

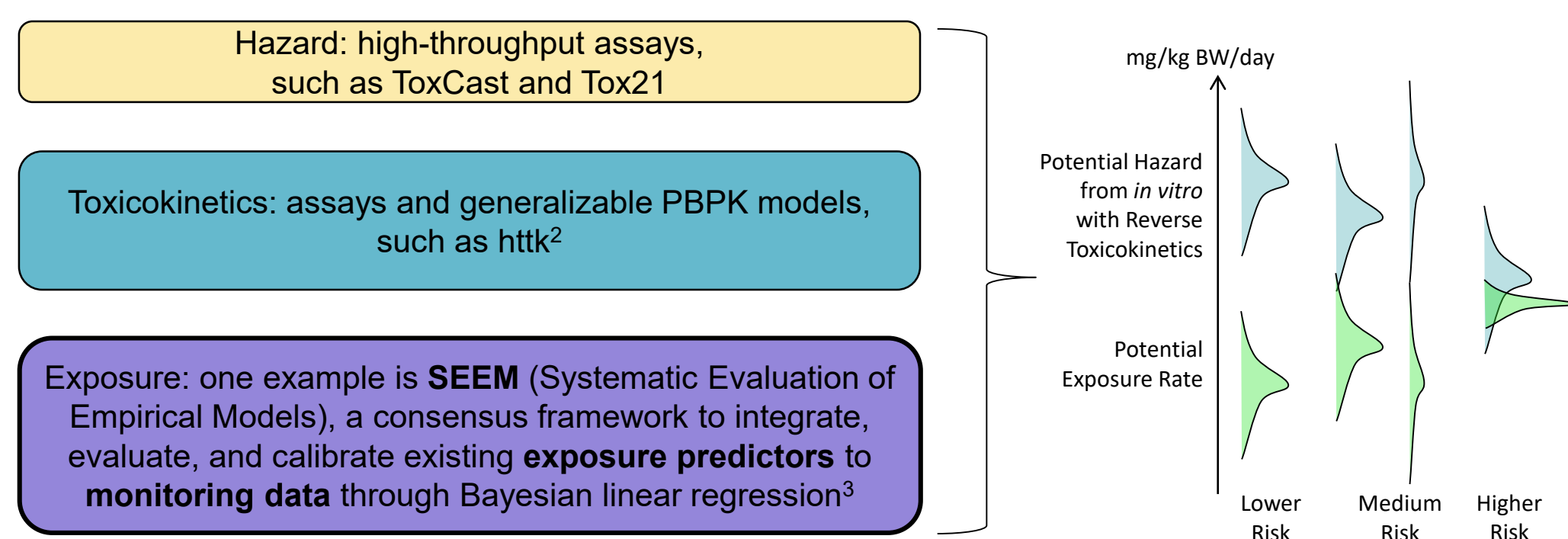
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