GRADUATE INDUSTRIAL RESEARCH SYMPOSIUM

2023 "Reshaping the Future through Science and Technology"

Evaluating the environmental impacts of U.S. historical oil spill incidents

Yiming Liu¹, Hua Cai^{1,2}

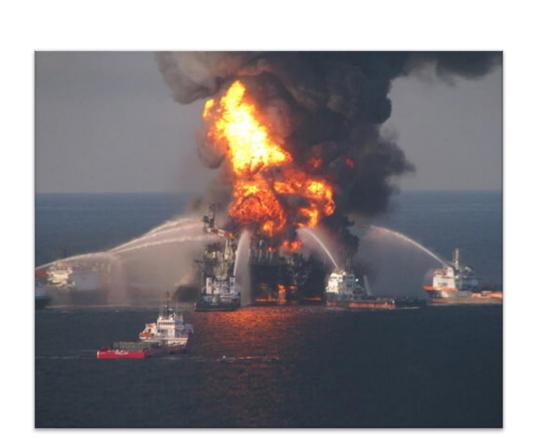
¹Environmental and Ecological Engineering, West Lafayette, Indiana 47907; ²Industrial Engineering, West Lafayette, Indiana 47907;



Agricultural and Biological Engineering

Introduction

- Frequently happened oil spills
- Catastrophic environmental effects
- Enormous economic loss



