Modeling Resource Allocation of Emergency Response in Arctic Oil Spills

Tanmoy Das, Floris Goerlandt

Department of Industrial Engineering, Dalhousie University, Halifax, NS, Canada

CONTEXT

Diminishing Arctic sea ice opens shipping routes

Increased shipping

Shipping accident

Oil spill risk

Mechanical recovery

Dispersant application

In-situ burning

OBJECTIVES

O1. To better understand the effectiveness of available options to respond to oil spills in Arctic marine environments

O2. To develop comprehensive modeling for response resources allocation to prepare for potential oil spills in Arctic, in order to support oil spill preparedness and response risk management

RESEARCH QUESTIONS

RQ1. What is the estimated volume of the oil spills on ship-ship collision accident?

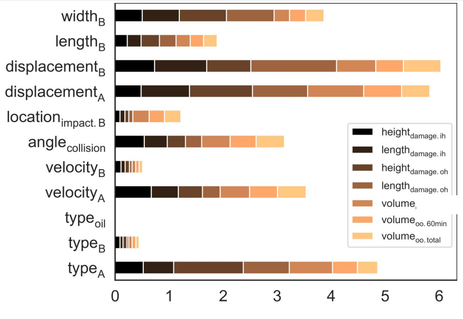
RQ2. What is the best available technique for oil spill cleanup in a ship-ship collision accident in harsh icy weather conditions?

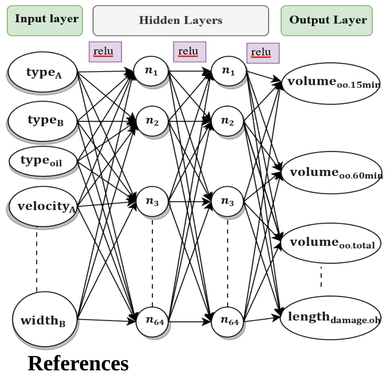
RQ3. What is the optimal stockpile improvement policy and what are optimal task completion policy in Arctic Environment?

RQ4. How to account for uncertainties in spill size, location, and response effectiveness in the resource allocation problem?

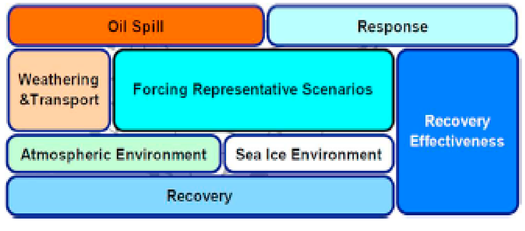
METHODS AND RESULTS

Metamodel to estimate oil spill





Selecting and ranking response systems



Optimization model for resource allocation

Minimizing response time
subject to stockpile availability of resources and deadline to reach resource to oil spill location

Maximizing the volume of removed oil
subject to capacities of response methods

Minimizing cost
subject to resource and operational limits

References

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COLLABORATORS

ACADIA UNIVERSITY

TALLINN UNIVERSITY OF TECHNOLOGY

Dr. Kristjan Tabri, TalTech, Estonia
Dr. Hassan Sarhadi, AcadiaU, NS, Canada

ENGAGEMENT

Through end-user engagement and involvement of industry experts, the societal relevance and usefulness of research objectives and results will be ensured.

ARCTIC COUNCIL

Transport Canada

Canadian Coast Guard

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MEOPAR