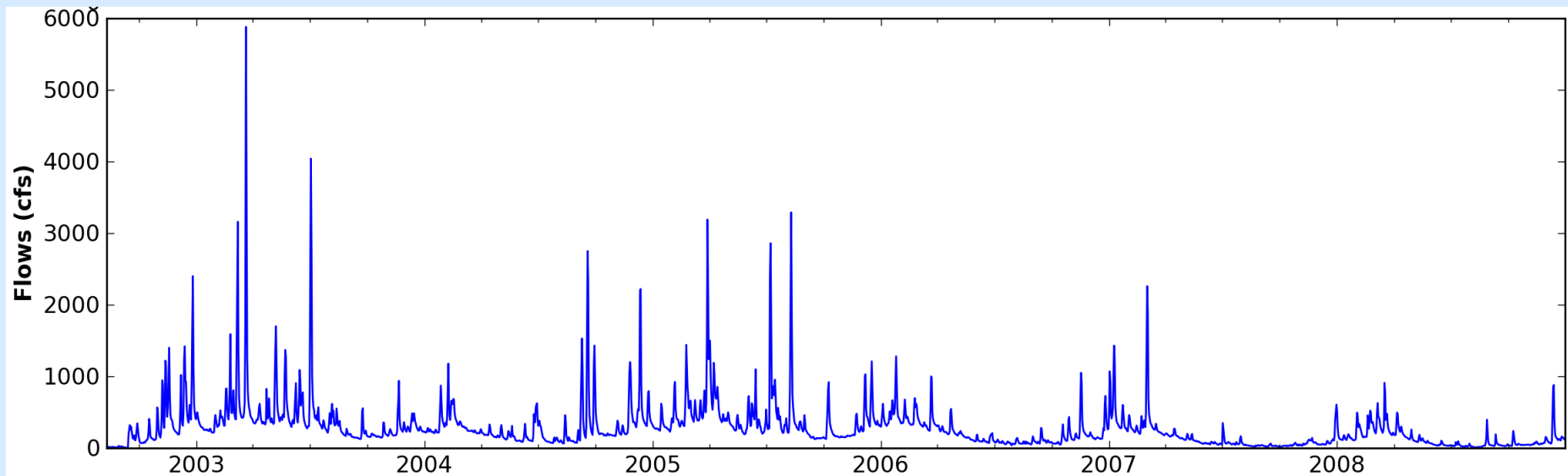


Runoff signatures



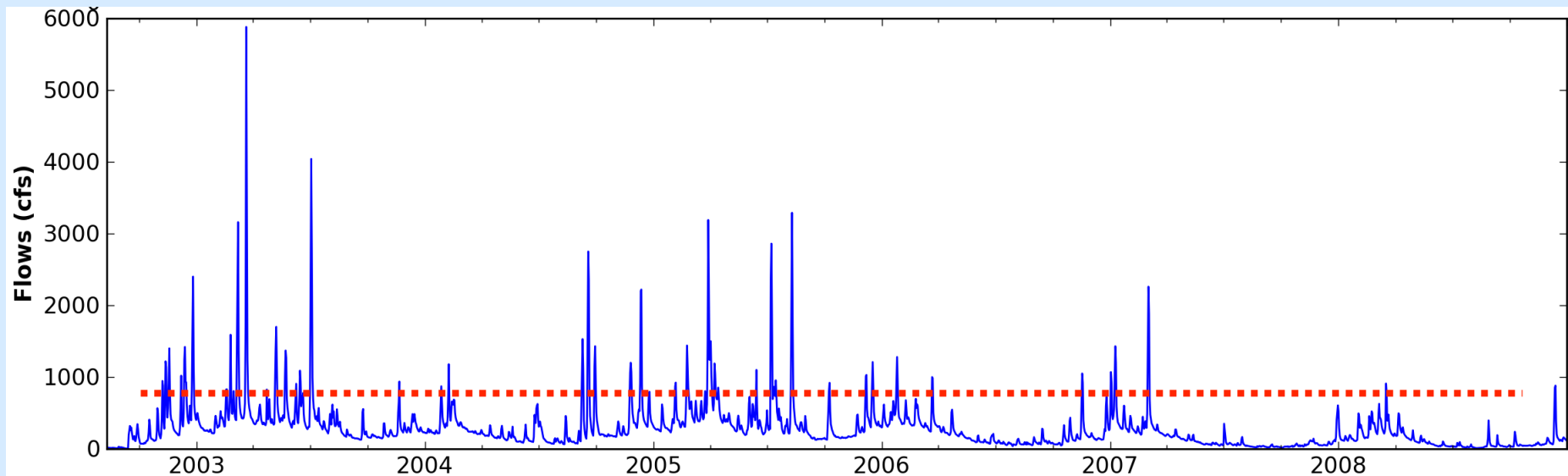


Runoff signatures





Runoff signatures

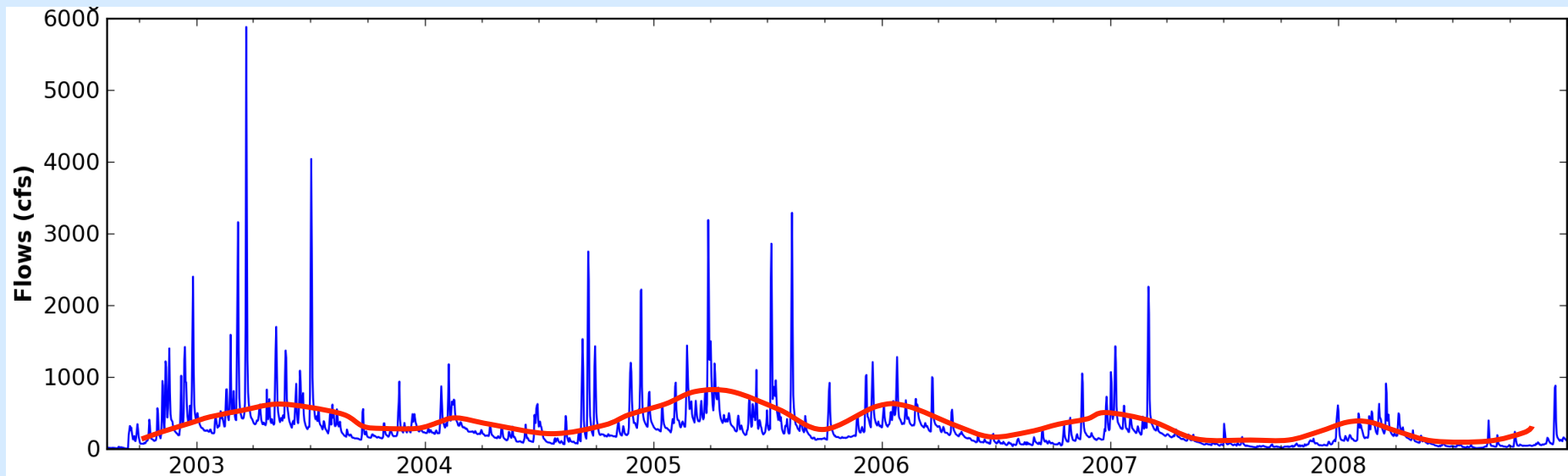


- Mean annual flow





