

## ABSTRACT

### Geostatistical Analysis of Marine Traffic in the Gulf of Paria, Trinidad and Tobago

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The Gulf of Paria, which lies between Trinidad and Venezuela, is a busy shipping maritime environment representing a wide range of shipping activities. The industrial development of the Western coast of Trinidad, inclusive of transportation needs of existing oil and gas projects, transshipment of mineral resources, containerized and general cargo as well as passenger vessels, increases the potential for maritime risks. Risks associated with the shipping industry, gives rise to real concerns that could compromise the safety of navigation, security and the protection of maritime environment and human life.

Maritime transportation is the backbone of the international trade and global economy. It involves risks such as, fire, grounding, collision, loss of property and spillage of dangerous or pollutant substances. Aside from the risk to life, there are also potentially disastrous consequences for the environment and for economic activities dependent on the sea, such as, fisheries and tourism. Growth of the world fleet, both in number of ships and in tonnage, gives rise to an increase in the number of maritime accidents.

Due to the high density of vessel traffic in the Gulf of Paria, the congested waterways offer potential for collision. Therefore, conducting risk assessments within the waterway is important for a first step towards improvement in the safety of maritime navigation and this study offers the first such assessment for the area. Such studies have only been feasible since the introduction of Automatic Identification System (AIS) for shipping.

AIS was developed as a real-time navigational safety tool for collision avoidance and for supporting vessel traffic services in ports and harbours. Essentially, this new technology makes vessels identifiable to each other within the radar and adds data concerning the vessels status. However, the data has also found use in historical form and is used in this study as a source of vessel traffic within the Gulf of Paria data over a 6 month period.

Following an analysis of the AIS data available, maritime traffic within the Gulf of Paria is characterized and a geo-statistical analysis of the traffic is provided. The study continues by developing an approach using GIS to highlight the risk to maritime navigation within the Gulf of Paria, combining geospatial vessel traffic information with risk likelihood factors, such as, confines of waters and obstructions that limits the manoeuvrability of vessels and chart quality. The resulting product is a spatial heat map indicating relative level of risk within the region.

Key words: Amrika Maharaj; AIS; Maritime Navigation; Vessel Movements; Risk; Gulf of Paria; Shipping; Geo-statistical analysis; GIS; Trinidad and Tobago.