

Temporal variability of annual suspended sediment yield estimates and their uncertainties

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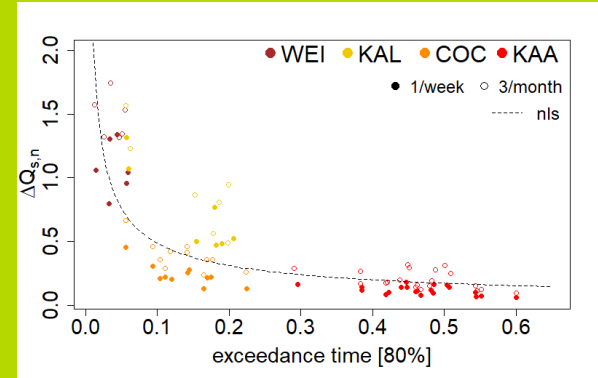
MOTIVATION

APPROACH

RESULTS



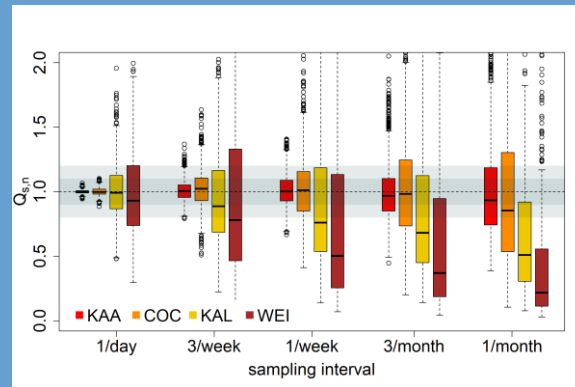
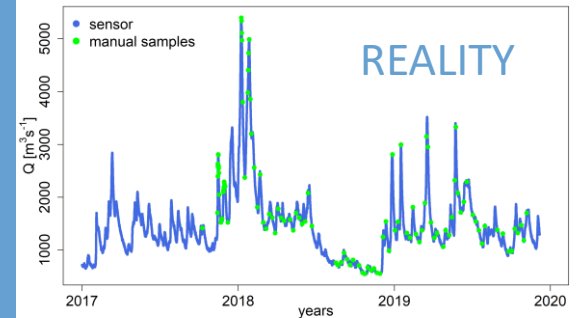
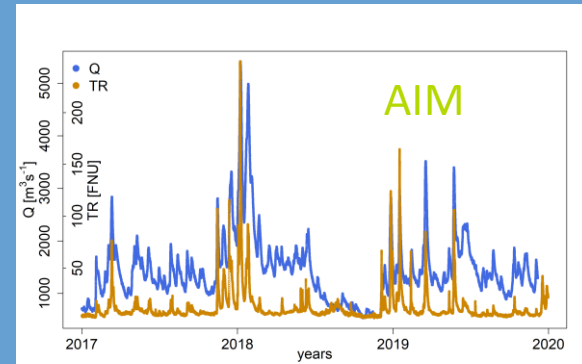
- Impact of sampling interval on annual loads based on bootstrap-resampling
- Quantification of variability based on exceedance time



- Negative exponential relationship between uncertainties in annual loads and temporal variability of sediment transport