Runoff signatures

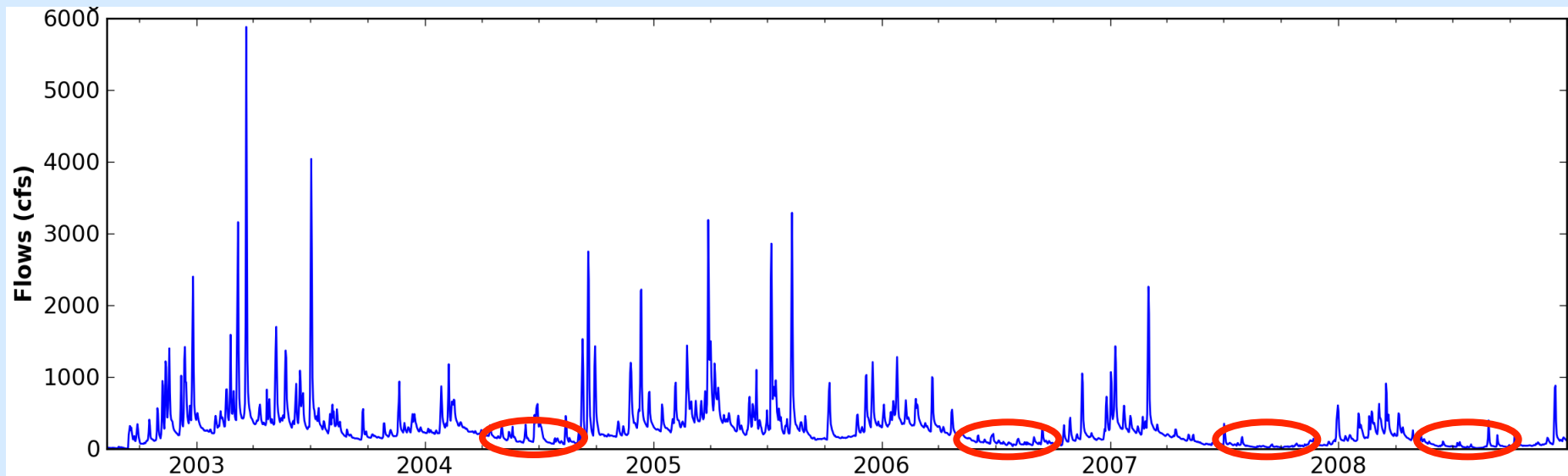


- Mean annual flow
- Seasonal (monthly) flow





Runoff signatures



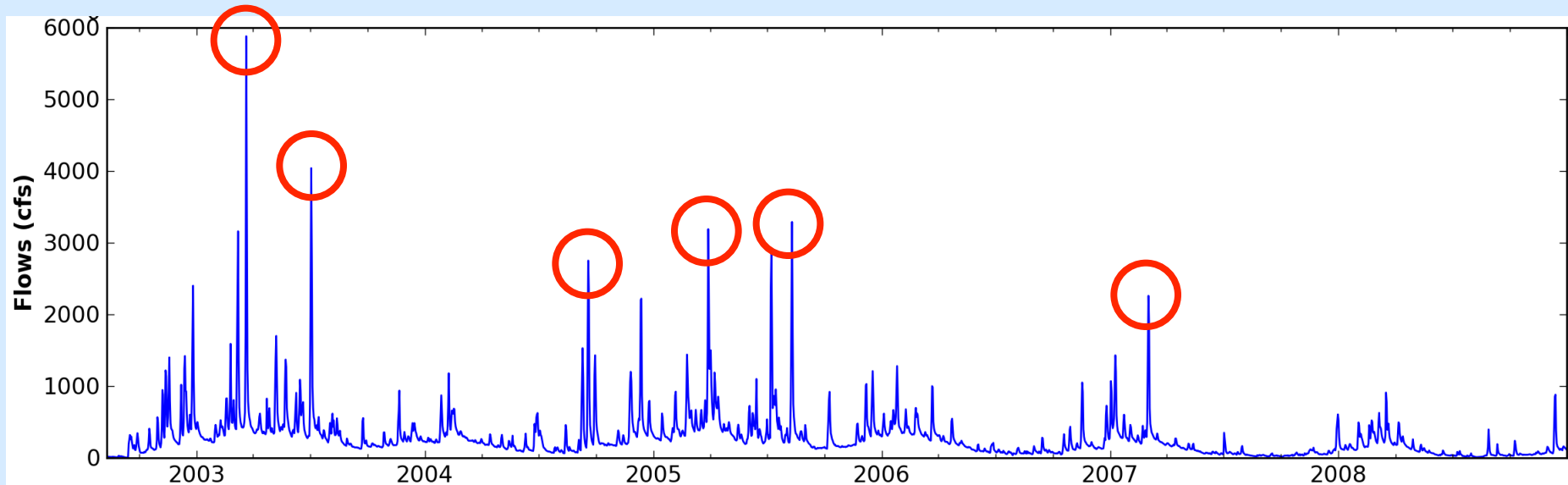
- Mean annual flow
- Seasonal (monthly) flow

- Low flows





Runoff signatures



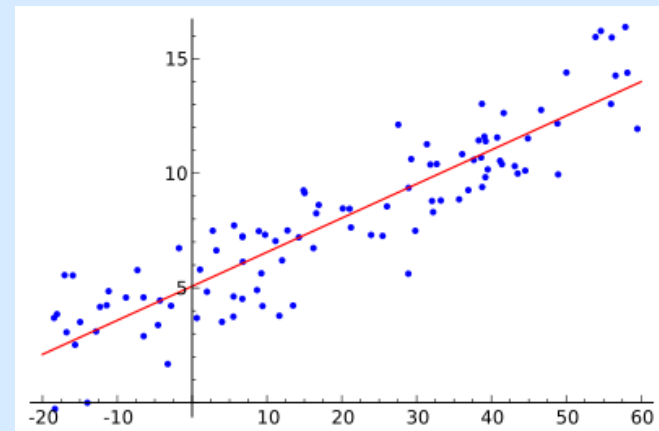
- Mean annual flow
- Seasonal (monthly) flow
- Low flows
- Floods (peak flows)



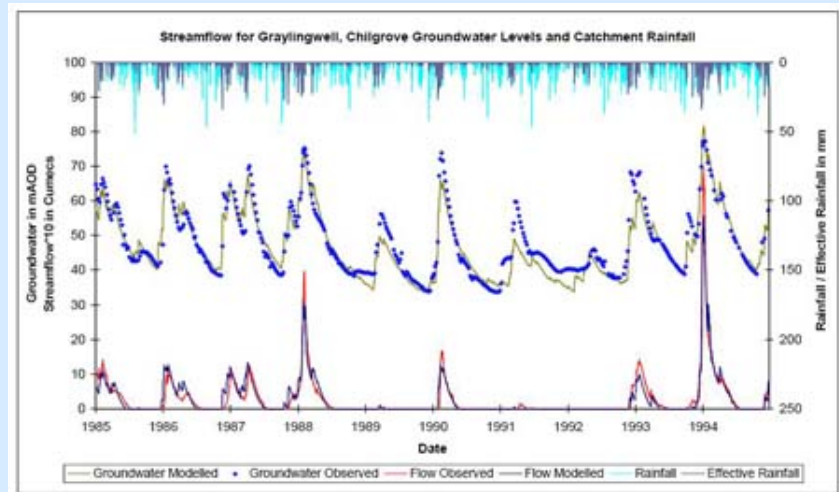


Regionalisation methods

- **Statistical** methods (runoff!)
 - Regression methods
 - Index (grouping) methods
 - Geostatistical methods

