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#### ▶ To cite this version:

Clément Iphar, Iwan Le Berre, Aldo Napoli, Éric Foulquier. Port call extraction and characterisation from maritime navigational data: an application to the Lesser Antilles. AGILE 2023 conference, Jun 2023, Delft, Netherlands. hal-04119873

#### HAL Id: hal-04119873 https://hal.univ-brest.fr/hal-04119873

Submitted on 6 Jun 2023

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# PORT CALL EXTRACTION AND CHARACTERISATION FROM MARITIME NAVIGATIONAL DATA: AN APPLICATION TO THE LESSER ANTILLES

CLÉMENT IPHAR<sup>1</sup>, IWAN LE BERRE<sup>1</sup>, ÉRIC FOULQUIER<sup>1</sup>, ALDO NAPOLI<sup>2</sup>

- <sup>1</sup> LETG Laboratory Littoral Environnement Télédétection Géomatique UMR 6554, Brest University, IUEM, Plouzané, France
- <sup>2</sup> CRC Centre for Research on Risks and Crises, MinesParis PSL, Sophia Antipolis, France

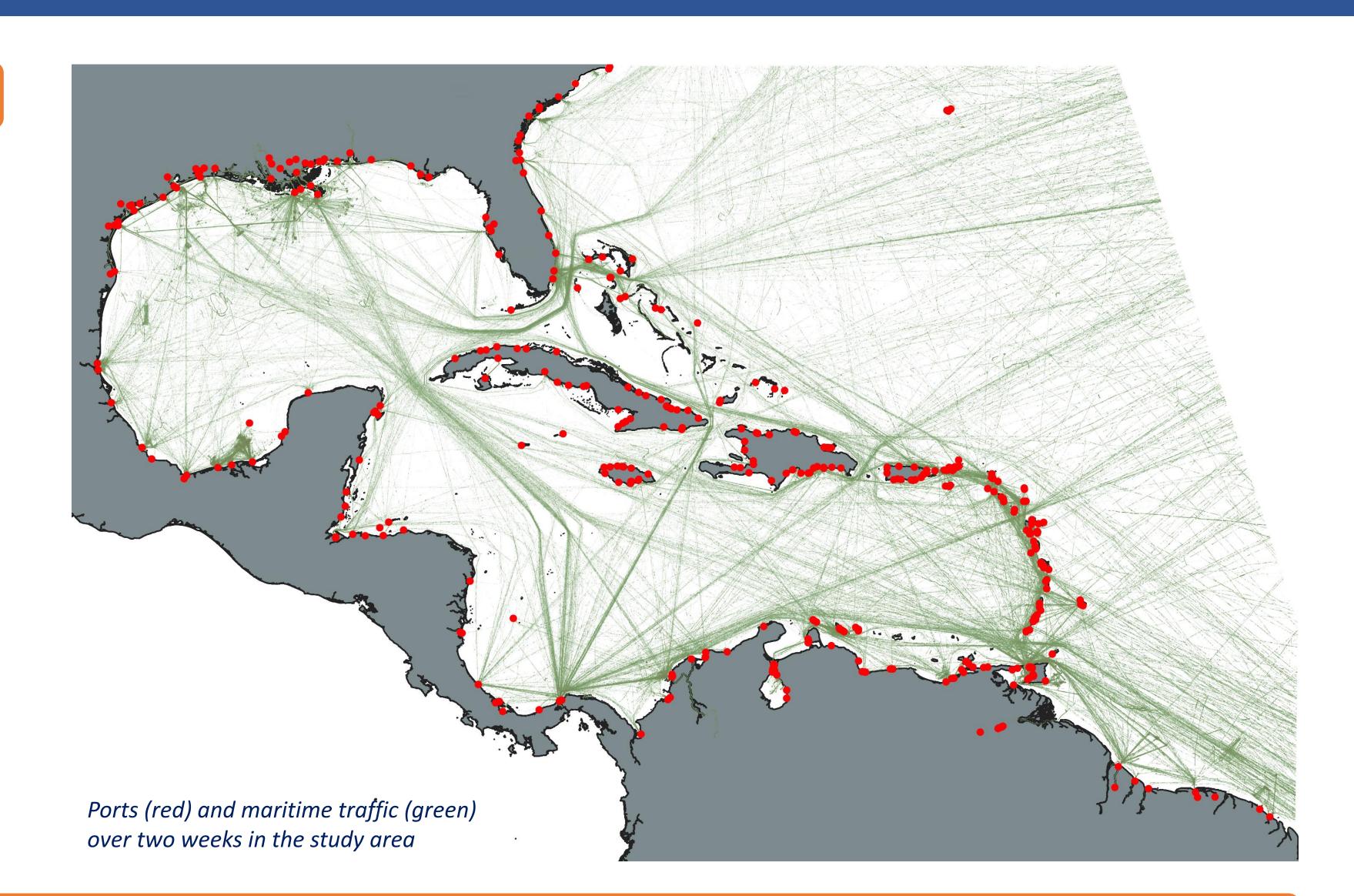
## **CONTEXT**

- Our work focuses on maritime transport characterisation and its impact in the Caribbean, a region fragmented into multiple territories and different sovereignties owing to major administrative and reglementary discrepancies.