IMPLICATION

- Assessment of uncertainties based on exceedance time



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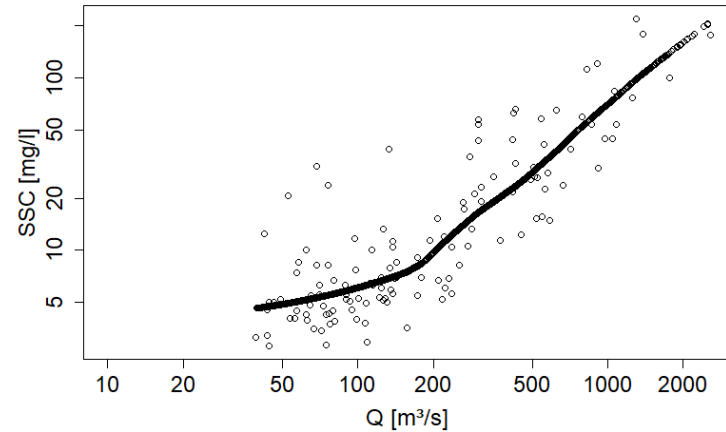
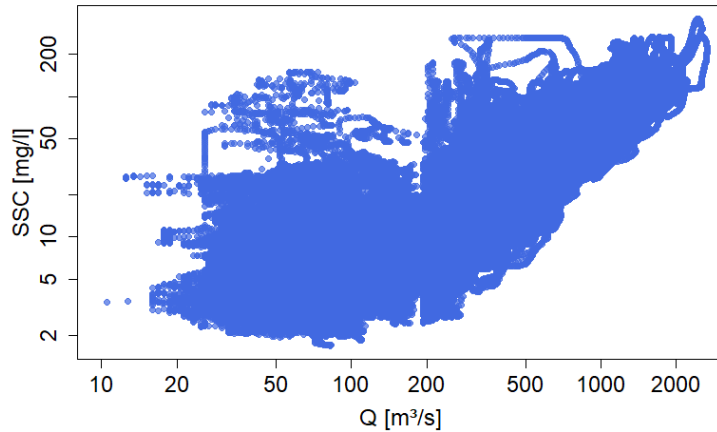
DATASET

Station	River	catchment size [km ²]	MQ [m ³ s ⁻¹]	N	E	time period of sensor data	# of sensor measurements	missing values [%]	calibration period	# of calibration samples
KA	Rhine	109 806	1 700	50.35	7.60	2000 – 2020	701 280	5.32	2011 – 2020	688
COC	Moselle	27 088	315	50.16	7.17	2010 – 2020	385 728	0.61	2009 – 2019	763
KAL	Ilz	765	16.1	48.69	13.45	2011 – 2018	237 191	14.12	2010 – 2019	515
WEI	Ammer	608	15.3	47.85	11.13	2013 – 2018	208 590	10.10	2012 – 2019	352

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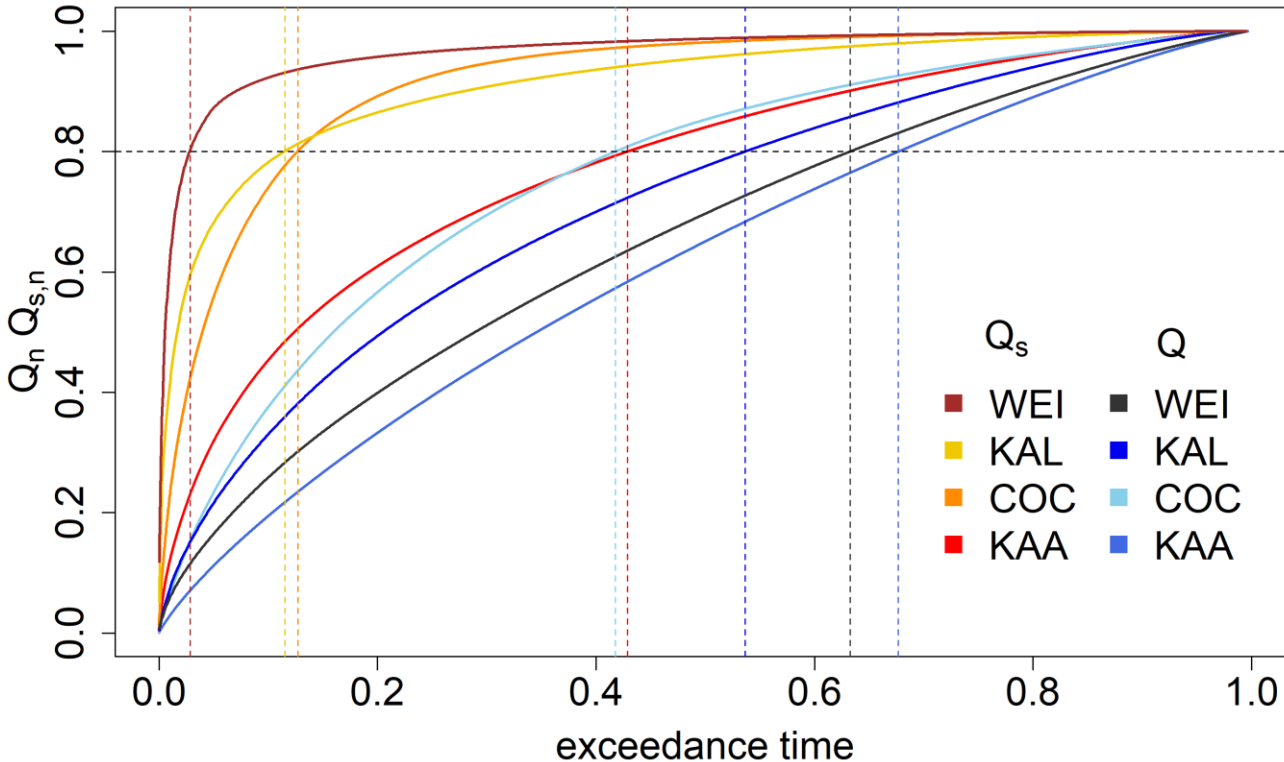