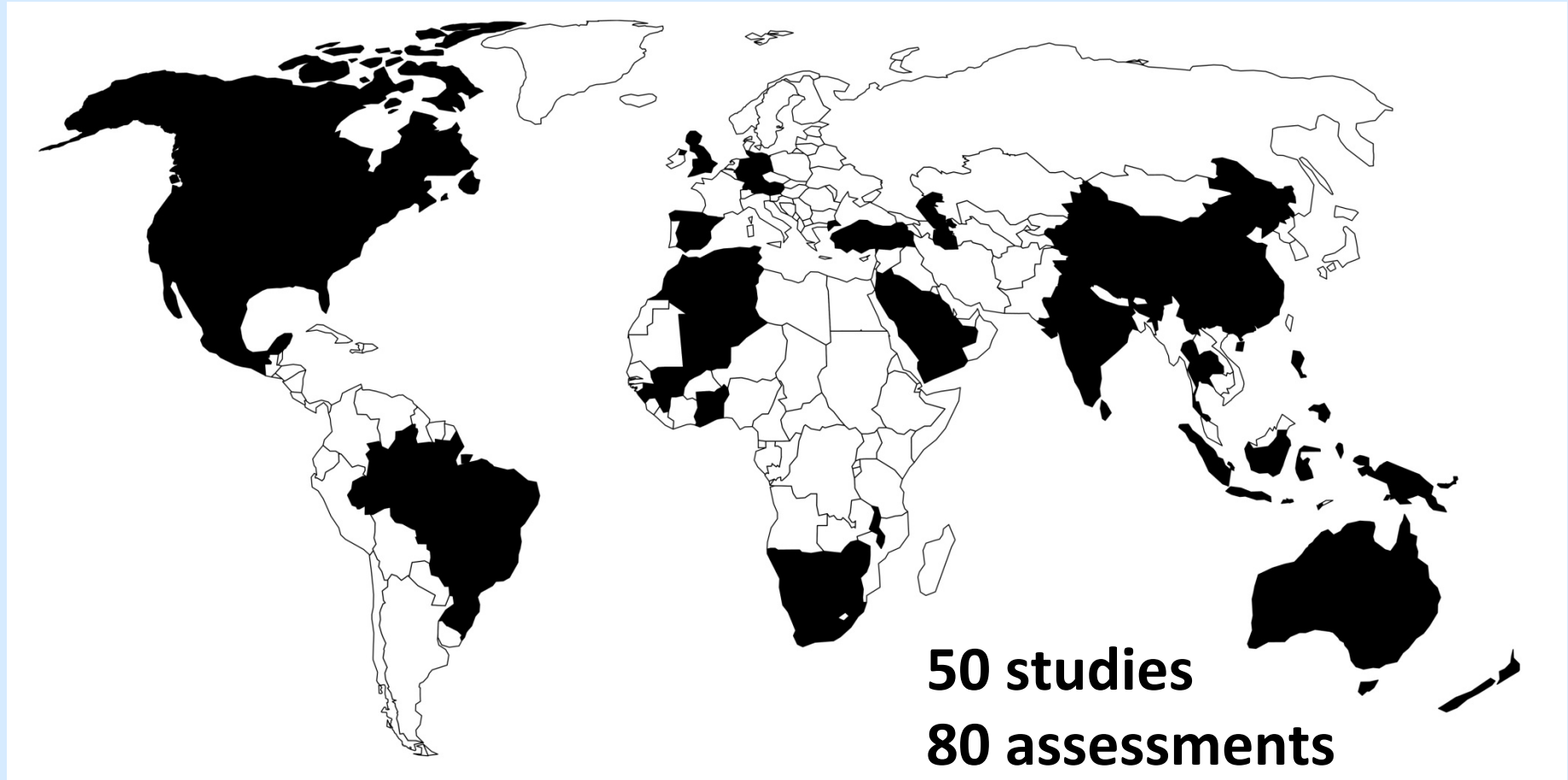


- **Process based** methods (rainfall!)
 - Regression methods
 - Index (grouping) methods
 - Geostatistical methods



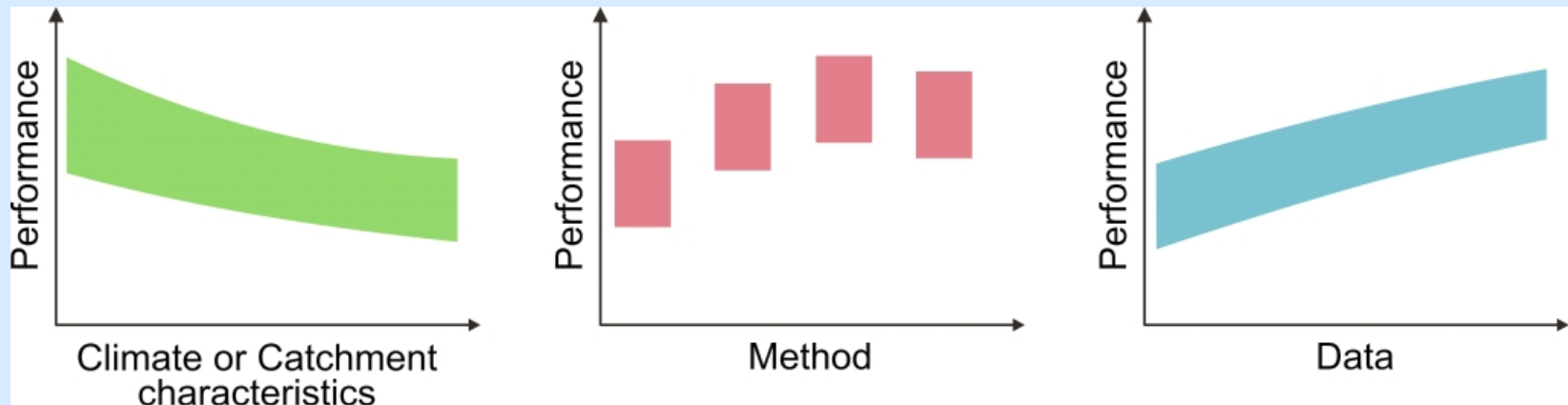


Level 1 – Comparative assessment





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- How good are the runoff predictions in different **climates**?
- Which **regionalisation method** performs best?
- How does **data** availability impact performance?

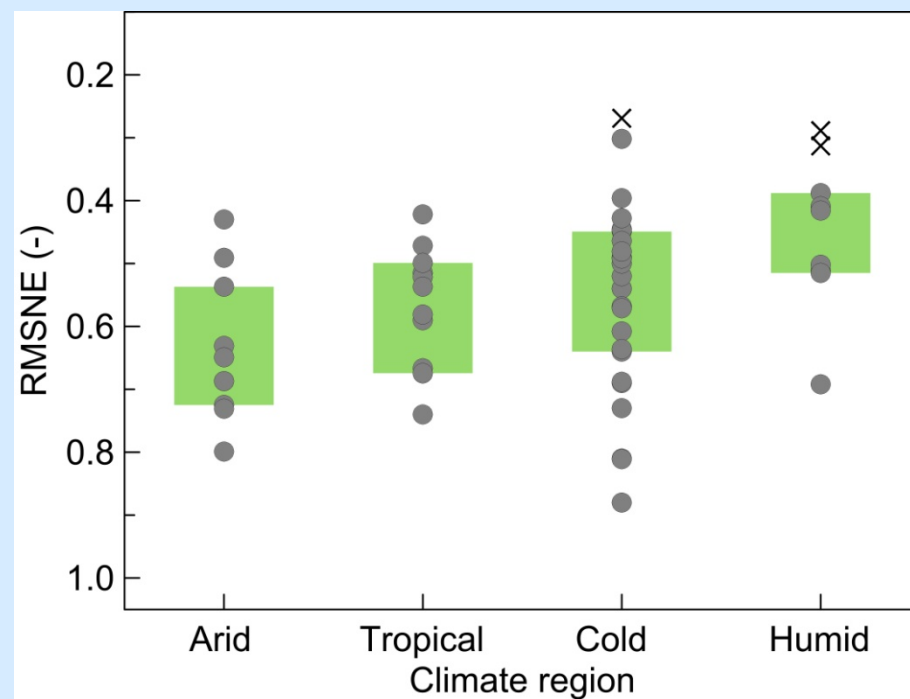
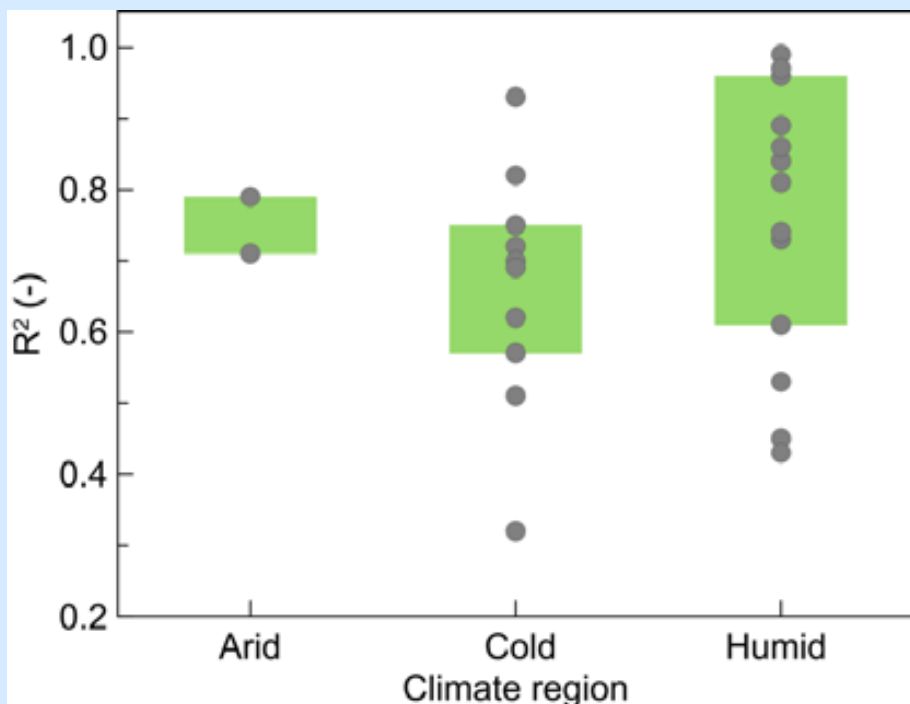




Level 1 – Comparative assessment (climate)

Low Flows ($Q_{95\%}$)

Floods (Q_{T100})

