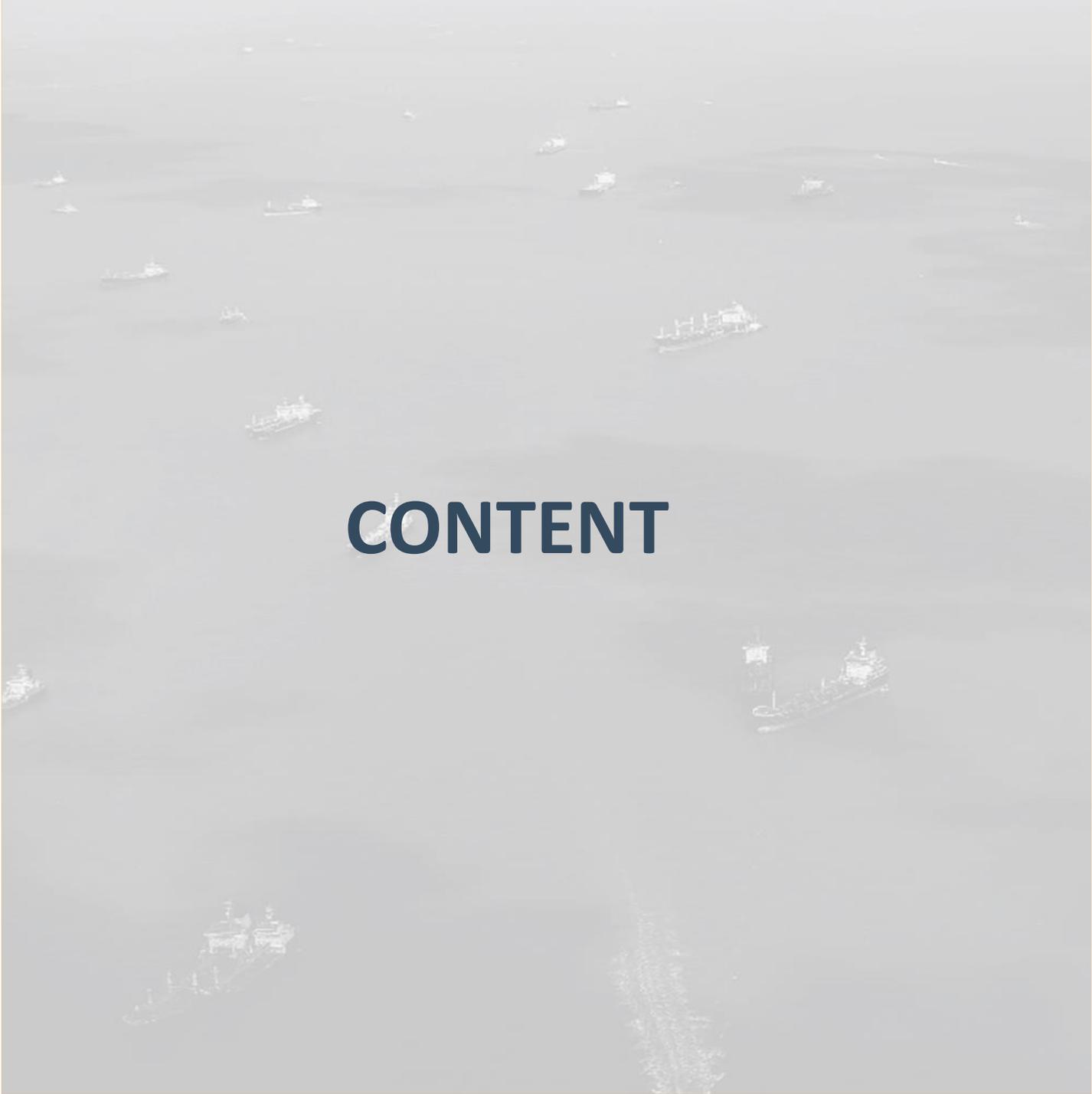


The Panama Canal and Suez Canal
transit information
from AIS

**A building block towards green
corridors implementation**



Data Caliber Group



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CONCLUSIONS

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Gabriel Fuentes

Rebeca Cáceres



Hussein Ashry



Javier Díaz



Data Caliber Group

THE EXTENDED TEAM

- Jonathan Gessendorfer
- James Hughes
- Joel Morgan
- Sean Lovell
- Habib Khan

Thank you

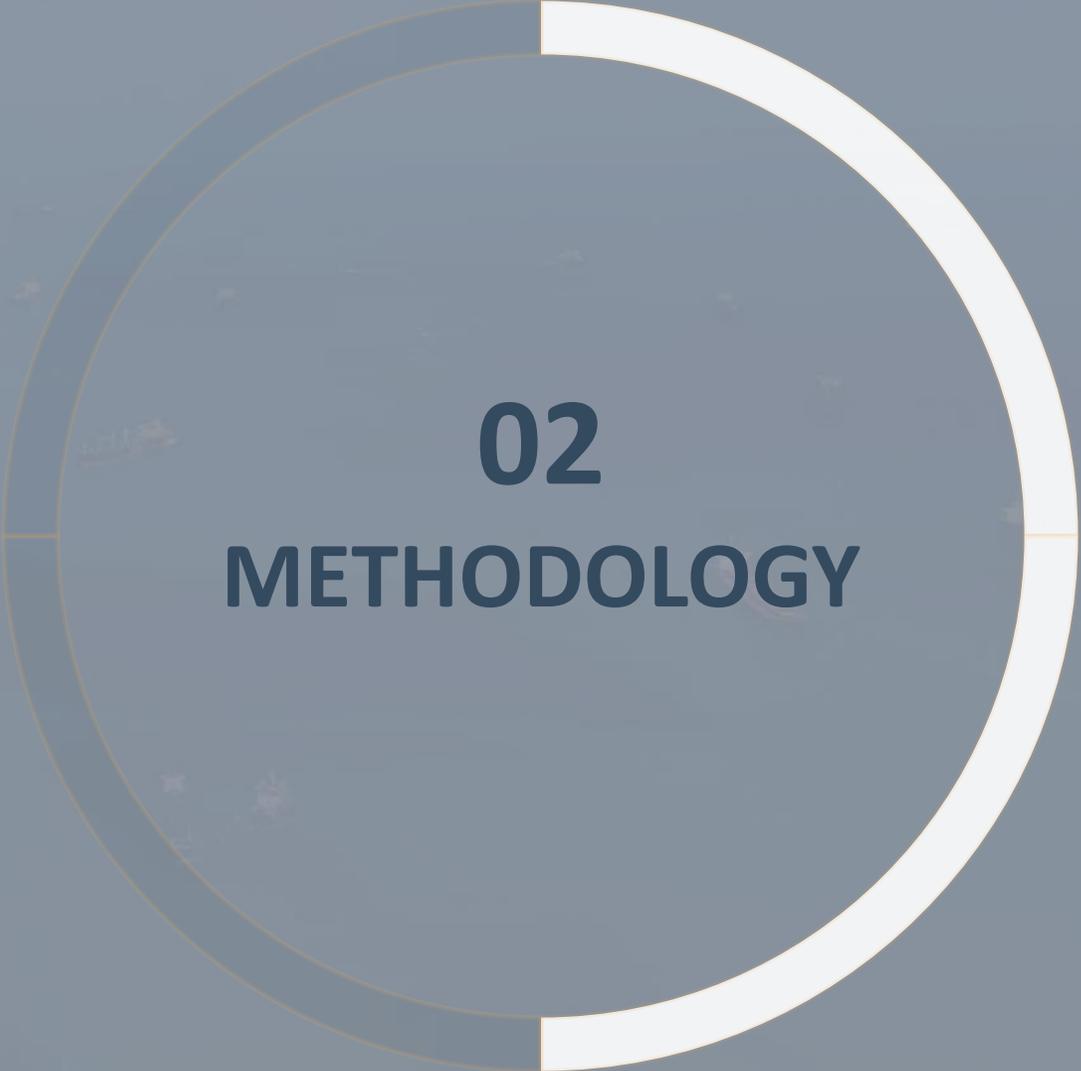


01

MOTIVATION

MOTIVATION

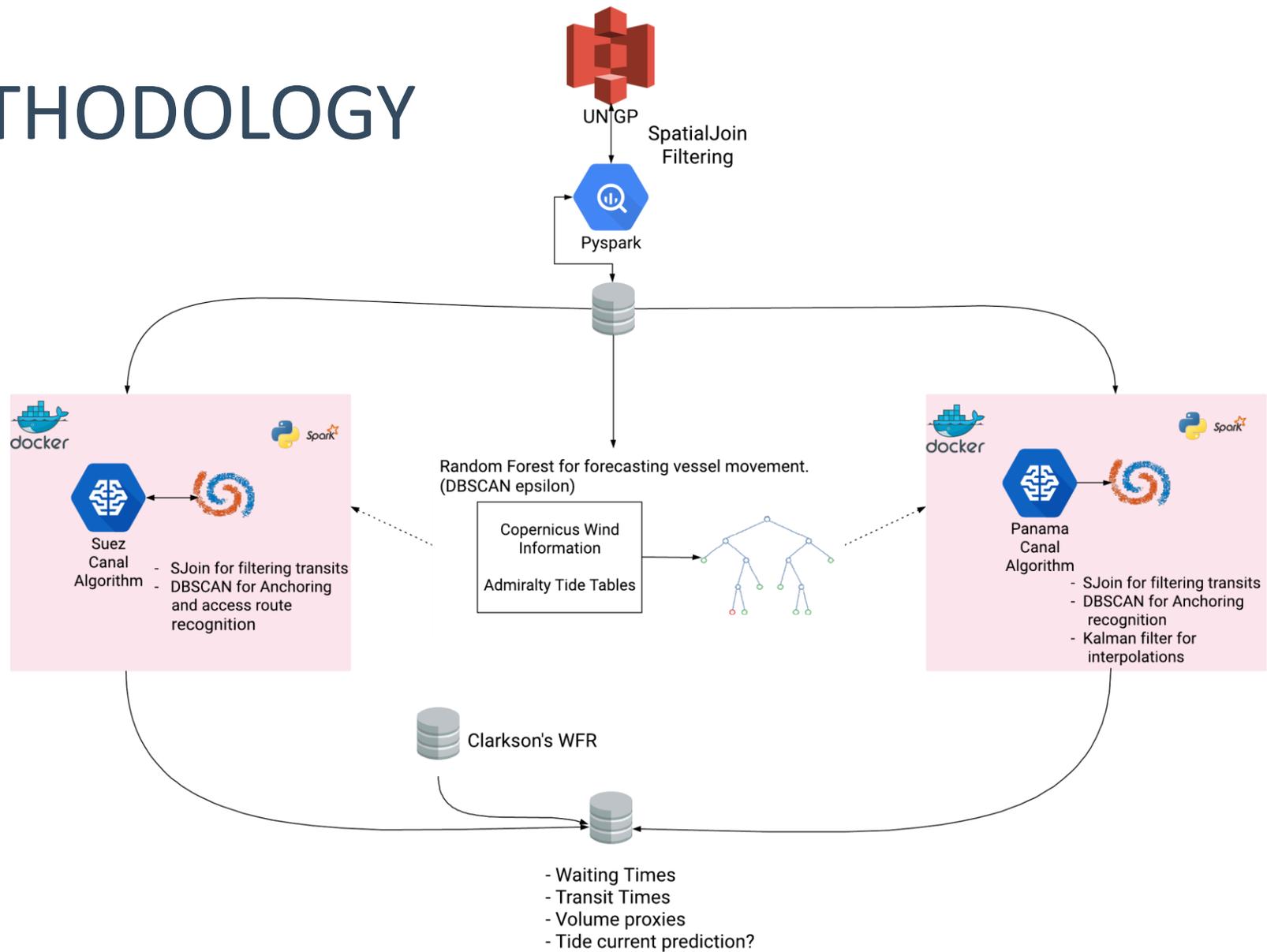
- The Panama Canal and the Suez Canal passes 6% and 13% of world trade by volume respectively
- Vessel transit information could serve as a proxy of global trade measured from a reduced space (smaller sample)
- Micro-level statistics on canal transits performance (waiting and transit times) are important in the efforts of:
 1. Optimizing operations. Leading to a boost in trade, increase in income and employment (**SDG 8**)
 2. Reducing inefficiencies helping in reducing emissions (**SDG 13**) by implementing real time booking for Just In Time (JIT) arrival
 3. Partnering with “competitors” and allies (**SDG 17**) to implement actions with the potential of having a global impact