- Data availability for station COC
- On the left: SSC and Q from sensor for time series (2009 – 2019)
- On the right: SSC and Q from sensor (synthetic time series) with 3 samples per month and lowess-regression

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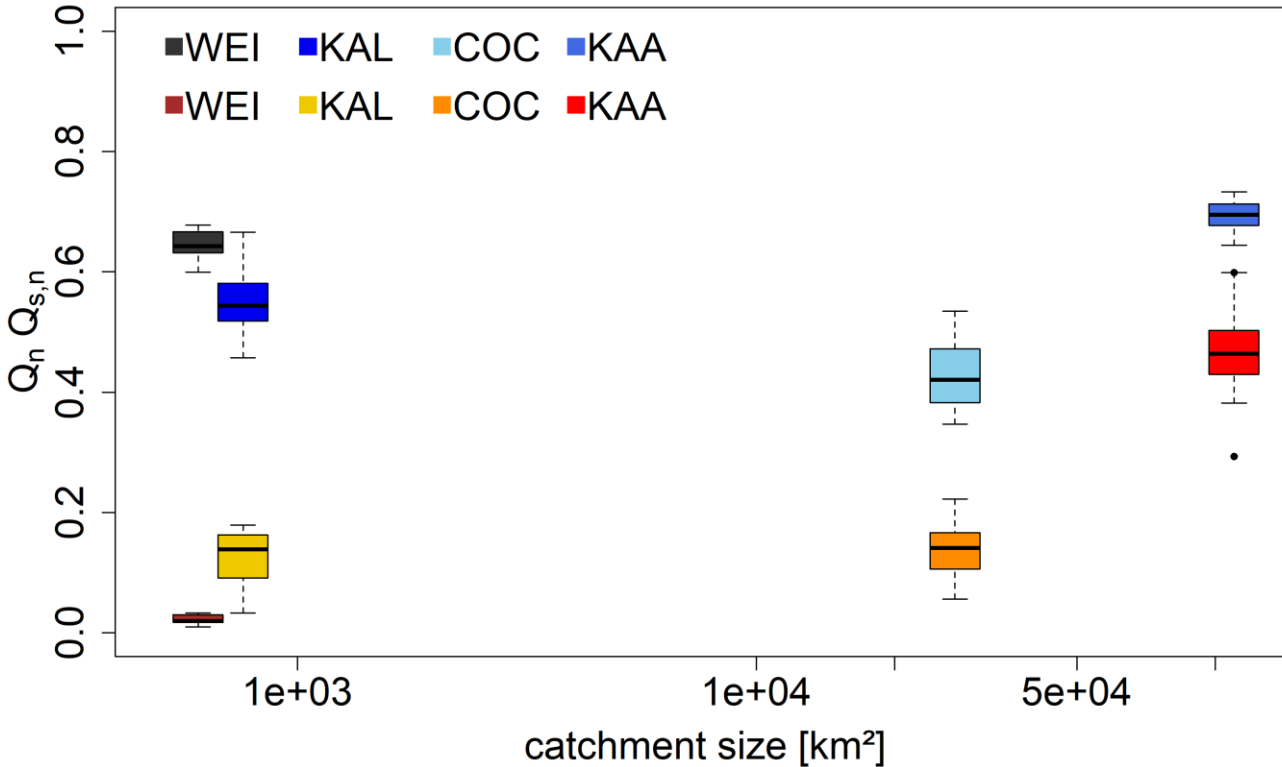