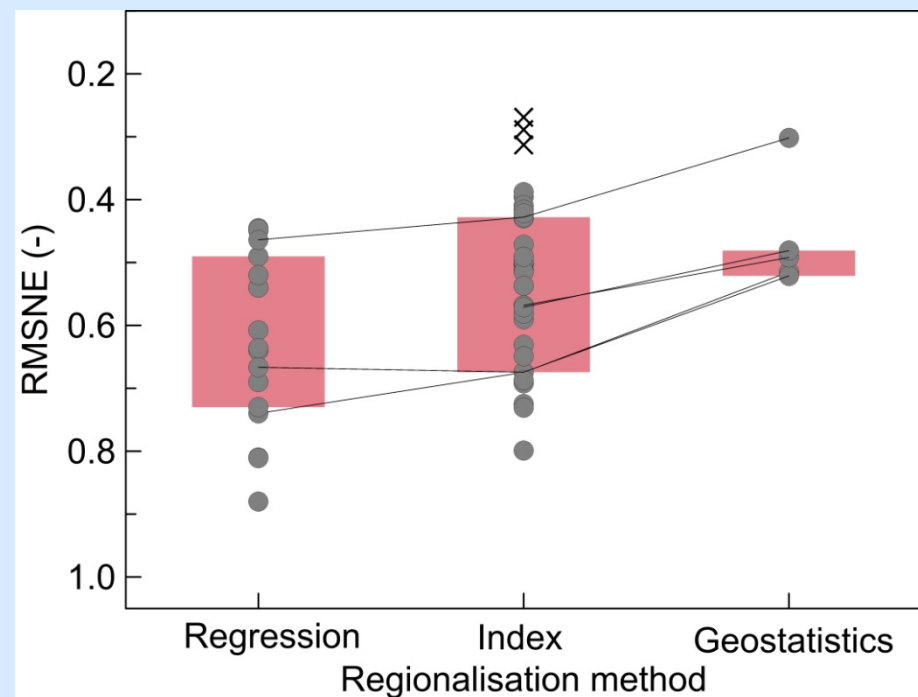
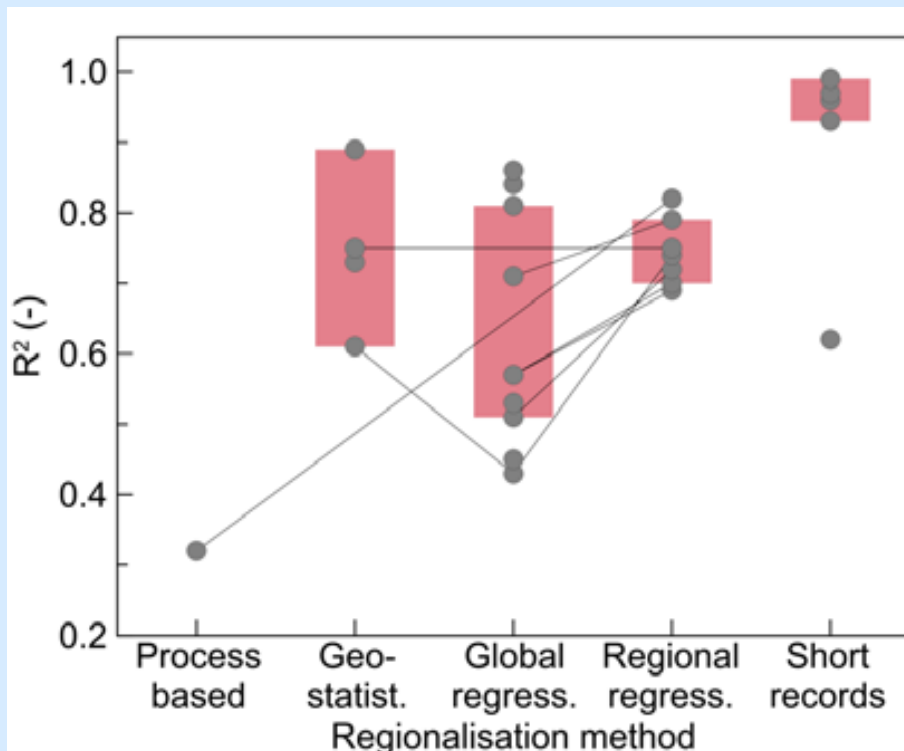




Level 1 – Comparative assessment (method)

Low Flows ($Q_{95\%}$)

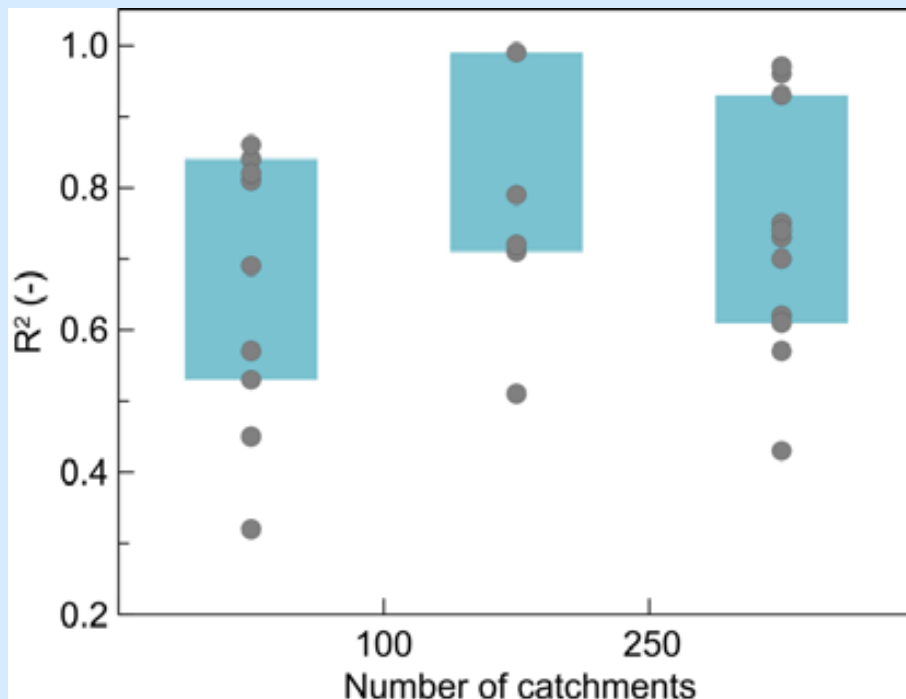
Floods (Q_{T100})