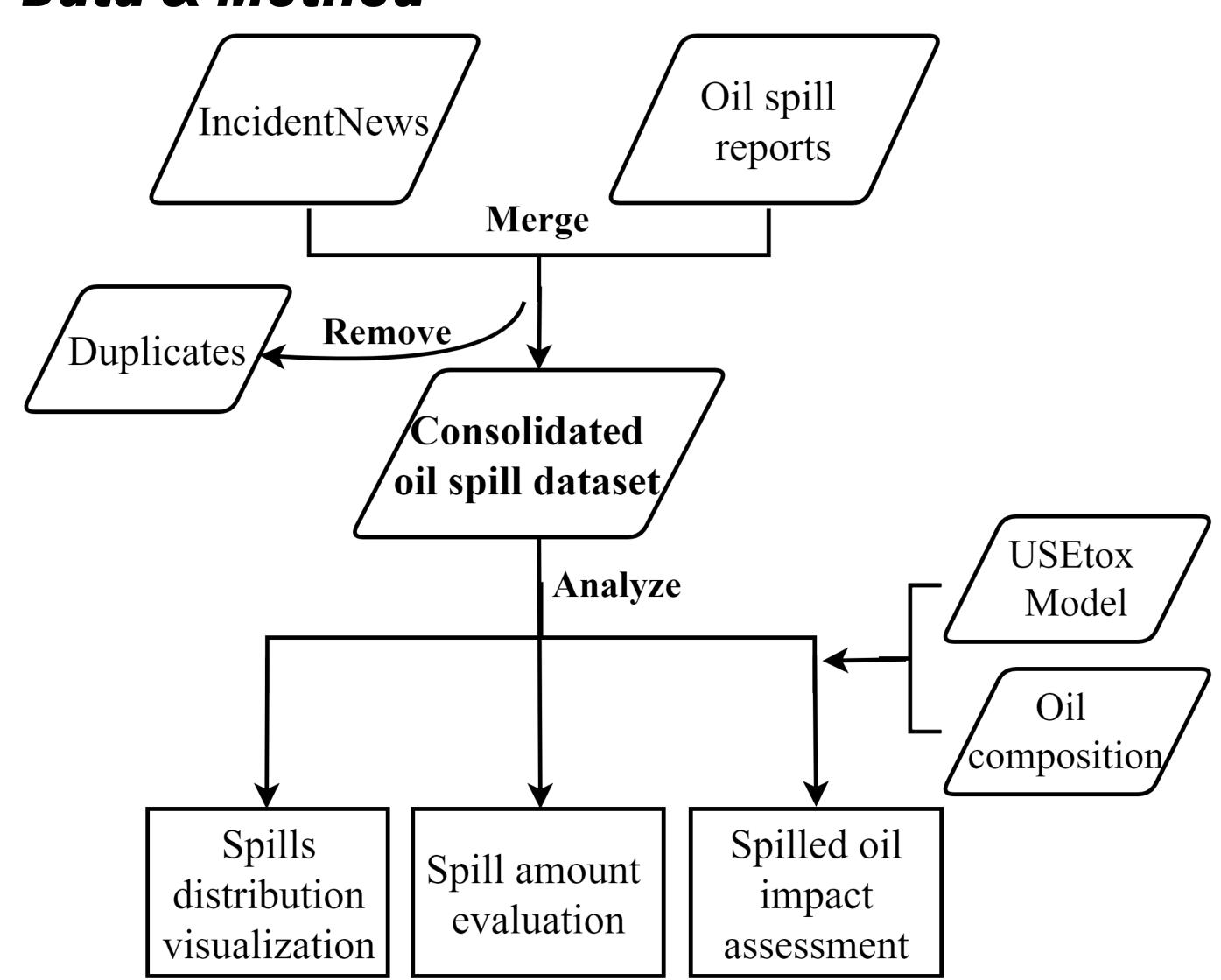
Research gaps

 Only large oil spills such as Deepwater Horizon Oil Spill are widely studied. The impacts of multiple smaller oil spills are still unknown.