- Exceedance time of discharge (Q) and sediment load (Q_s) for time series of stations WEI, KAL, COC, and KAA
- Exceedance time indicates time necessary to reach 80% of discharge or sediment load
- The lower the exceedance time, the steeper the curve – indicating responsiveness of the river (i.e. flushy vs steady) and its variability

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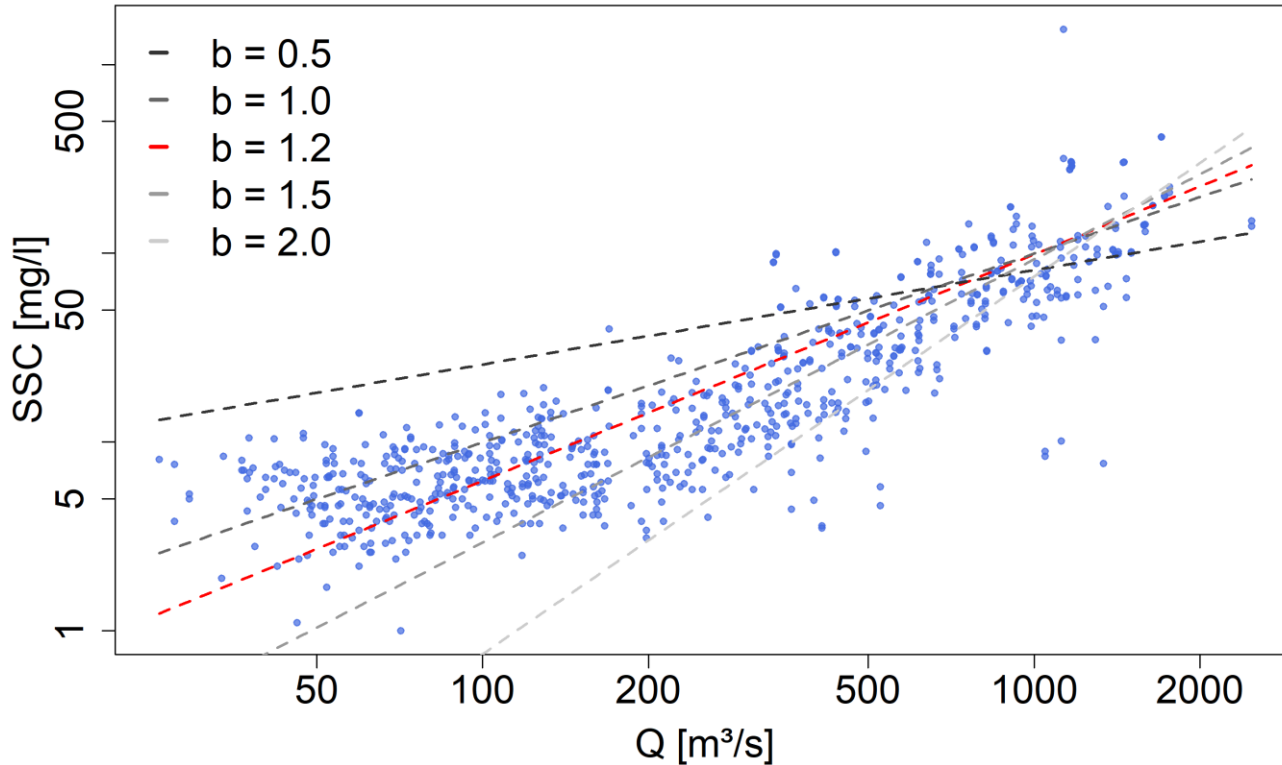