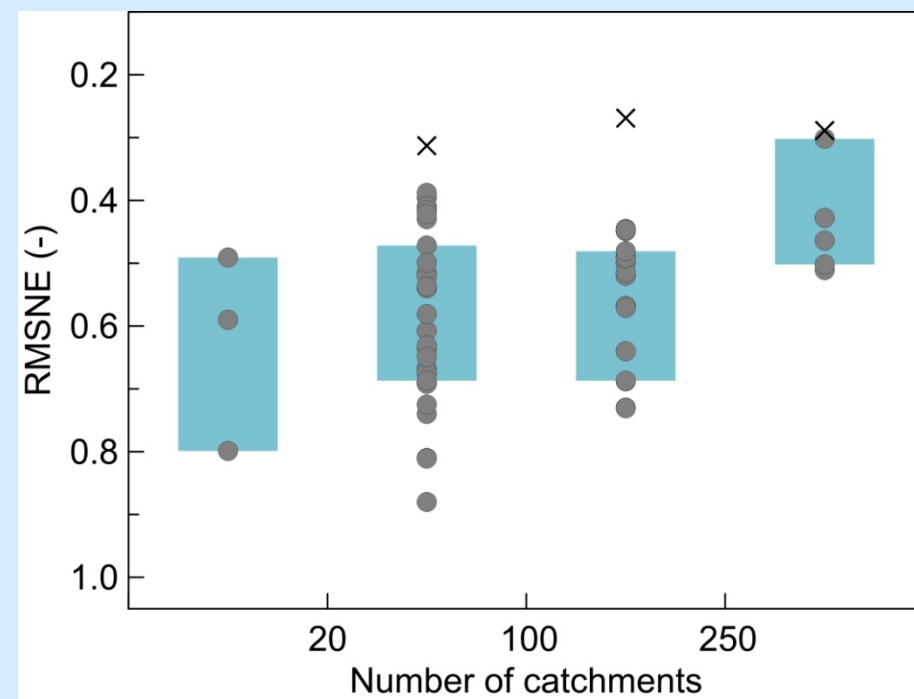


Level 1 – Comparative assessment (data)

Low Flows ($Q_{95\%}$)



Floods (Q_{T100})



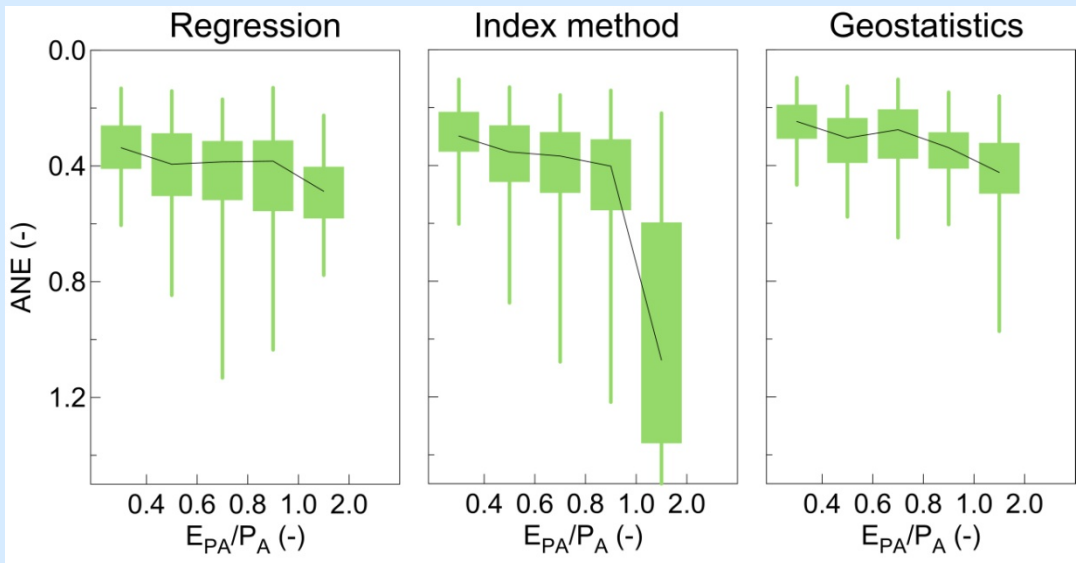


Level 2 – Comparative assessment

- Detailed data from 13 studies
- Performances from around 4000 catchments

To what extent does runoff prediction performance depend on climate and catchment characteristics?