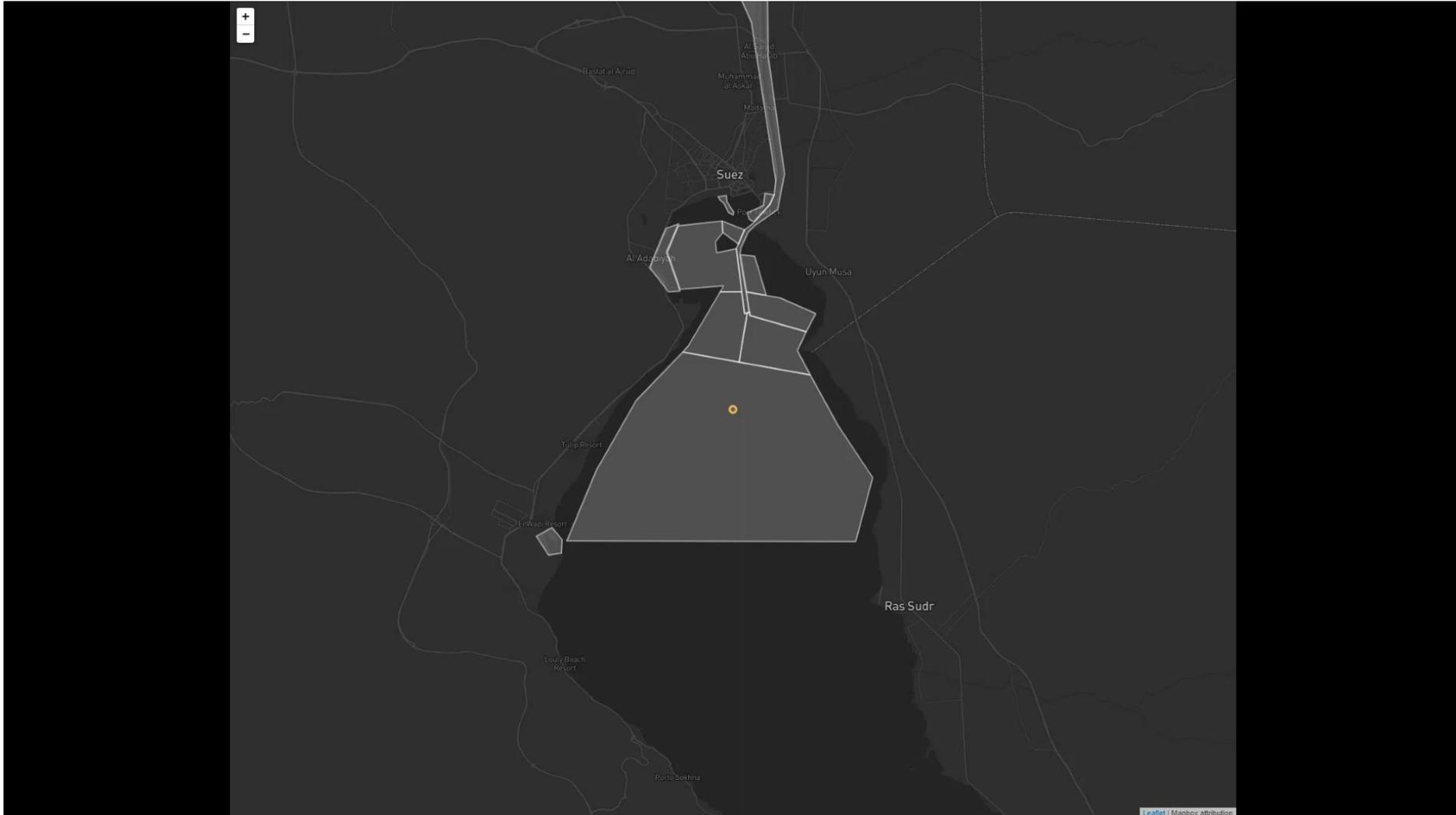
02

METHODOLOGY

METHODOLOGY



METHODOLOGY



METHODOLOGY

df - DataFrame

Index	imo	transit_bound	initial_anchoring_area	time_anchoring_in	time_anchoring_out	draught_in	draught_out	access	time_at_entrance	time_out_canal	transit_blocked
0	9176632	Northbound	E1-E12 S Anchorage	2018-12-04 20:13:37	2018-12-05 04:08:37	9.1	9.1	South Access	2018-12-05 04:48:36	2018-12-05 15:04:22.344381	False
1	9176632	Northbound	E1-E12 S Anchorage	2019-03-14 18:49:39	2019-03-15 02:58:05	9.2	9.2	South Access	2019-03-15 03:46:08	2019-03-15 13:37:39.089212	True
2	9176632	Southbound	North Anchorage	2019-08-31 13:40:06	2019-09-01 02:20:50	9.1	9.1	North Access East	2019-09-01 02:36:19.184983	2019-09-01 12:38:00	True
3	9269001	Northbound	E1-E12 S Anchorage	2020-06-10 16:12:28	2020-06-11 04:53:48	13.1	13.1	South Access	2020-06-11 05:54:19	2020-06-11 16:29:08.983875	True
4	9274939	Southbound	North Anchorage	2020-02-28 11:59:16	2020-02-29 03:52:27	12.1	12.1	North Access East	2020-02-29 05:42:55.932001	2020-02-29 16:00:59	True
5	9279111	Northbound	Green Island S Anchorage	2019-04-19 17:25:19	2019-04-20 14:16:49	10.1	10.1	South Access	2019-04-20 14:46:59	2019-04-21 00:37:04.064493	True
6	9279111	Southbound	North Anchorage	2019-05-22 19:57:28	2019-05-23 02:05:00	10.5	10.5	North Access East	2019-05-23 03:07:01.702093	2019-05-23 13:23:00	True
7	9279111	Northbound	Green Island S Anchorage	2019-07-21 18:55:00	2019-07-22 05:10:39	10.2	10.2	South Access	2019-07-22 05:44:33.510188	2019-07-22 16:22:47.256910	True