- We aim at assessing port vulnerability through port traffic data extracted from vessel positions, and analysed through the prism of the port call.

## DATA

This analysis is based on the joint use of AIS data and a mapping of the ports of the study area.

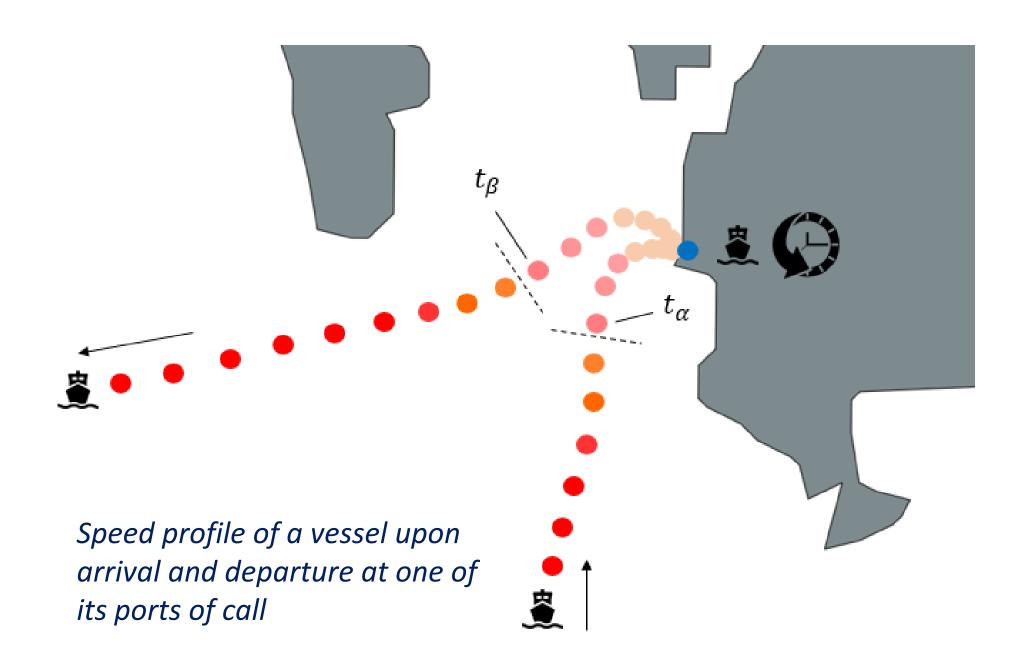
- The AIS dataset has been acquired from the company exactEarth for the Caribbean and the Gulf of Mexico for the full year 2019 (TRAFIC project, funded by the Fondation de France). This dataset contains about 642M messages, i.e. 1.76M per day.
- The **port mapping** has been interpreted using **satellite imagery** (Google Earth, Bing) with QGIS. The commercial berths (quays and wharves) of 387 ports have been meticulously surveyed at the 1/5000 scale. In the Lesser Antilles, a total of 101 ports and 296 port structures has been identified.



# PORT CALL ANALYSIS

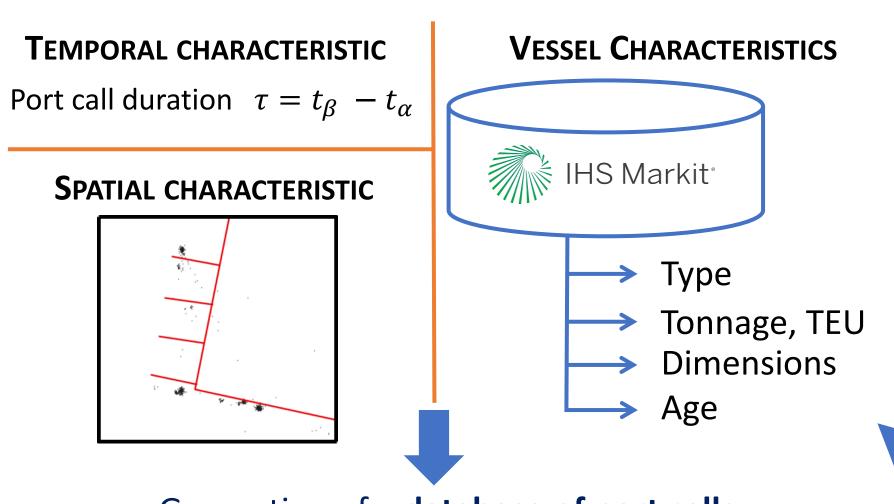
## **Extraction**

Arrivals and departures (day and hour) are timestamped at the crossing of a speed threshold of 0.5 knots in the vicinity of a port infrastructure.



