A HIGH RESOLUTION OIL SPILL RISK ASSESSMENT SYSTEM AT SANTANDER BAY (SPAIN)

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This work presents a high resolution oil spill risk assessment system developed in Santander Bay (Spain) in the framework of the SPRES (OIL SPILL PREVENTION AND RESPONSE AT LOCAL SCALES) project (2012-2014), co-funded by the European Transnational Programme (Atlantic Area).

METHODOLOGY

1. GATHERING/GENERATION OF THE MET-OCEAN DATABASES

1) SELECTION OF MET-OCEAN SCENARIOS (WIND, WAVES, RIVER FLOW AND TIDES)

Dependent local variables selection

2) HYDRODYNAMIC DOWNSCALING OF CURRENTS AND WAVES (COAWST MODEL)

49 (C) x 5 (TR) x 245 hydrodynamic scenarios

2. OIL SPILL SIMULATIONS (TESEO)

Each combination of (C, TR, L) is used to simulate oil spill scenarios using the oil spill numerical model TESCO (Abascal et al., 2014).

The drift process of the spilled oil is described by tracking numerical particles (equivalent to the oil slicks) which are moved by effect of the currents, wind and waves.

The oil spill evaporation will be included in the postprocessing.

3) STATISTICAL ANALYSIS: PROBABILITY OF CONTAMINATION AT RECEPTOR POINTS (RP)

The probability of occurrence of an oil spill scenario, \( P_i(\text{TAR}, L) \), is calculated according to the probabilities of its corresponding cluster (\( P^{(C)} \), tidal range (\( P^{(TR)} \)) and tidal phase (\( P^{(P)} \)).

4) HAZARD

Expected hazardous area

3) CRITICAL POINTS

RESULTS

WEB APPLICATION: A web service that manages the risk system and allows the user to enquire about risk has been implemented.

CONCLUSIONS

The number of accidental oil spills affecting the Atlantic coast of Europe in the last decades has led to a growing concern regarding oil spill preparedness and response, and has motivated the development and implementation of different tools to be used in these emergency situations. Close to shore, most damage occurs in sheltered bays and inlets, where oil becomes concentrated. Although noticeable advances have been done at a regional scale (Omega), more effort is needed in developing local systems that help regional decision makers to respond to oil spill threat.

To develop a high resolution oil spill risk assessment system based on: (1) the use of extensive meteorological and oceanographic databases provided by state-of-the-art ocean and atmospheric models, (2) the use of clustering techniques to establish representative met-ocean scenarios (i.e. combination of sea state, meteorological conditions, tide and river flow), (3) dynamic downsampling of the met-ocean scenarios with COAWST modelling system and (4) the management of hundreds of runs performed with the state-of-the-art oil spill transport model TESCO.

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