8	9279111	Southbound	North Anchorage	2019-08-19 16:13:43	2019-08-20 03:52:52	9.8	9.8	North Access East	2019-08-20 05:12:50.353362	2019-08-20 14:57:42	True
9	9279111	Northbound	Green Island S Anchorage	2019-10-29 11:27:09	2019-10-30 05:54:53	10.1	10.1	South Access	2019-10-30 06:25:13	2019-10-30 16:56:35.224206	True
10	9285471	Northbound	E13-E21 S Anchorage	2019-01-01 20:58:49	2019-01-02 04:27:23	12.3	12.3	South Access	2019-01-02 05:31:57	2019-01-02 15:50:03.288718	False
11	9285471	Southbound	North Anchorage	2019-02-10 14:47:40	2019-02-11 10:24:46	12.9	12.9	North Access West	2019-02-11 11:19:35.738571	2019-02-12 12:45:56	False
12	9285471	Northbound	E13-E21 S Anchorage	2019-03-06 19:55:03	2019-03-07 04:04:01	13.2	13.2	South Access	2019-03-07 05:02:02	2019-03-07 15:23:31.900559	False
13	9285471	Southbound	North Anchorage	2019-04-13 19:42:14	2019-04-14 08:54:26	13.4	13.1	North Access West	2019-04-14 09:51:36.723313	2019-04-15 16:16:45	False
14	9285471	Southbound	North Anchorage	2019-06-14 09:59:23	2019-06-14 10:50:41	12.4	11.8	North Access West	2019-06-14 11:30:12.067826	2019-06-16 11:35:23	False
15	9285471	Northbound	E13-E21 S Anchorage	2019-07-19 21:15:43	2019-07-20 03:06:46	14.5	14.3	South Access	2019-07-20 03:44:34	2019-07-20 18:21:43.044719	False



03

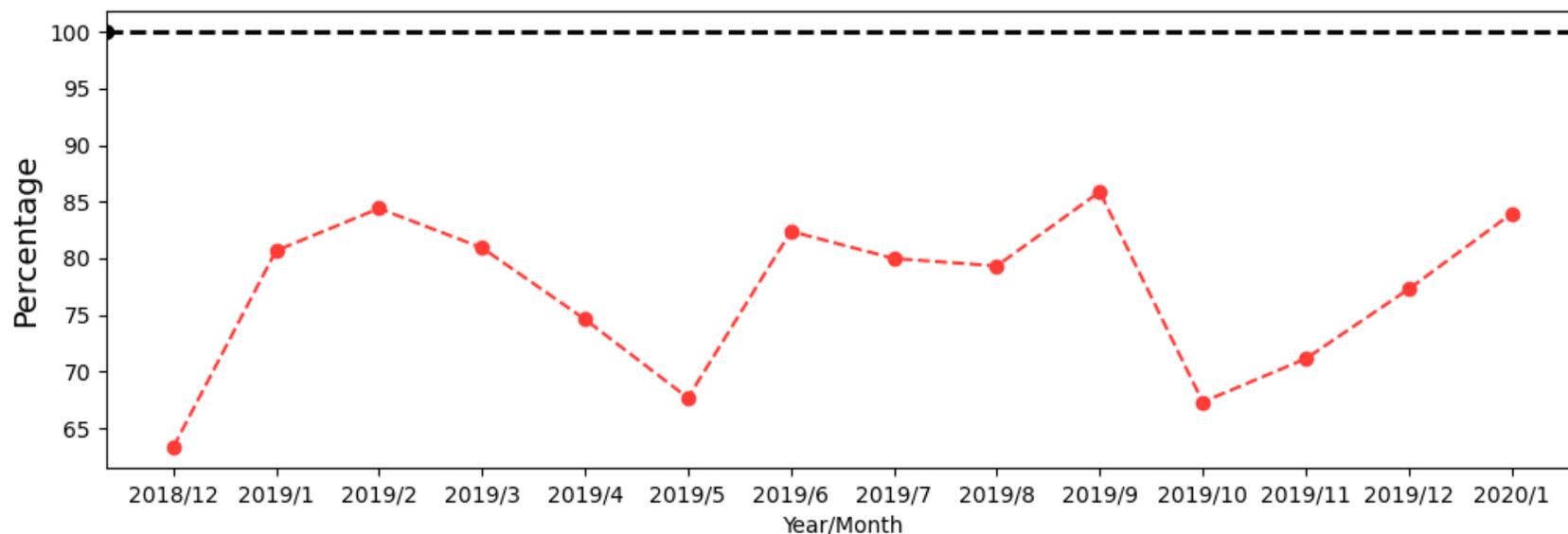
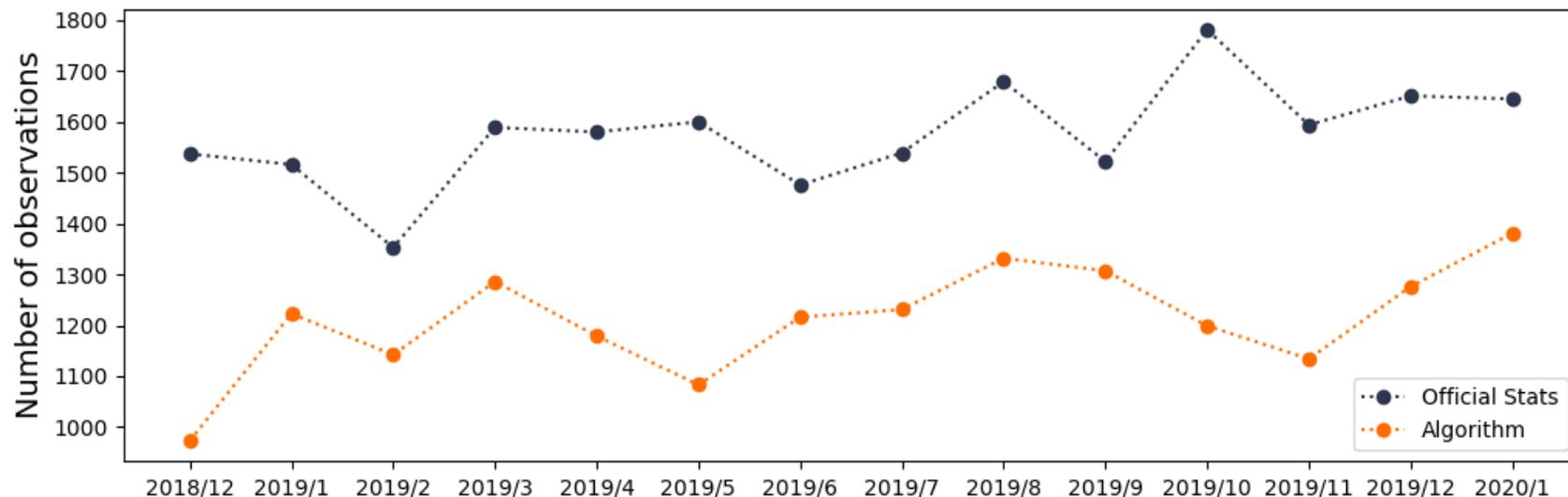
EMPIRICAL RESULTS