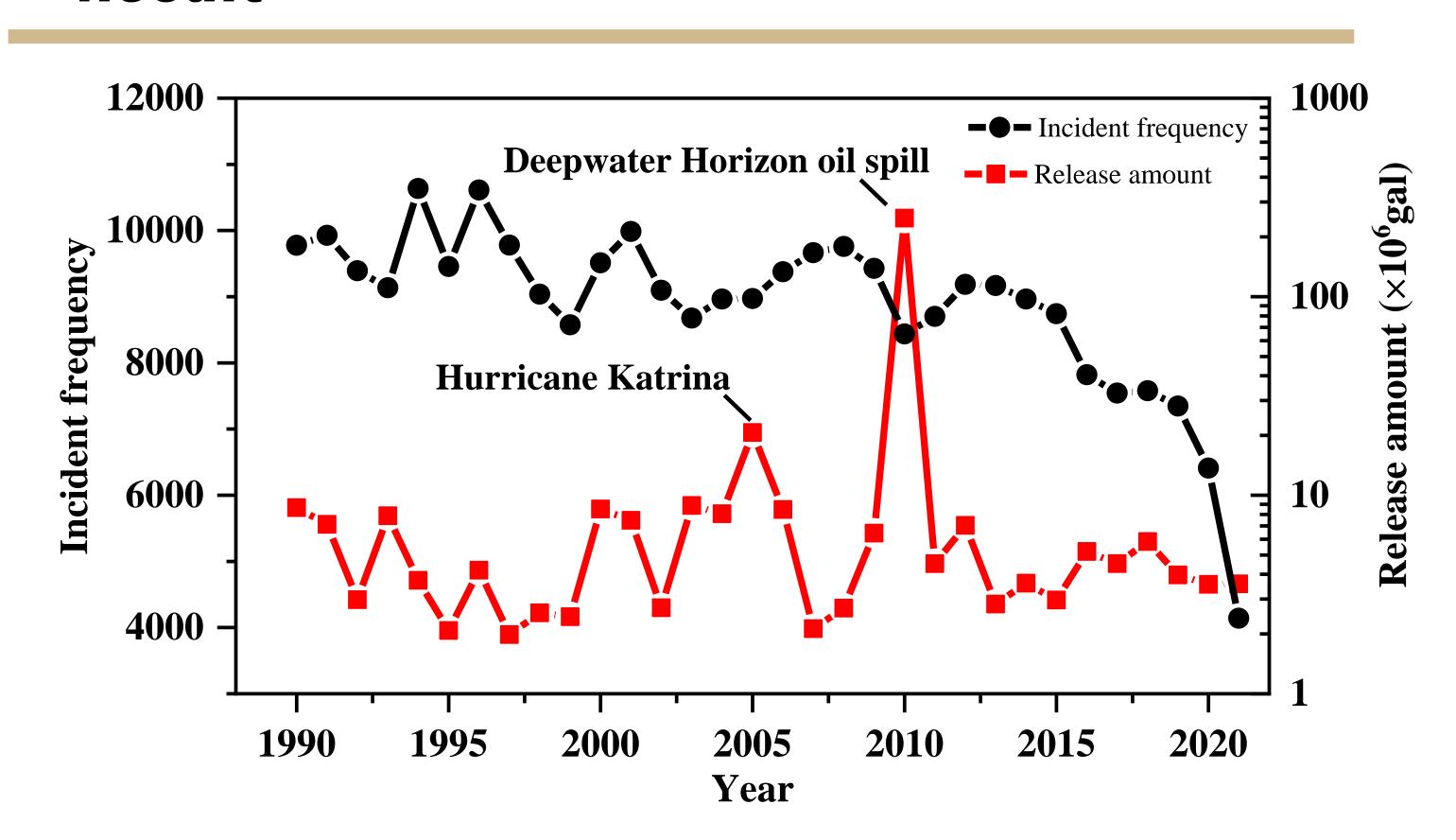
Research questions

- When, where, and how frequently do oil spills happened?
- How much oil has been spilled?
- How much impact does the spilled oil have?

