**SUMMARY**

Despite policy and media attention and a significant increase in search and rescue efforts, the number of deaths of refugees and migrants crossing the Mediterranean Sea hit record numbers in 2016. UN Global Pulse worked with the UN High Commissioner for Refugees (UNHCR) on a project that analyzed new big data sources to provide a better understanding of the context of search and rescue operations. The project used vessel location data (AIS) to determine the route of rescue ships from Italy and Malta to rescue zones and back, and combined it with broadcast warning data of distress calls from ships stranded at sea. The insights were used to construct narratives of individual rescues and gain a better understanding of collective rescue activities in the region. Findings showed a change in the pattern of distress signals over time, with signals being recorded closer and closer to the Libyan shore, forcing rescue operations to venture and expand beyond initial search-and-rescue zones.

**BACKGROUND**

In 2016, the International Organization for Migration (IOM) reported over 360,000 migrants and refugees arriving in Europe by sea, while 5,079 were reported dead or missing.\(^1\) The latter represents 1.38 per cent of all those attempting to cross the sea into Europe. Furthermore, from January 2014 to April 2017, over 17 per cent of all reports of people dead and missing in the Mediterranean included references to accompanying survivors, implying that many who die or disappear are on board vessels that are attended to by search and rescue operations.\(^2\)

Reducing the number of deaths requires an understanding of the overall process of maritime crossing, beginning with identifying the main challenges to effectively direct rescue operations.

UN Global Pulse worked with UNHCR to define whether vessel location data, specifically Automatic Identification System (AIS) and broadcast warnings data, can provide insights into the movement of displaced populations crossing the Mediterranean Sea from Libya to Italy and Malta.

**VISUALIZING RESCUE ACTIVITIES WITH VESSEL TRACKING DATA**

The Automatic Information System (AIS) is a maritime communications system through which vessels regularly broadcast information, including their identifier, vessel type, latitude and longitude, speed, course and destination. This information is used by maritime authorities and ships to locate other nearby vessels and to avoid collisions. AIS transmissions occur as fast as once every two minutes, which provides fine-grained information on vessel behaviour.

Broadcast warnings are produced by the World-Wide Navigational Warnings Service, and are used to warn ships of potential safety risks in a region. More importantly, they also notify ships of nearby emergencies, invoking a legal responsibility to respond if possible. Broadcast warnings about ships in distress often include an estimate of the number of people on board, and the approximate GPS coordinates.

UN Global Pulse and UNHCR used AIS data to determine the route of rescue ships from Italy and Malta to rescue zones and back, and created visualizations to understand the magnitude of rescue operations. Distress calls emitted by ships carrying migrants and refugees were also visualized to understand how rescue operations expanded over time.

Cases in which multiple vessels coordinated a single rescue, and in which multiple migrant and refugee boats were rescued by a single vessel, were identified in the analysis.

For example, Figure 1 shows AIS position readings of the Migrant Offshore Aid Station (MOAS) Phoenix, an NGO-operated rescue ship conducting several rescue operations between 10 and 15 October 2016.\(^3\)

Figure 2 shows rescue tracks from two Médecins Sans Frontières (MSF) vessels, namely the Bourbon Argos and the Aquarius, from 1 to 6 October 2016. According to MSF, on 3 October, the Argos conducted eight separate rescues, and rescued over 1,000 people.

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The Aquarius was engaged in a large rescue of a single boat carrying over 700 people.4

CONCLUSIONS

This project demonstrated that the analysis of AIS and broadcast warnings data can be used to understand rescue operations. Findings showed a change in the pattern of distress signals over time, consistent with anecdotal reports. Vessels in distress were recorded closer and closer to the Libyan border, forcing rescue operations to venture and expand beyond initial search-and-rescue zones.

In addition, the high concentration of rescue activities relative to the reported locations of deaths and disappearances at sea suggests that there may be a need for increased geographic coverage of rescue operations, and coordination by search and rescue vessels in the region.

A number of challenges with the analysis remain:

- Using rescues as a proxy for understanding migration introduces a default selection bias, which leaves out migrants and refugees who go un-rescued;
- The generation of AIS data requires that vessels are equipped with a transmitter that is actively broadcasting information. Also, AIS data may omit some vessel types, including small boats, or boats that intentionally turn off their transmitters;
- Producing broadcast warning data requires vessels in distress to call in to a local Maritime Rescue Coordination Centre using a satellite phone, or for these vessels to be seen by others;
- AIS data can be used to understand patterns in the trajectories of vessels, but cannot be used to identify the precise nature of an incident;
- Features that may have been key predictors of rescue activity in the past, like specific latitudes and longitudes, may not be relevant at the time of use, if rescue patterns shift.


HOW TO CITE THIS DOCUMENT:
