Selection of oil spill response method in Arctic offshore waters: A fuzzy decision tree based framework.

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Abstract: A fuzzy decision tree (FDT) based framework was developed to facilitate the selection of suitable oil spill response methods in the Arctic. Hypothetical oil spill cases were developed based on six identified attributes, while the suitability of three spill response methods (mechanical containment and recovery, use of chemical dispersants, and in-situ burning) for each spill case was obtained based on expert judgments. Fuzzy sets were used to address the associated uncertainties, and FDTs were then developed through generating: i) one decision tree for all three response methods (FDT-AP1) and ii) one decision tree for each response method and the development of linear regression models at terminal nodes (FDT-LR). The FDT-LR approach exhibited higher prediction accuracy than the FDT-AP1 approach. A maximum of 100% accurate predictions could be achieved for testing cases using it. On average, 75% of suitable oil spill response methods out of 10,000 performed iterations were predicted correctly.

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