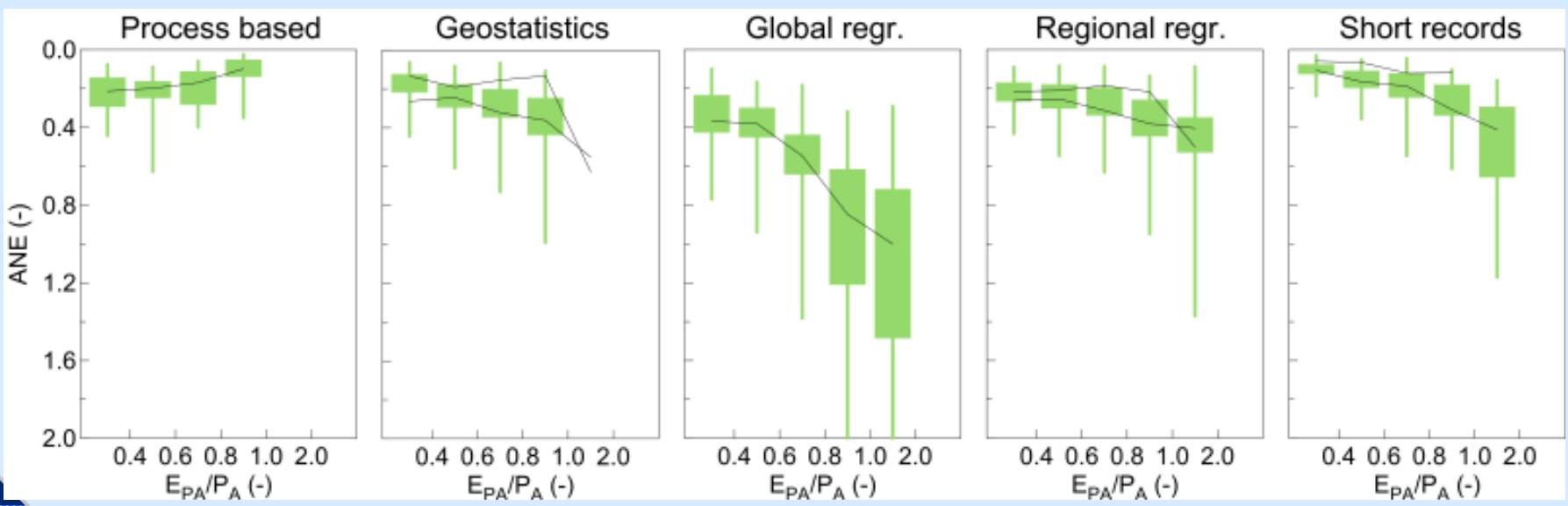


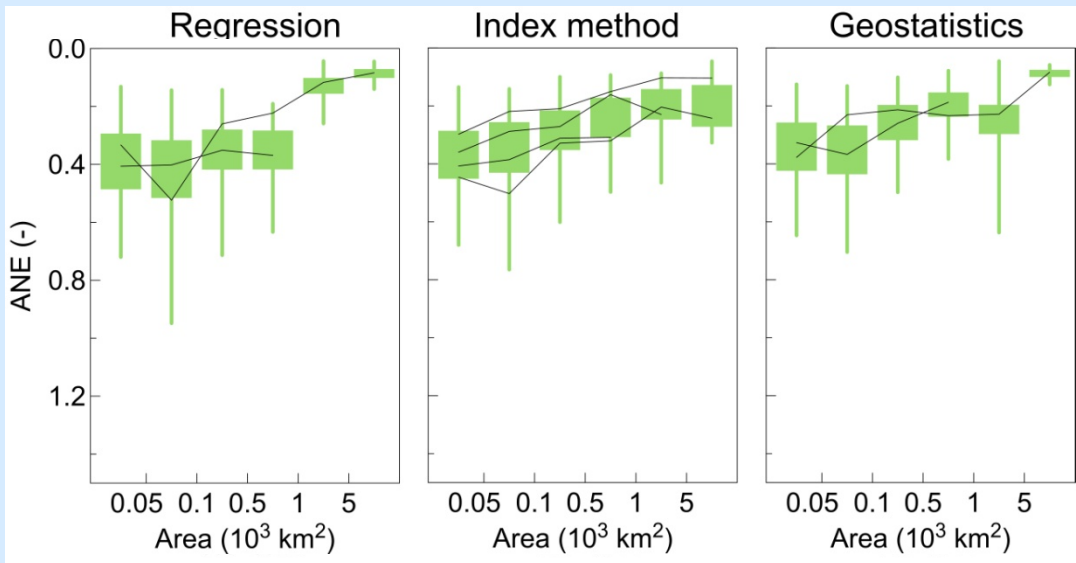


Floods (Q_{T100})

Aridity Index

Low Flows ($Q_{95\%}$)

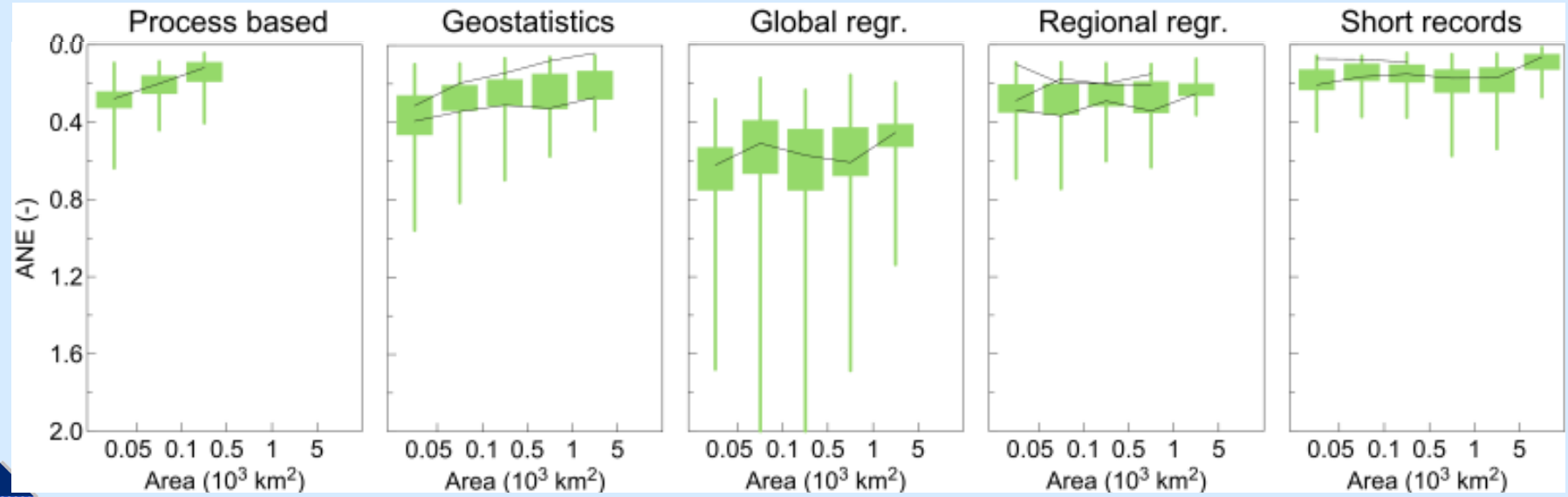




Floods (Q_{T100})

Catchment size

Low Flows ($Q_{95\%}$)





Conclusions

- Predictive performance gets **worse** with **increasing aridity**
- Predictive performance gets **better** with **increasing catchment size**
- **Knowledge accumulation** – publish information on goodness of our methods that other people can use (discuss where, when, why the methods perform best or worst)





Thank you for
your attention!