SUEZ CANAL



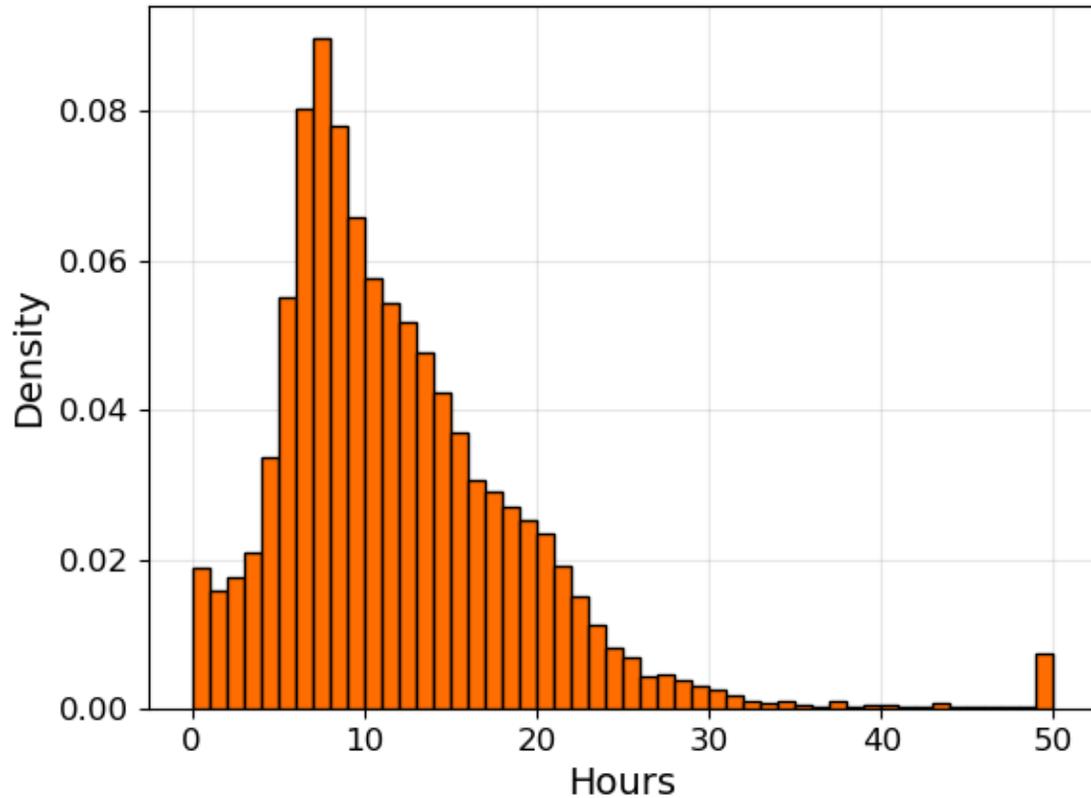
Suez Canal algorithm performance

63%
to
86%



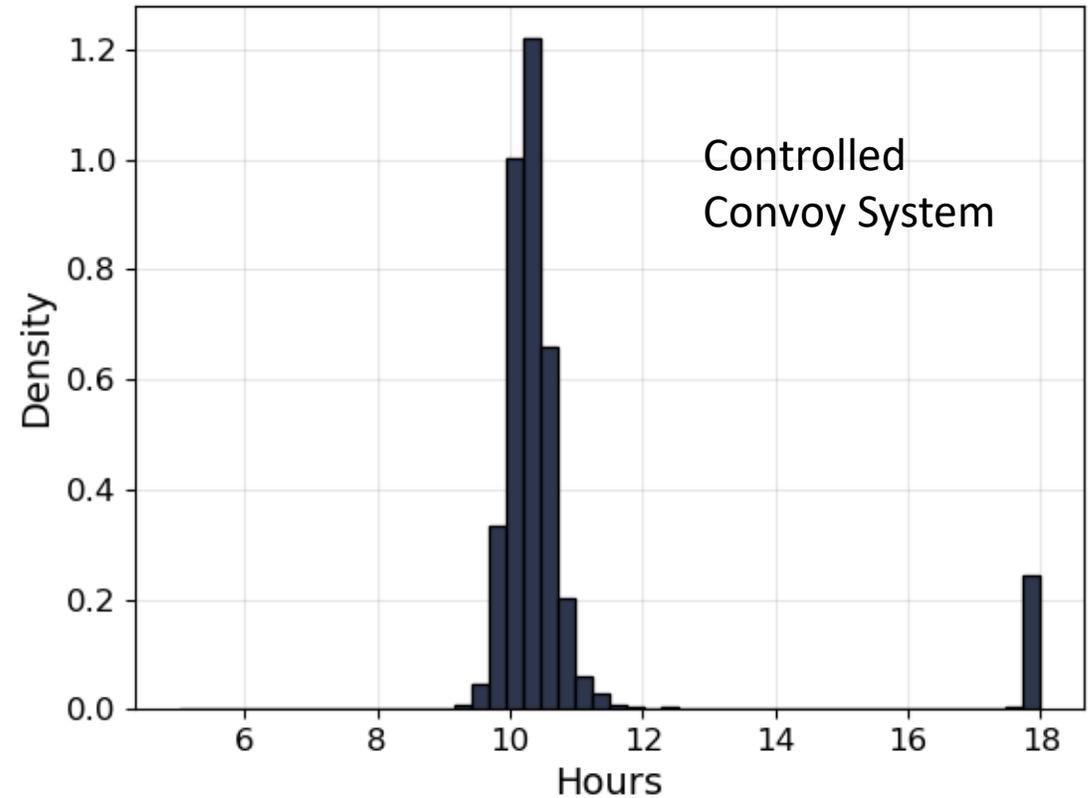
SUEZ CANAL

Suez Waiting Time



*The last vertical bar includes all records larger than 50 hours

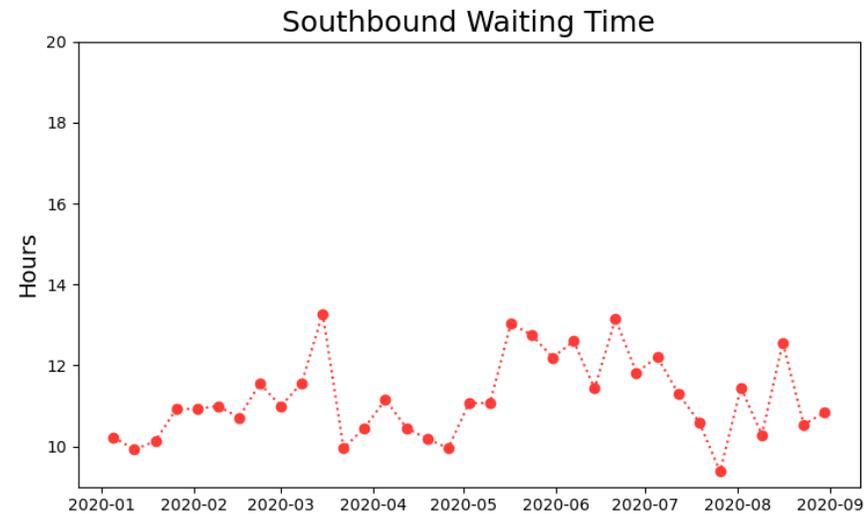
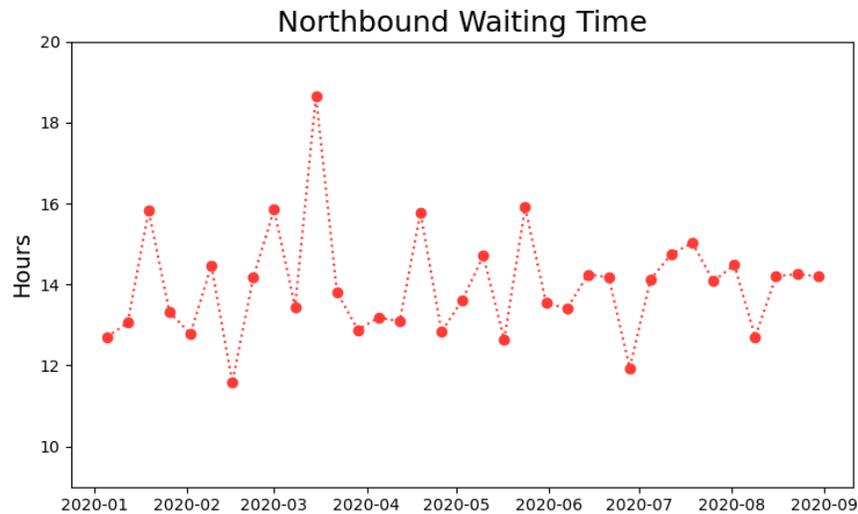