# Characterisation

**Spatial and temporal characteristics** of the port call are computed from AIS data. They are completed by **vessel characteristics** extracted from a database maintained by the IHS Markit firm.

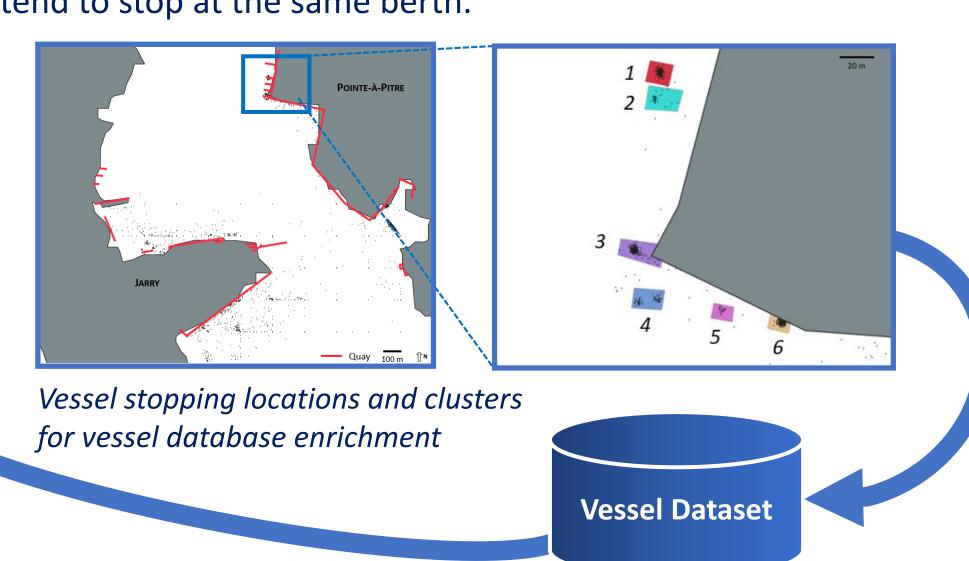


Generation of a database of port calls

- 1 455 000 port calls in the whole of the Caribbean area in 2019
- 171 000 port calls in the 101 surveyed ports of the Lesser Antilles

