Title of Research:

18_R04-01

Exploring roles and simple estimation methods of species sensitivity distribution for deriving PNECs

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Summary of Research:

We developed models to predict species sensitivity distribution (SSD) parameters from limited data (research 1), and quantified the uncertainties associated with SSD-based assessment (research 2). In the research 1, to predict mean and standard deviation (SD) of acute SSDs, we developed multiple linear regression models that included, in addition to readily obtainable descriptors, the mean and SD of the $\log_{10}$-transformed concentrations that are acutely toxic to one algal, one crustacean, and one fish species, as predictors. We also found that the means of chronic SSDs were, one average, 10 times lower than acute SSD means, and the SDs of chronic and acute SSDs were similar. In the research 2, a condition that we need uncertainty factor to determine a predicted no effect concentration (PNEC) by SSD approach was argued.

Timeline:

March 1, 2020 - February 28, 2021

Topics:

Oral presentation at JCIA LRI Annual Workshop 2020 “Exploring roles and simple estimation methods of species sensitivity distribution for deriving PNECs” (On-line, August 21st, 2020)

Publications:

1. Yuichi Iwasaki, Kiyan Sorgog (2021). Estimating species sensitivity distributions on the basis of readily obtainable descriptors and toxicity data for three species of algae, crustaceans, and fish. PeerJ 9: e10981 https://doi.org/10.7717/peerj.10981
2. Kyoshiro Hiki, Yuichi Iwasaki (2020). Can we reasonably predict chronic species sensitivity distributions from acute species sensitivity distributions? Environmental Science & Technology 54(20):13131-13136. doi: 10.1021/acs.est.0c03108.
3. Masashi Kamo, Kiyan Sorgog (2020). Response to: Quantifying the precision of ecological risk: Misunderstandings and errors in the methods for assessment factors versus species sensitivity distributions by Drs. Scott E. Belanger and Gregory J. Carr. Ecotoxicology and Environmental Safety. Vol.207, No. 111542
4. 加茂将史、岩崎雄一、Kiyan Sorgog、内藤航 (2021). 生態リスク評価における種の感受性分布の活用について. 第 55 回日本水環境学会年会. オンライン開催 (in Japanese)
5. 日置恭史郎、岩崎雄一（2021）. 慢性毒性に基づく種の感受性分布を急性毒性に基づく種の感受性分布から予測できるか？日本環境毒性学会第１回オンライン研究発表会、オンライン開催(in Japanese)
6. Kiyan Sorgog, Yuichi Iwasaki (2020). Developing models to estimate parameters of species sensitivity distribution by three species ecotoxicity data. 41st annual meeting on Society of Environmental Toxicology and Chemistry (SETAC) North America. virtual conference.