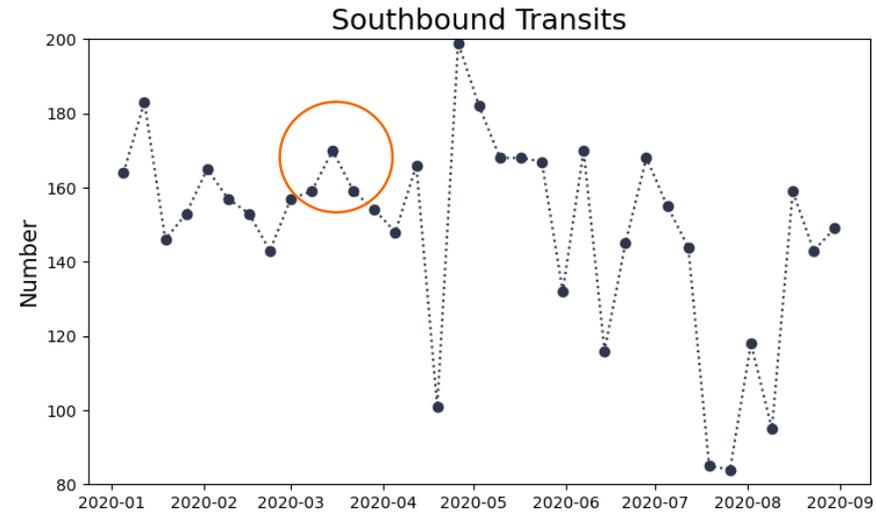
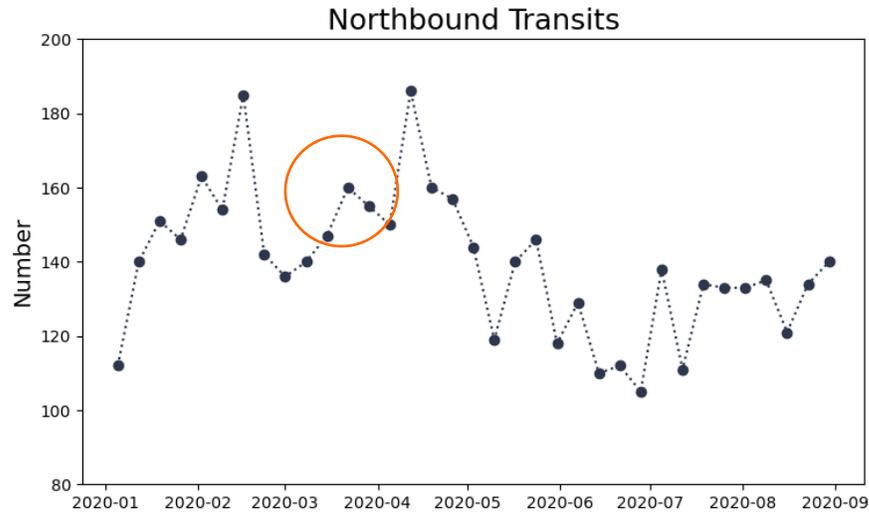
Suez Transit Time



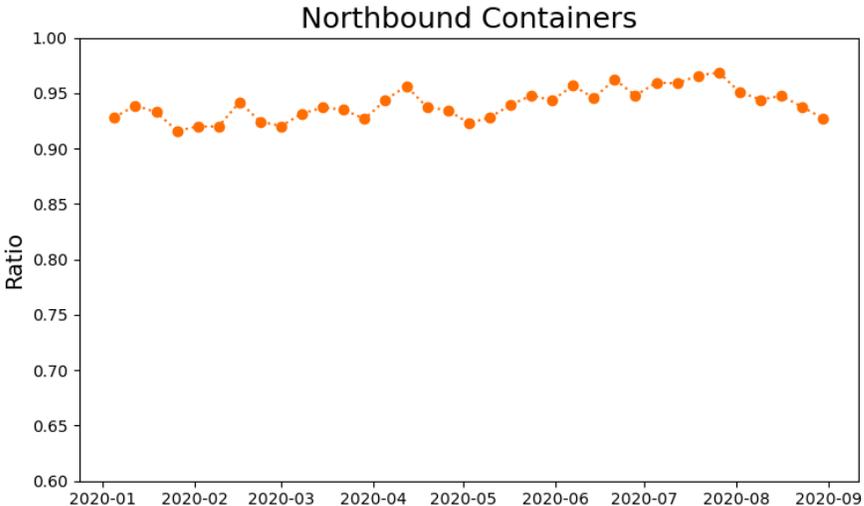
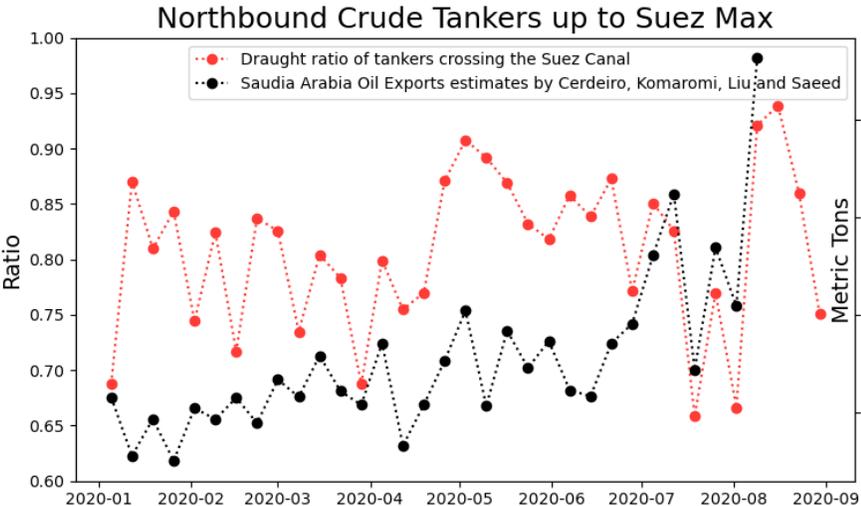
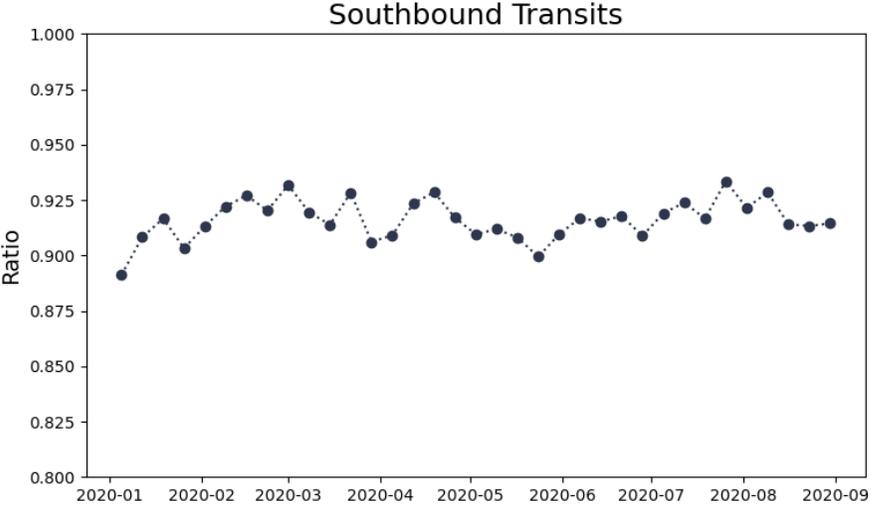
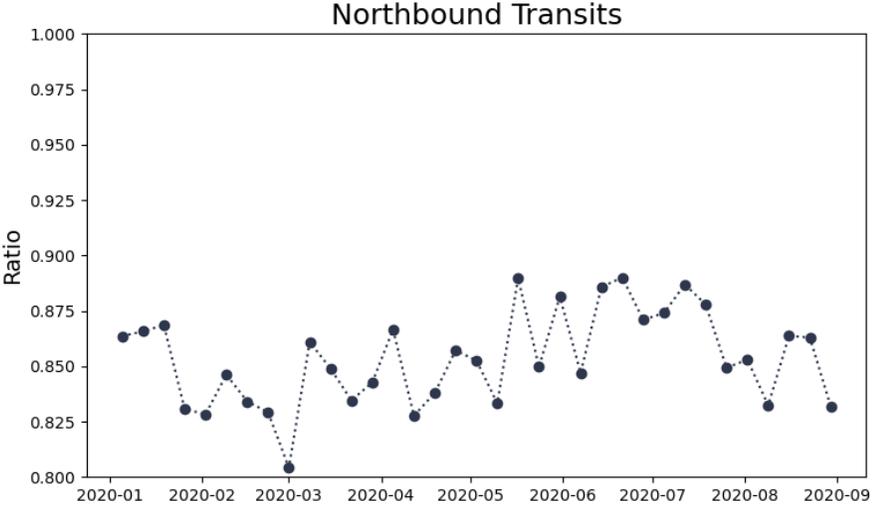
*The last vertical bar includes all records larger than 18 hours

