Interspill 2022 – Amsterdam

Naa Sackeyfio (ITOPF) **Contact: NaaSackeyfio@ITOPF.ORG**

Paper submitted for the main conference - 500-1000 word abstract

Topic - Shipping Risks Stream

Spatial distribution of global marine oil tanker spills over half a century

For the past five decades, ITOPF has reported comprehensively on the temporal trends of oil tanker spills and other industry publications have provided insights based on temporal analysis. Spatial distribution and trends of accidental oil spills from tankers have also been analysed and reported to some extent, mainly focussing on large spills and the major oil spills in history. There, however, remains a paucity of information on the spatial distribution of oil tanker spills globally, particularly for past decades. This is unsurprising considering the uncertainty of location information in some historical reports. The analyses of both spatial and temporal dimensions of historical oil spill data are significant in the assessment of risk for the improvement of safety in marine waters. Today, Automatic Identification Systems (AIS), remote sensing and Geographic Information Systems (GIS) are all being explored to detect spill locations and expand knowledge on oil spills.

This paper provides a global overview of the spatial distribution of accidental marine oil tanker spills of size 7 tonnes and over, based on ITOPF's spills database, and explores spatio-temporal patterns over 50 years using GIS. It also explores the relationship between spill frequency and oil movement and presents visualisations that include general marine traffic data to promote understanding of shipping risk. The main purpose of this study however, is to produce maps that represent actual spill occurrence and highlight areas of high and low densities as accurately as possible.

Approximately 1500 marine oil tanker spills in excess of 7 tonnes that occurred between 1970 and 2019 were analysed for this study. These spills are recorded in the waters of over one hundred countries, territories and regions around the world. Spills recorded in the top ten countries constitute 50 percent of spills analysed. To highlight the areas of high spill frequency, the data was displayed using heat map symbology (which utilizes the Kernel density method). Time-series heat maps were also produced to show relative spill densities in various regions around the world per decade.

The results emphasise the dramatic decline in accidental marine oil tanker spills globally, over half a century and show spatial variations in oil spills over the period. Northwest Europe, specifically the Strait of Dover and Northeast USA were identified as the regions with the highest concentration of oil tanker spills in the five decade period. In the last three decades however, most spills have been recorded in Asia. There has been over a 70 percent reduction in the number of spills in Asia and over 90 percent in the rest of the world between the 1970s and 2010s. Nonetheless, accidents regrettably remain a possibility and occasionally the worst happens. Deeper analysis with focus on recent decades is therefore crucial to provide insights to help manage current spill risks.

The results also show a strong relationship between oil movement and oil tanker spills when frequency of oil spills in the various regions is compared with world seaborne trade data over ten years. Spills were generally higher in regions where the volume of crude oil, petroleum products and gas loaded and unloaded were higher. This does not conclusively suggest higher probability of oil spills in high oil-movement areas as a combination of factors come into play in the evaluation of risk of oil spills. However, it highlights a strong relationship between the two factors.

The use of GIS allowed the efficient production of distribution maps and density analysis, revealing key spatial information about global oil tanker spills. The study has shown positive trends in oil spills across various regions in the world. This trend is likely to persist if spill incidents continue to be measured and consequently managed within the shipping industry, with support from governments.