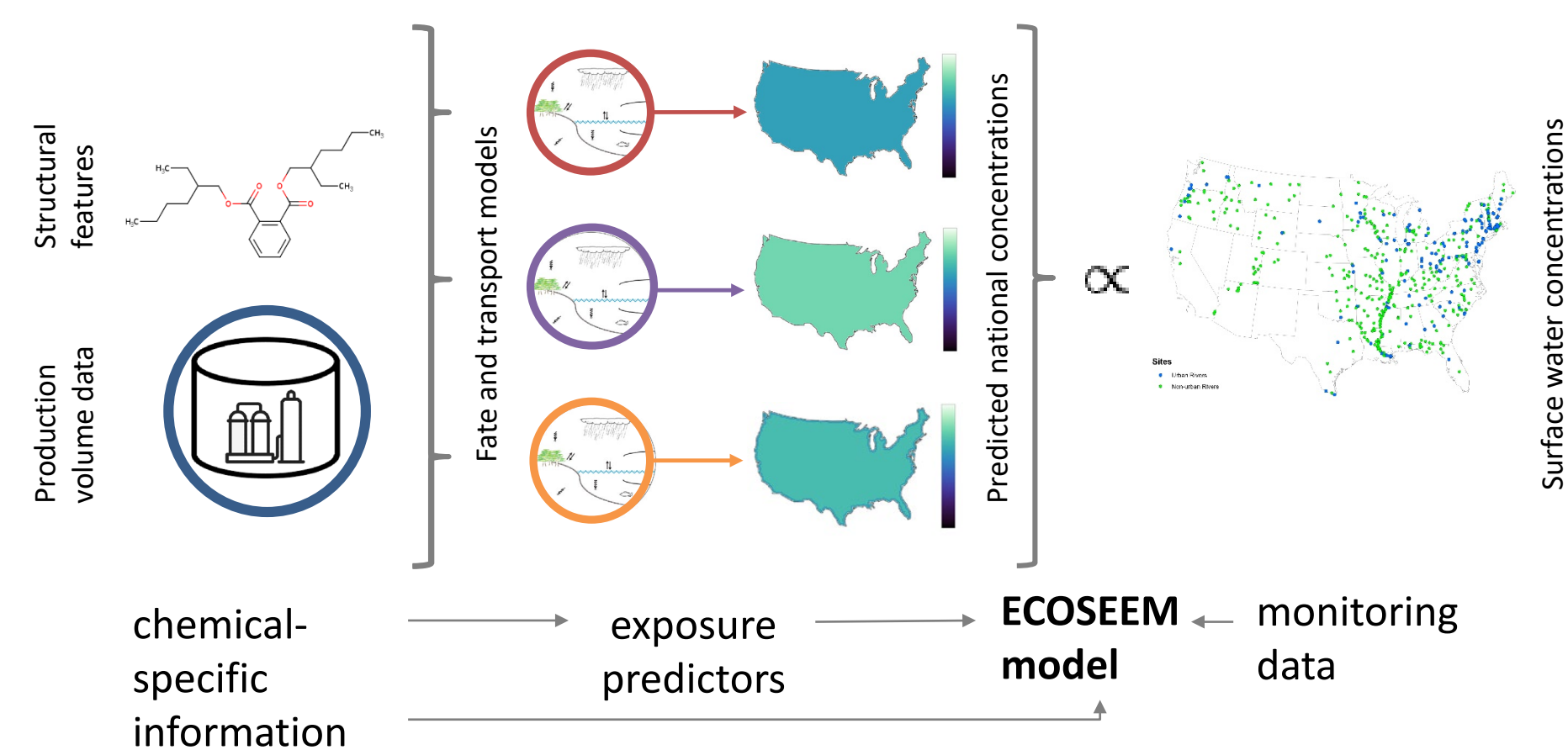
Introduction