SUEZ CANAL

WHO declares a COVID 19 pandemic



SUEZ CANAL (Draught Ratio)

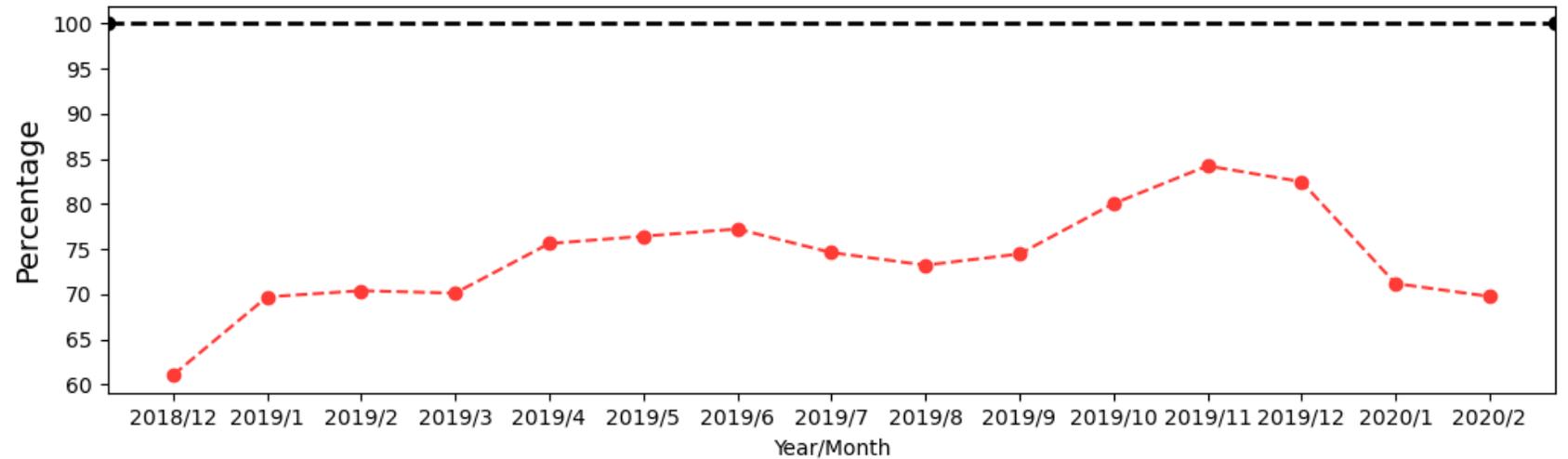
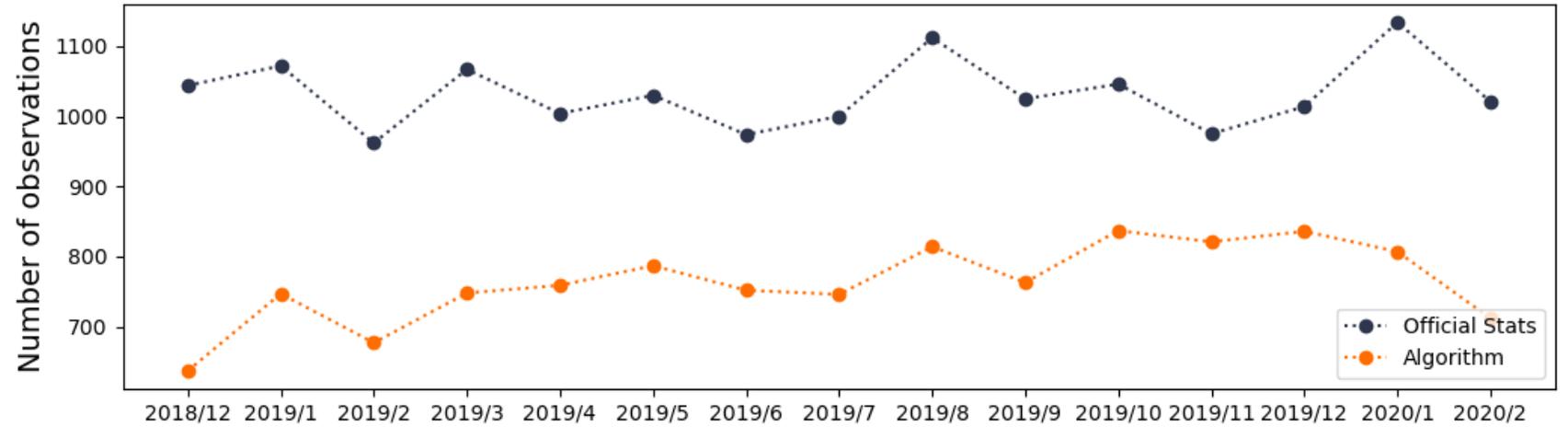


PANAMA CANAL



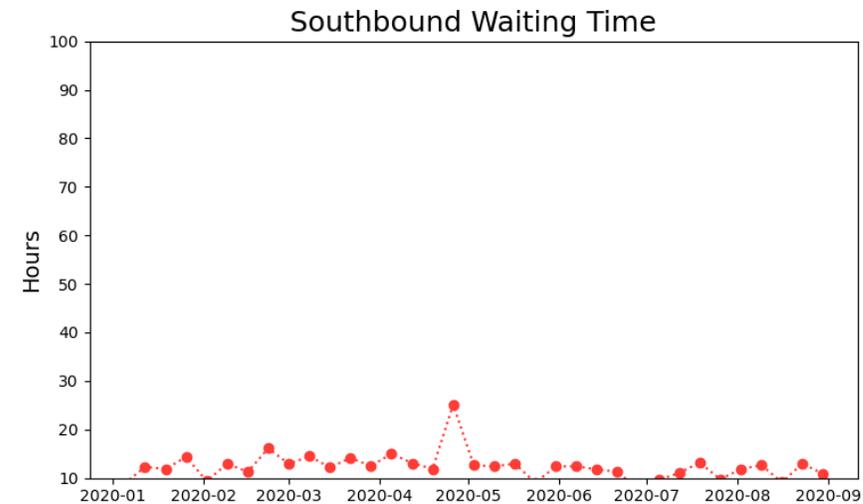
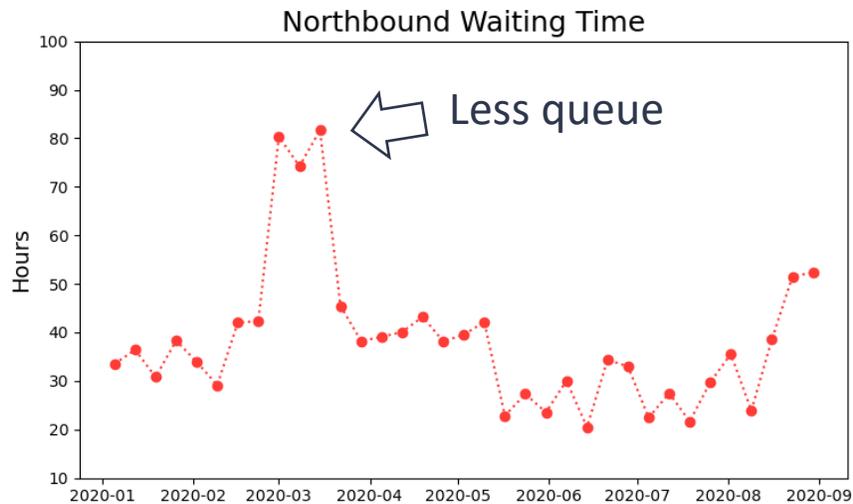
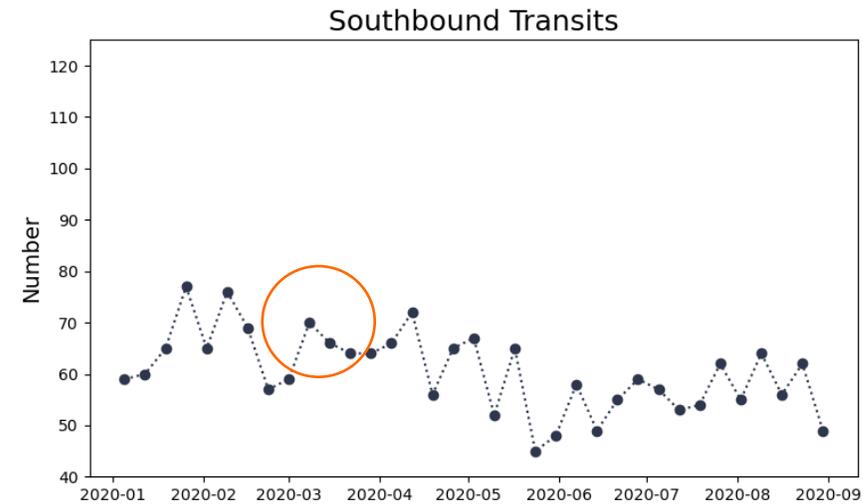
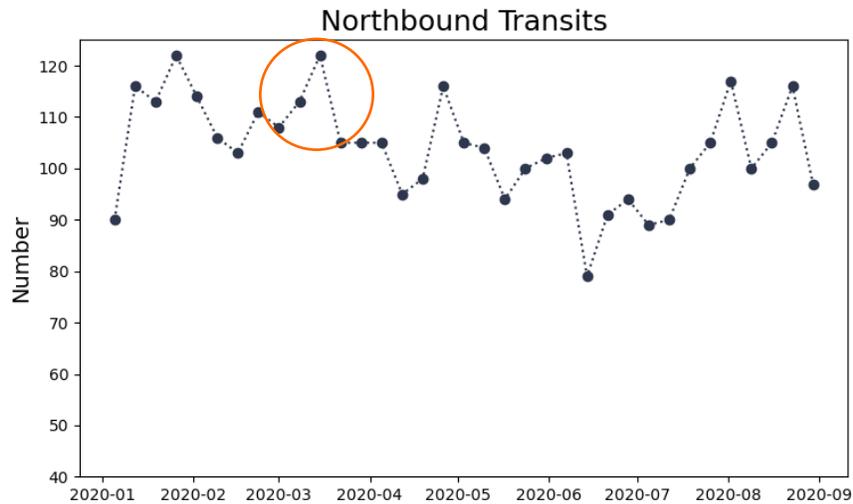
Panama Canal algorithm performance

60%
to
83%

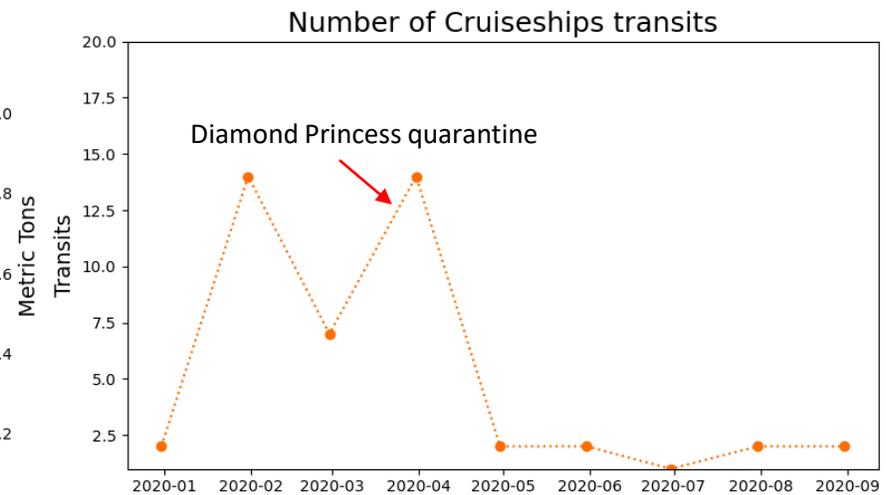
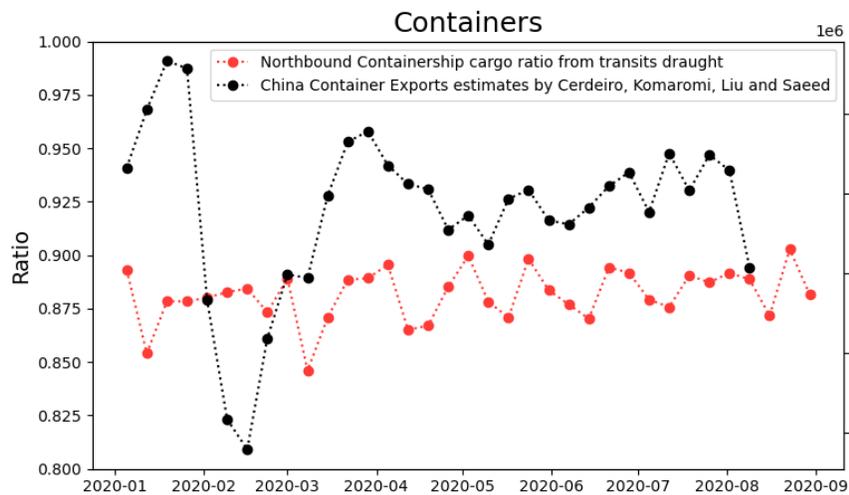
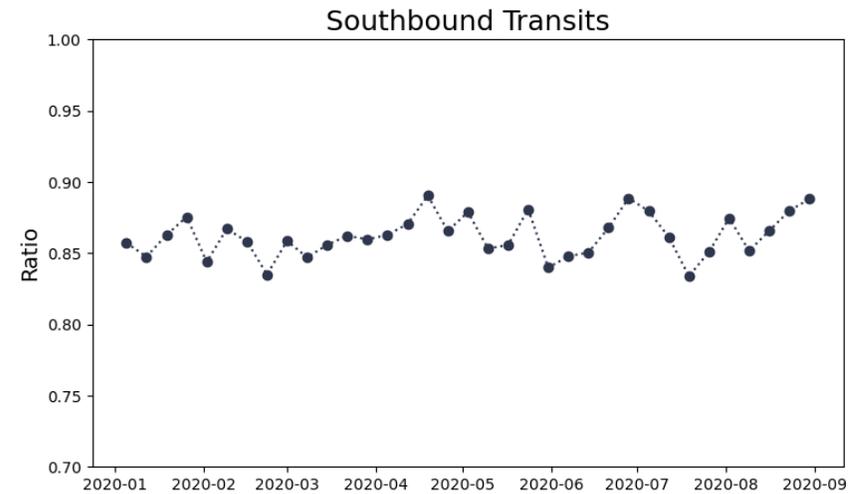
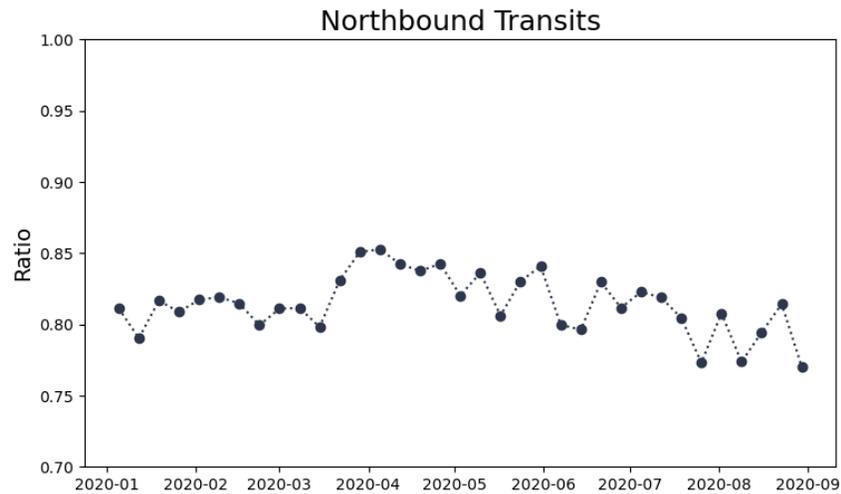