- Relationship of exceedance time and catchment size
- Sediment transport exceedance time increases with catchment size
- Discharge exceedance time does not indicate relationship
- Height of boxes indicates variability of exceedance time over time series

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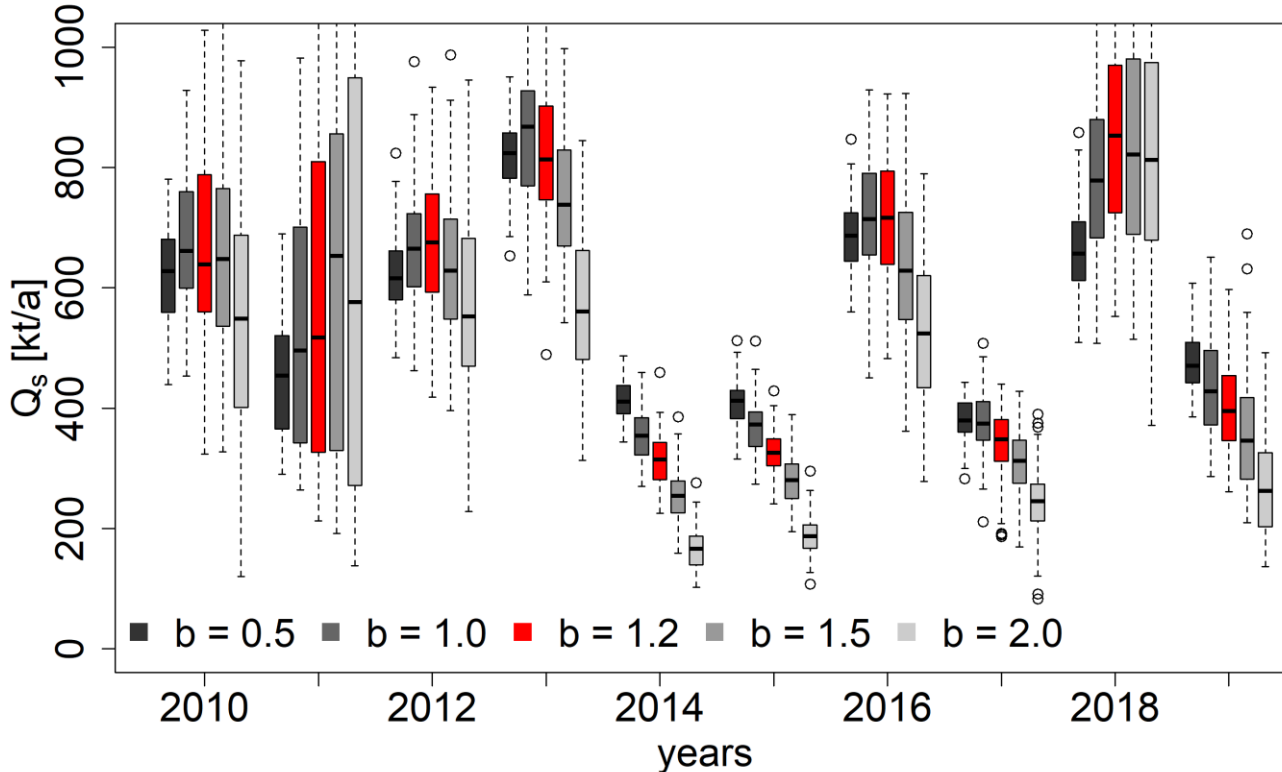


- Annual load estimates with
$$SSC = a Q^b + \varepsilon$$
$$Q_s = SSC * Q$$
- Impact of predefined rating exponent b on regression
- ε as error term, residuals of rating curve – indicates scatter and fit

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- Annual load estimates for station COC
- Based on regression with alternating b exponents
- Years with low sediment transport lead to descending pattern from low b to high b
- Trend not detectable during years with increased sediment transport