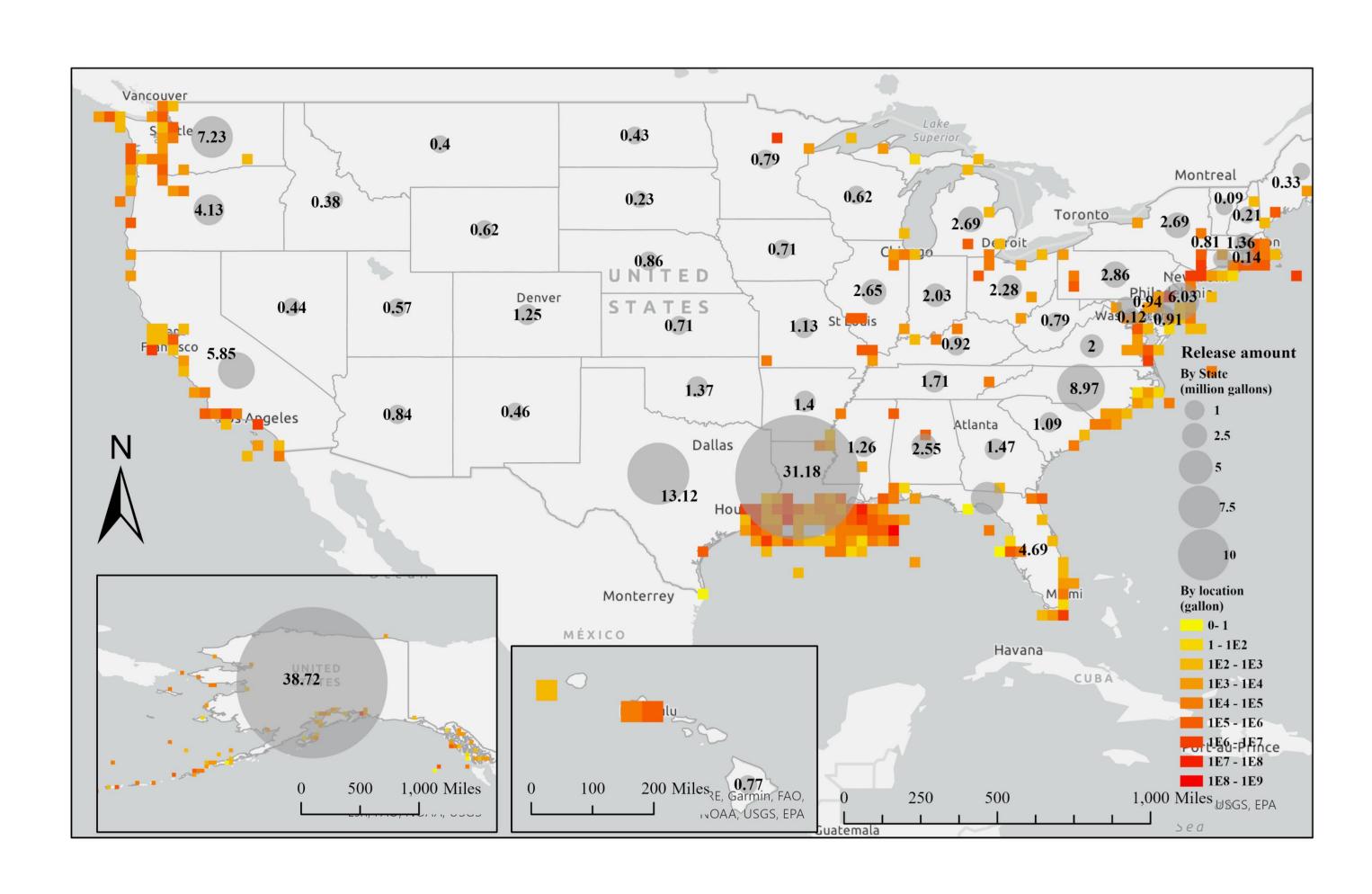
Data & Method



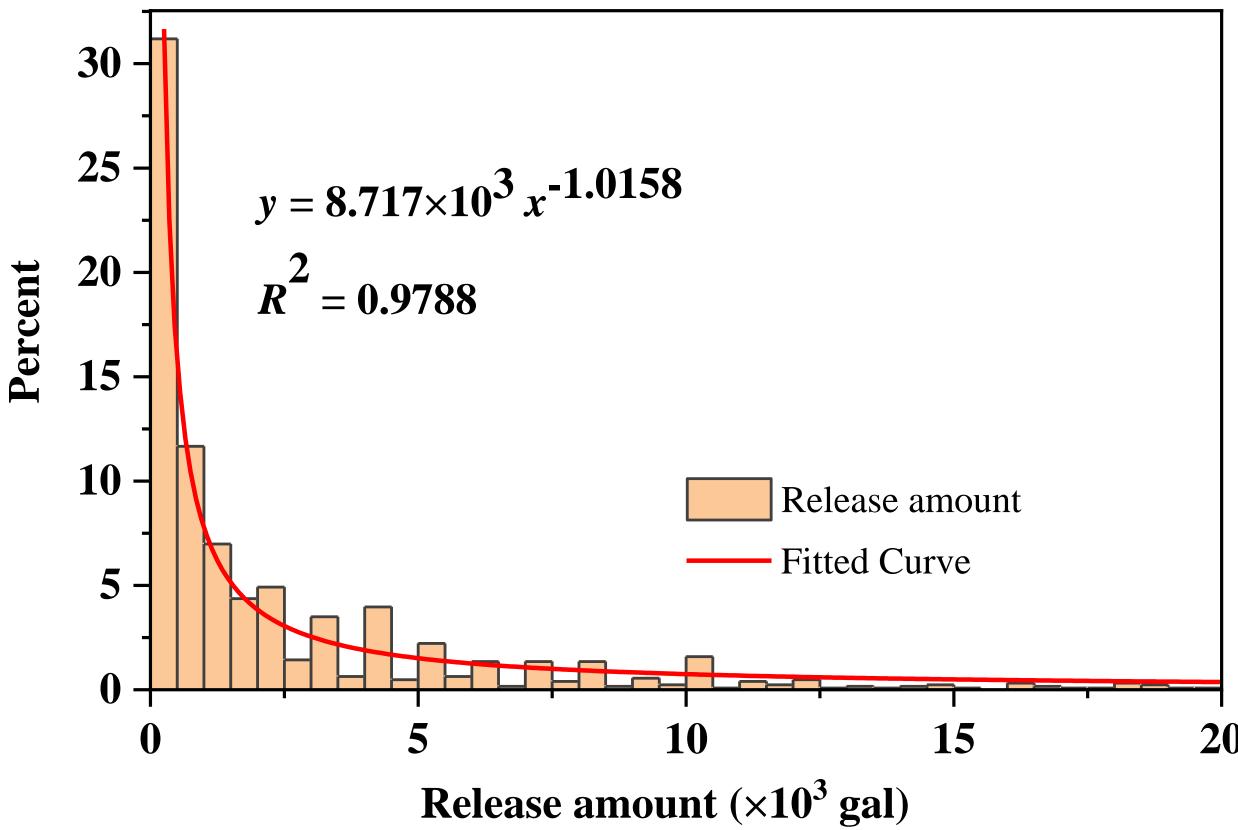
Result



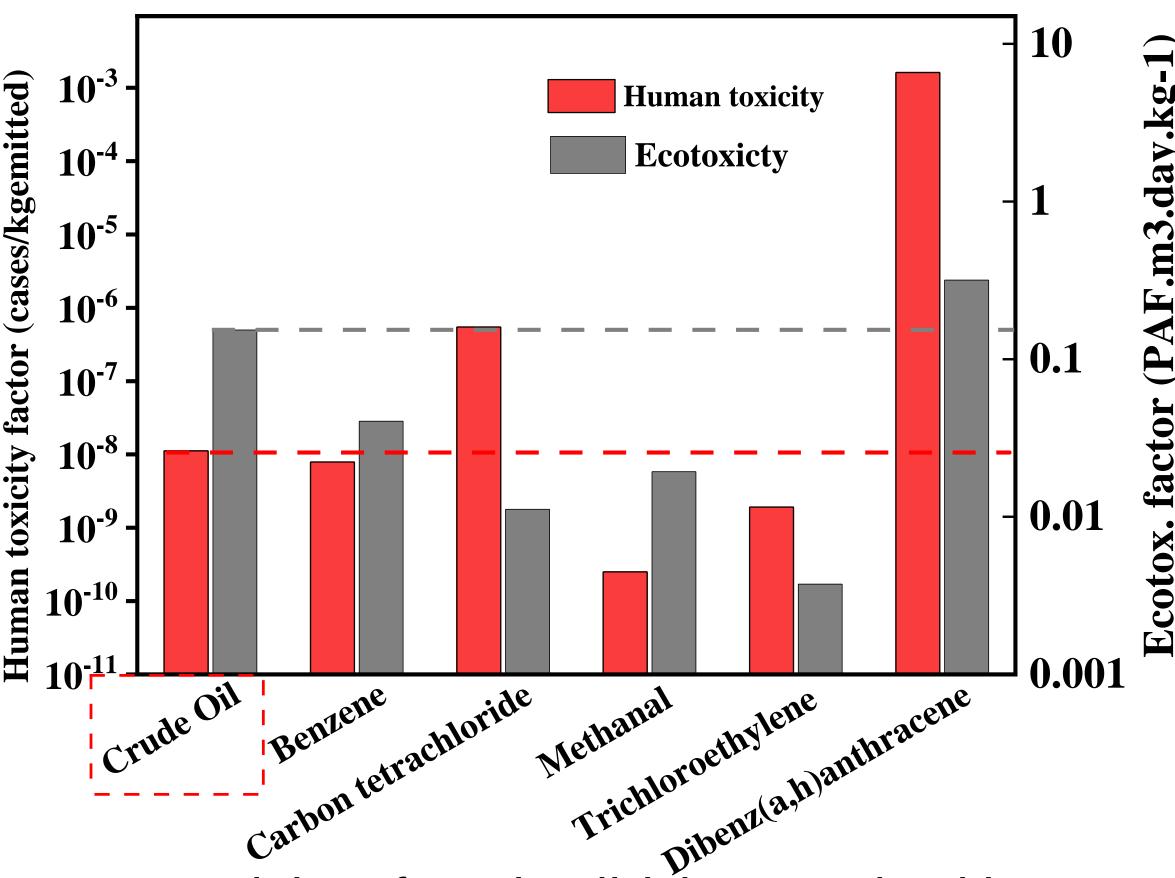
- Oil spills are decline in recent years.
- Yearly release amounts are dominated by extreme events.



 Offshore waters and coastal states contribute most of oil spills and release amounts due to intense offshore oil drilling and transits.



 Power law distribution between spill frequency and release amounts



• Human toxicity of crude oil (characterized by USEtox Model) is similar with benzene in seawater.

Conclusion

- Total amount of spilled oil is approximately 480 million gallons (three Deepwater Horizon spills).
- Spilled oil has considerable impacts on human health and marine ecosystem