PANAMA CANAL

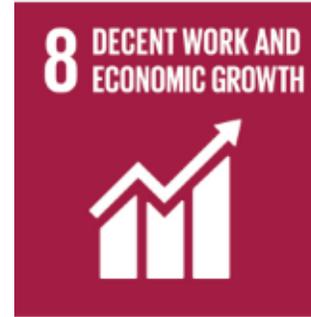
WHO declares a COVID 19 pandemic



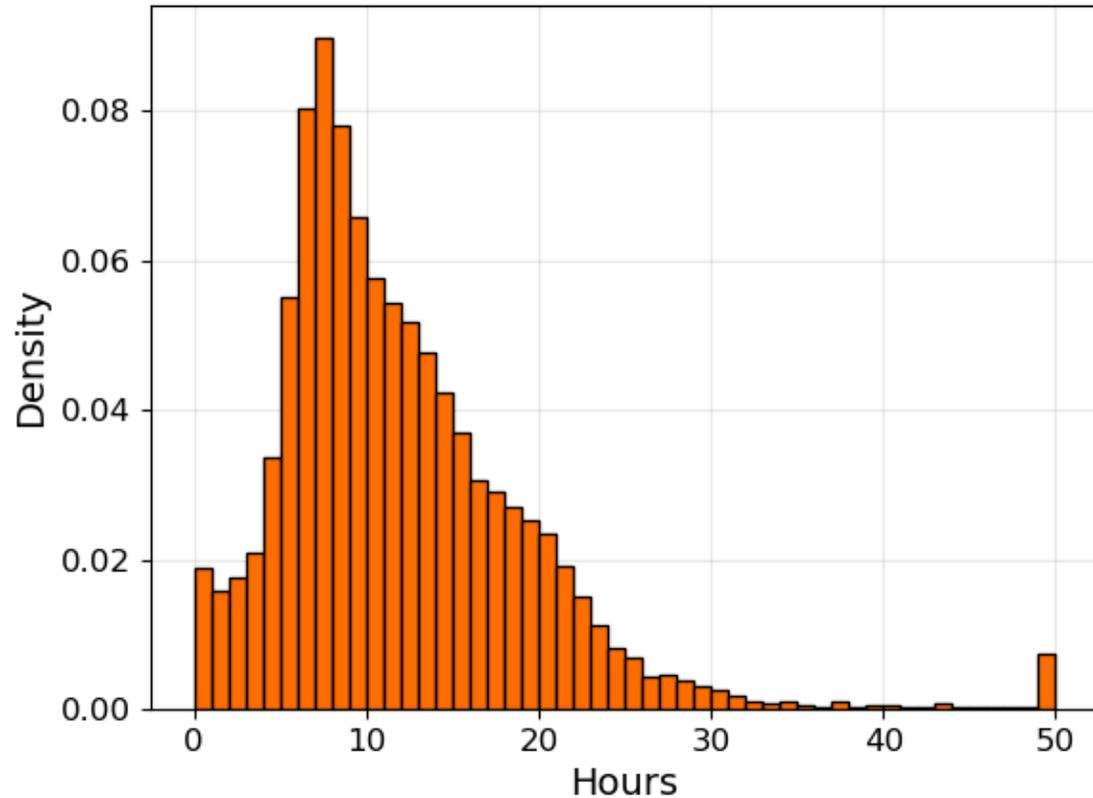
PANAMA CANAL



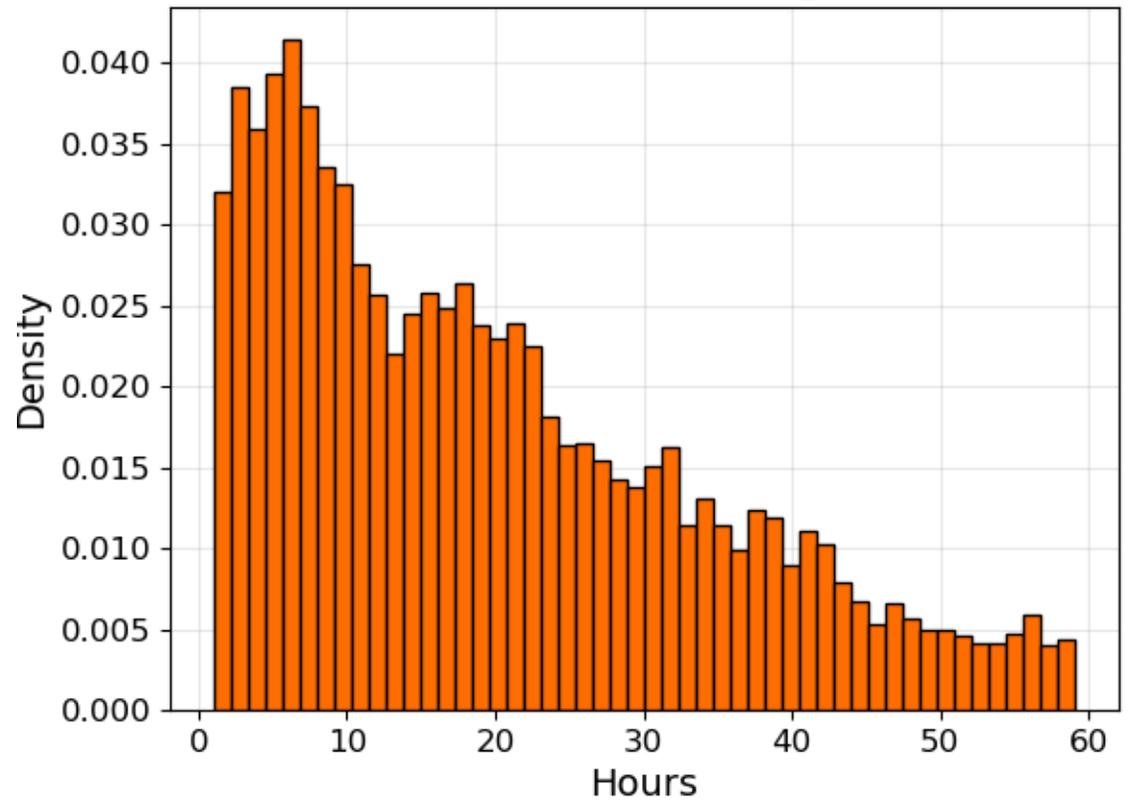
PANAMA CANAL



Suez Waiting Time



*Without vessels entering JIT
Panama Canal Waiting Time



JUST IN TIME ARRIVAL FRAMEWORK

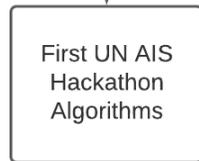


- Just in time Arrival Guide was recently launched (August 2020) by GEF-UNDP-IMO GloMEEP and members of GIA
- Main barrier of implementation is the exchange of information between stakeholders
- What if the only stakeholders involved are the vessel and the Port and what they need is to build information supplied by AIS?
- Panama Canal manages the vessel transiting assignment and can clear vessels for transit under a Single Window platform without interaction of the country's authorities
- For the Panama Canal booking system, JIT exists under demand. However, for better utilization, “green slots” assignments could be implemented to reduce emissions and water utilized by lockage.
- Vessels waiting time as supplied by our algorithm serves as measurement of implementation success
- Ship-owners benefits in terms of voyage planning and fuel cost management

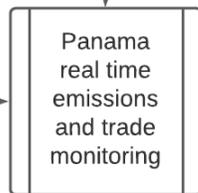
GREEN CORRIDORS FRAMEWORK



Stage 1



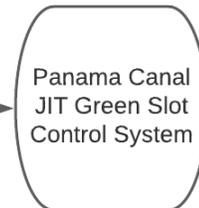
Stage 2



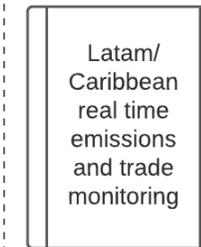
Stage 3



Green Slot



Stage 4



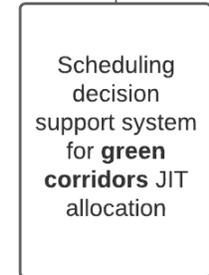
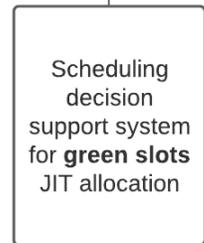
Stage 5

Green Corridors



- Deliverables
- Panama Canal operations recognition algorithm
 - Suez Canal operations recognition algorithm

- Deliverables
- Emissions Bottom Up method
 - Top down. Panama registry?
 - Trade information for local ports
 - Waiting/Services times distribution of local ports and the Panama Canal





04

CONCLUSIONS

CONCLUSIONS

- We demonstrated that more granular statistics can be obtained from higher AIS frequency and feature engineering of the Canal operations. Well defined interpolation methods and parameters selections are paramount for accurate calculations.
- Both the Panama and the Suez Canals shows signals of being gauges of global trade health. Additional experiments such as econometric and time series analysis will help in testing these hypothesis
- The statistics built from AIS and the few barriers affecting the JIT policy implementation, signals that the Panama Canal might have an incentive to be among the early implementers of “green” slot policies for JIT arrivals
- The methods presented by this group could ease the implementation of policies which requires continuous and in real time monitoring
- Our team benefited from the continuous exchange of information between members from academia, industry and government from three different countries. Moreover, the exchange gave us a direct taste of the benefits of cooperation to design tailor made solutions to attend global issues.



THANK YOU

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gabrielfuentes.org**