USEPA's risk prioritization framework¹ for the thousands of chemicals to which people could possibly be exposed



This version of SEEM, **ECOSEEM**, describes screening-level estimates of average concentrations of organic chemicals (and their likelihoods) in surface water, based on openly-available fate and transport models and chemical data evaluated against monitoring data. Extending that relationship to other chemicals can serve as a possible data stream for chemical prioritization.

Method overview



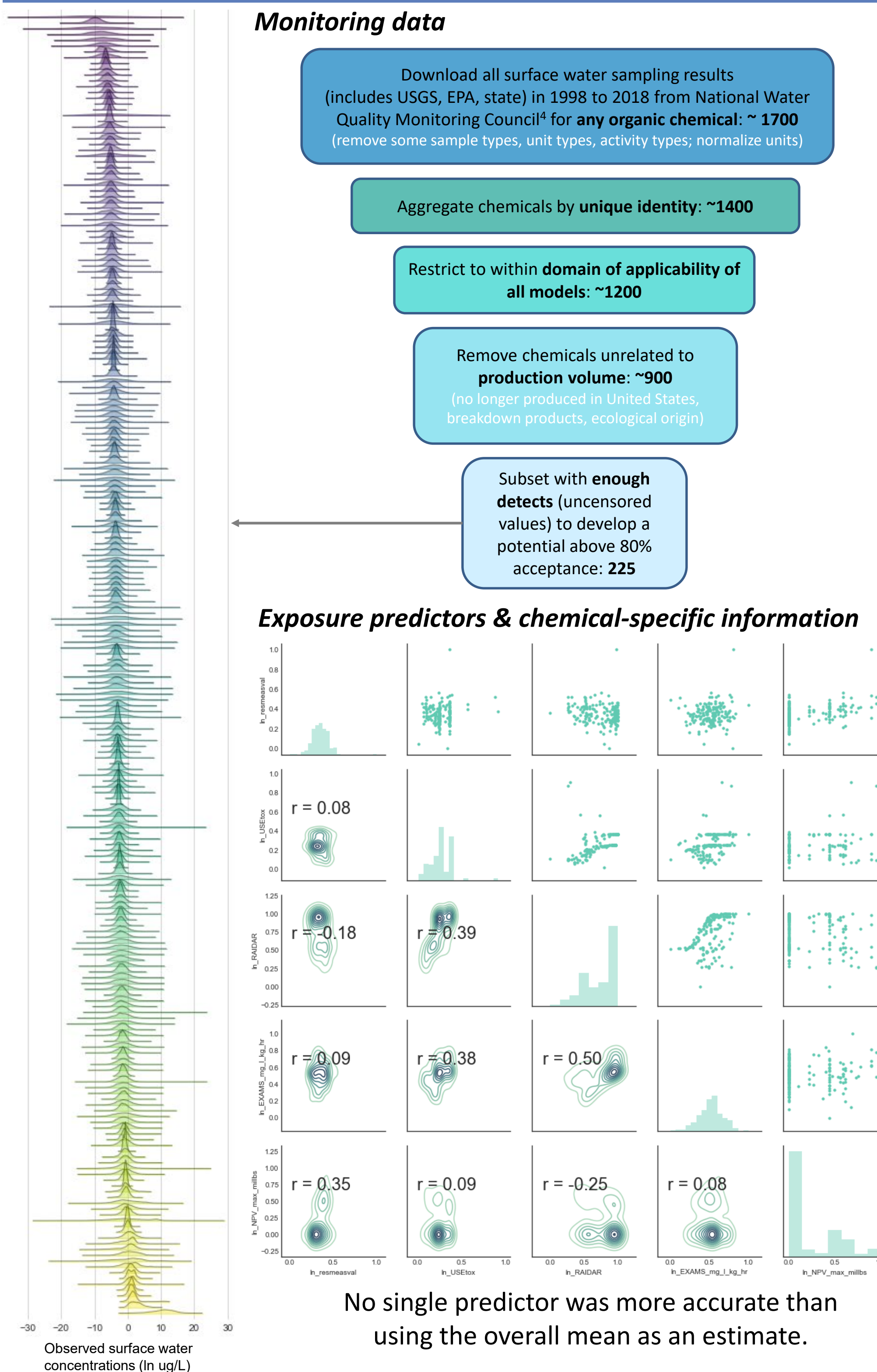
A model may not be equally correlated to the data across chemicals.

$$\text{Posterior} = \frac{\text{Likelihood} * \text{Prior}}{\text{Normalization}}$$

Representation of Bayes theorem.

Prior: domain knowledge represented by the fate and transport model or other exposure predictor
Posterior: credible interval of model parameters based on the relationship between monitoring data and the prior

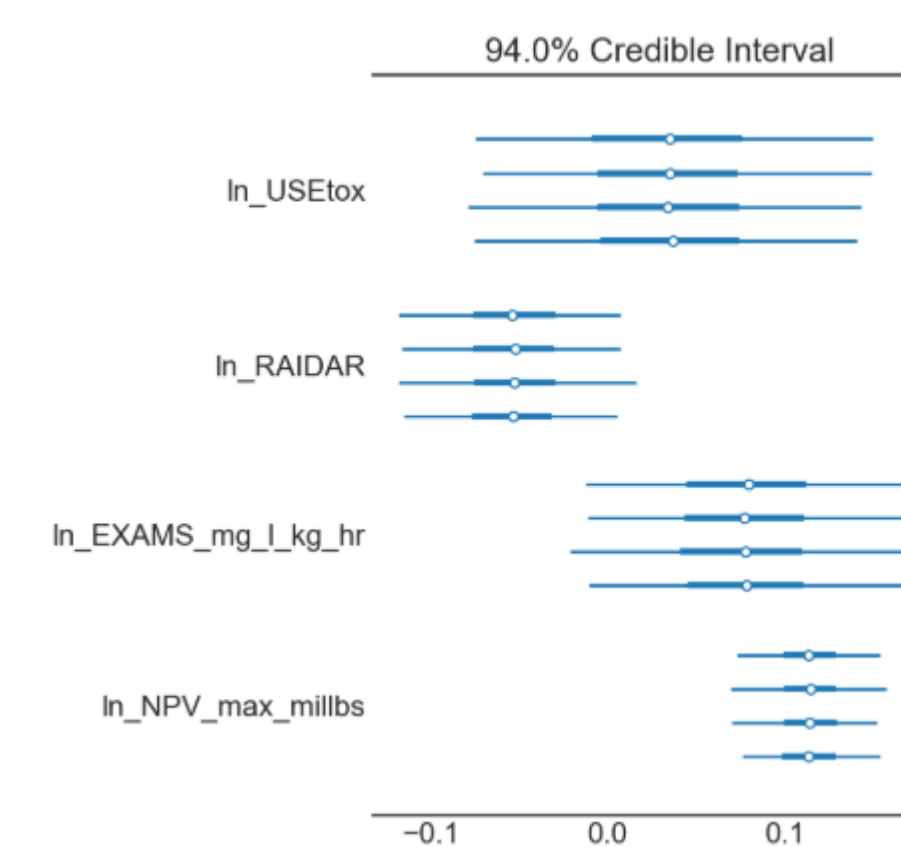
Metamodel inputs



No single predictor was more accurate than using the overall mean as an estimate.

Results

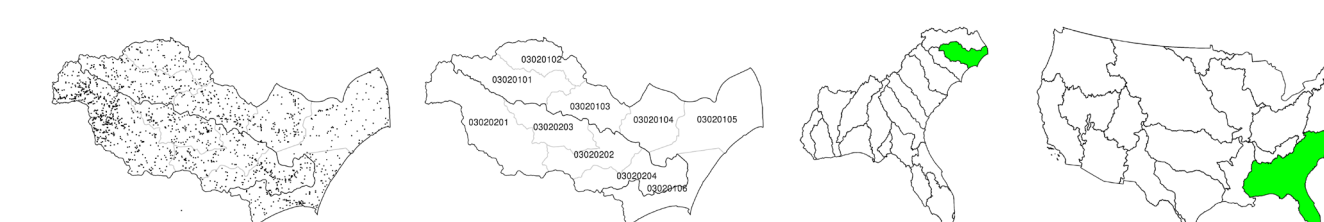
Exposure prediction evaluation



Predictor	Inputs	Outputs
USEtox ⁵	physchem properties from TEST ⁸ , OPERA ⁹ , EPI Suite ¹⁰	Mass in the environment (freshwater compartment) for 1 kg/day emitted (kg per kg/d)
RAIDAR ⁶	physchem properties from TEST, OPERA	Amount in water (kg per kg/hr emission rate)
EXAMS ⁷	physchem properties from OPERA; water system flow rate	Annual average dissolved water concentration rate (mg/L per kg/hr)
NPV/CDR ¹¹	reports by producers and importers	lb/yr produced

Of the tested predictors, National Production Volume is most likely to describe median observed water concentrations. When regressing on physchem properties, all coefficients include 0.

Future work



$$\ln(y) = \mu + R_i + S_{ij} + A_{ijk} + W_{ijkl} + \epsilon$$

Develop hierarchical model to aggregate concentrations at a watershed level

Figures adapted from Woody Setzer

Apply Bayesian maximum entropy approach to estimate likely concentrations in non-sampling areas. Values from the entire estimation grid will describe an average and variance for the whole country over the time period

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This poster does not necessarily represent the views or policies of the U.S. Environmental Protection Agency.