United States Environmental Protection Agency

Screening for biological relevance of environmental chemistry data using the toxEval software package

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Challenges of Assessing Environmental Monitoring Data

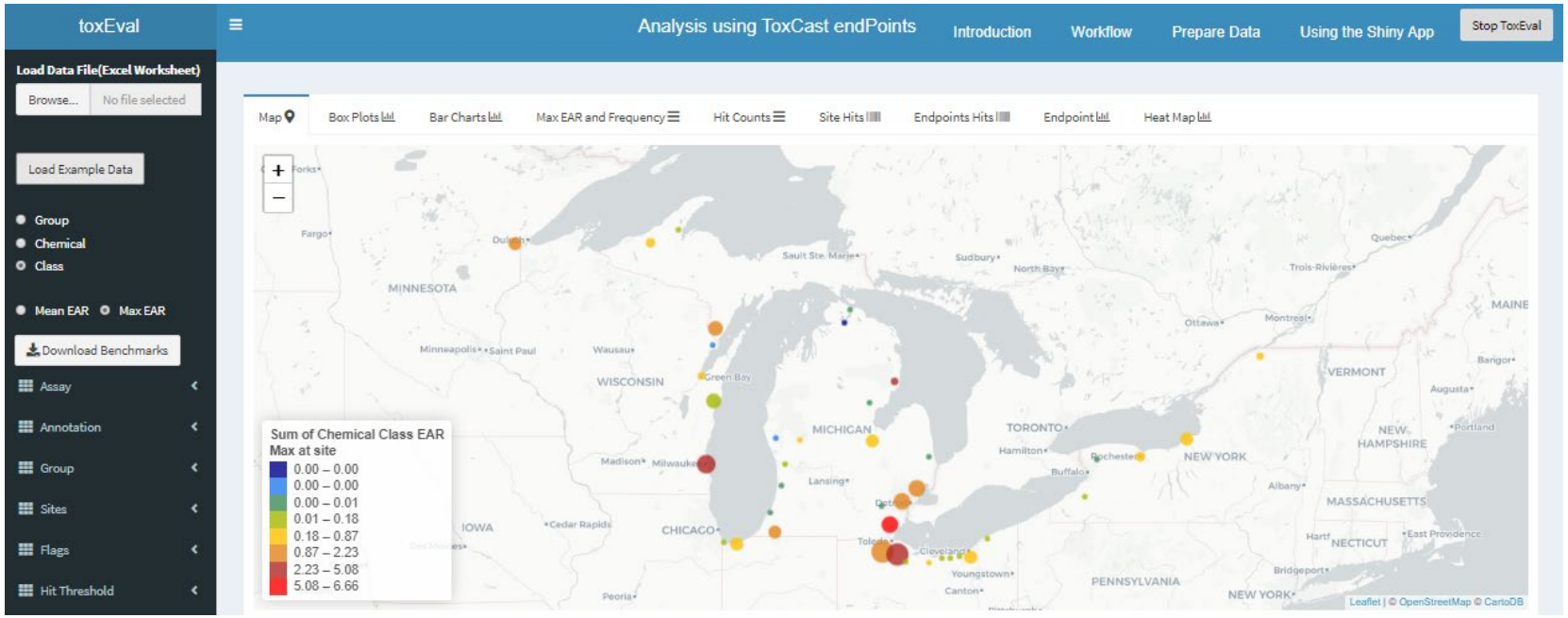
- Thousands of potential contaminants in the environment
  - Monitoring for hundreds per sample not uncommon
  - Improved analytical methods provide detections in the low ng/L
  - Difficult to determine what is of concern biologically

Needs:
  - Prioritize chemicals, sites, and/or biological pathways
  - Provide stakeholders/decision makers with information to make informed decisions

- ToxEval provides a tool for effects-based prioritization

Using toxEval for Prioritization

- ToxEval uses exposure:activity ratios (EARs) to prioritize based on the ToxCast database
  - >9000 chemicals screened through up to >300 assays
- Alternatively, toxEval can generate hazard quotients from user-provided benchmarks (aquatic life benchmarks, etc)
- Software package provides functions to analyze, visual, and organize concentration data based on selected endpoints



toxEval Analysis

ToxCast Endpoints: Exposure-Activity Ratio (EAR):

$$EAR = \frac{Concentration}{ACC}$$

Aquatic Life Benchmark Hazard quotient (HQ):

$$HQ = \frac{Concentration}{Aquatic\ Life\ Benchmark}$$

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Prioritize chemicals and sites

Accessing toxEval

- Publicly available R package
  - Currently on GitHub
  - Download available through CRAN
- Intended audience:
  - Regulators and resource managers (federal, state, local)
  - Researchers (government, academia, industry, NGO)
- Current users: primarily government researchers

https://github.com/USGS-R/toxEval