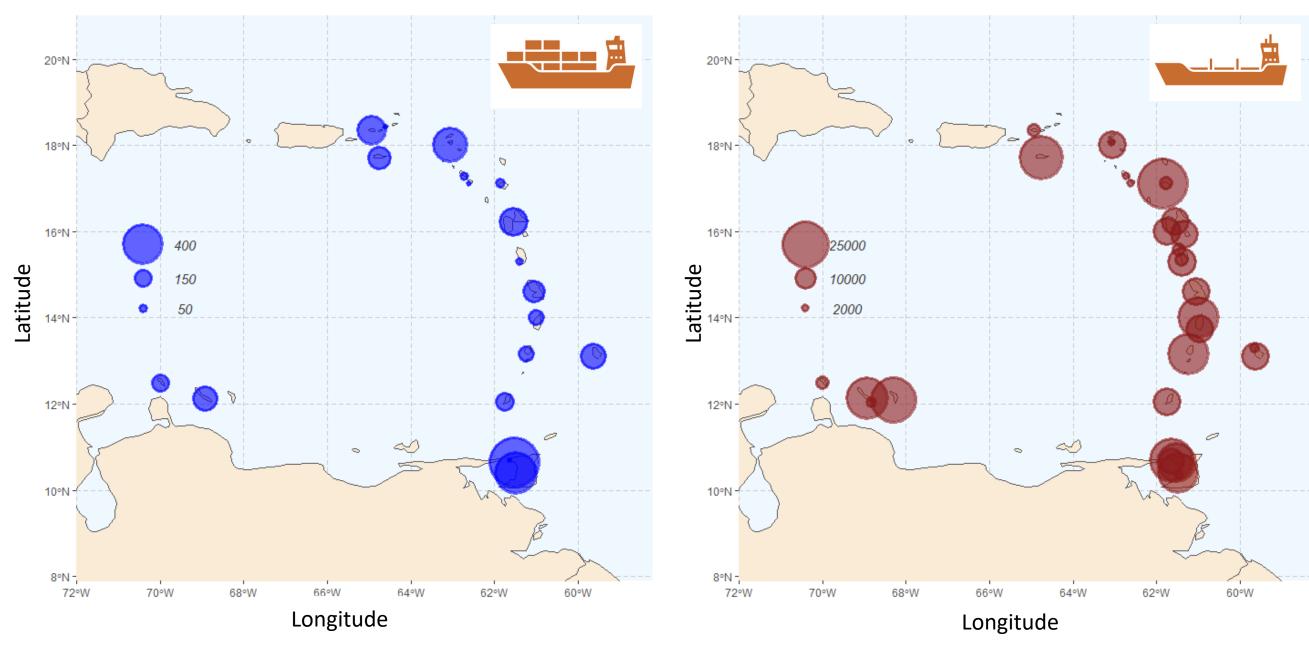
## **Enrichment**

The vessel database is enhanced through a method of enrichment which aims at retrieving vessels that are not described in IHS Markit's data by using the clusters of precise vessel stopping location, and considering that similar vessels tend to stop at the same berth.

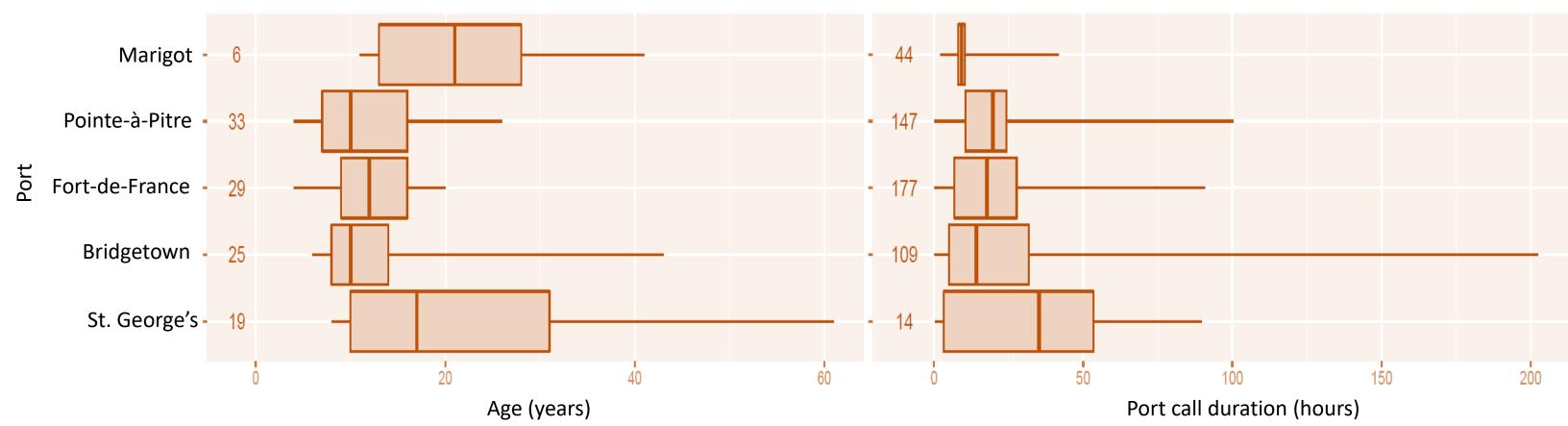


# RESULTS

- Values are given for each port, for each vessel type and along various parameters: age or vessel tonnage, port call duration or total number of calls.
- They are validated in comparison with a UNCTAD database (article in progress)



Number of port calls for container vessels (left) and mean tonnage of bulk vessels (right)



Age of general cargo vessels and port call duration of tanker vessels for 5 ports of the Lesser Antilles

# **UPCOMING WORK...**

- Determination of inter-ports journeys, and of vessel trajectories in the Caribbean
- Characterisation of networks and subnetworks between ports, according to vessel types and port calls characteristics
- Development of a geovisualisation dashboard of port calls and related indicators, enabling the assessment of port activity, traffic pressure applied on ports and port vulnerabilities.

This poster has received funding from the European Union's Horizon 2020 research programme under the Marie Skłodowska-Curie grant agreement No 899546. It also received funding from IUEM (Institut Universitaire Européen de la Mer) and from France, handled by the ANR (French National Research Agency) through the programme "Investissements d'avenir": the Labex DRIIHM under grant agreement ANR-11-LABX-0010 and the programme ISblue "Interdisciplinary Graduate School for the Blue Planet", within France 2030, under grant agreement ANR-17-EURE-0015.

















