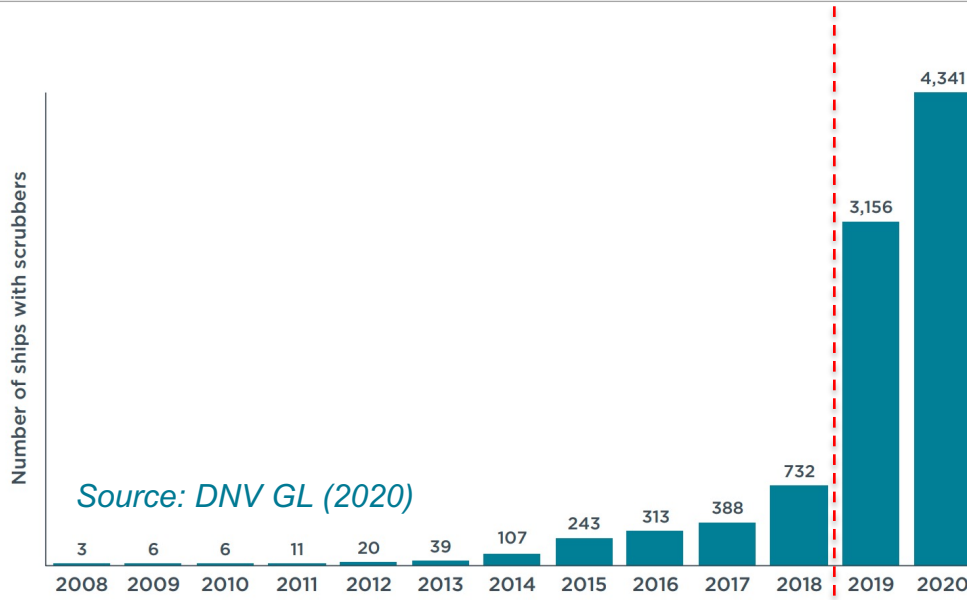


Global scrubber washwater discharges under IMO's 2020 fuel sulfur limit

Liudmila Osipova
Bryan Comer

09/06/2021
Webinar

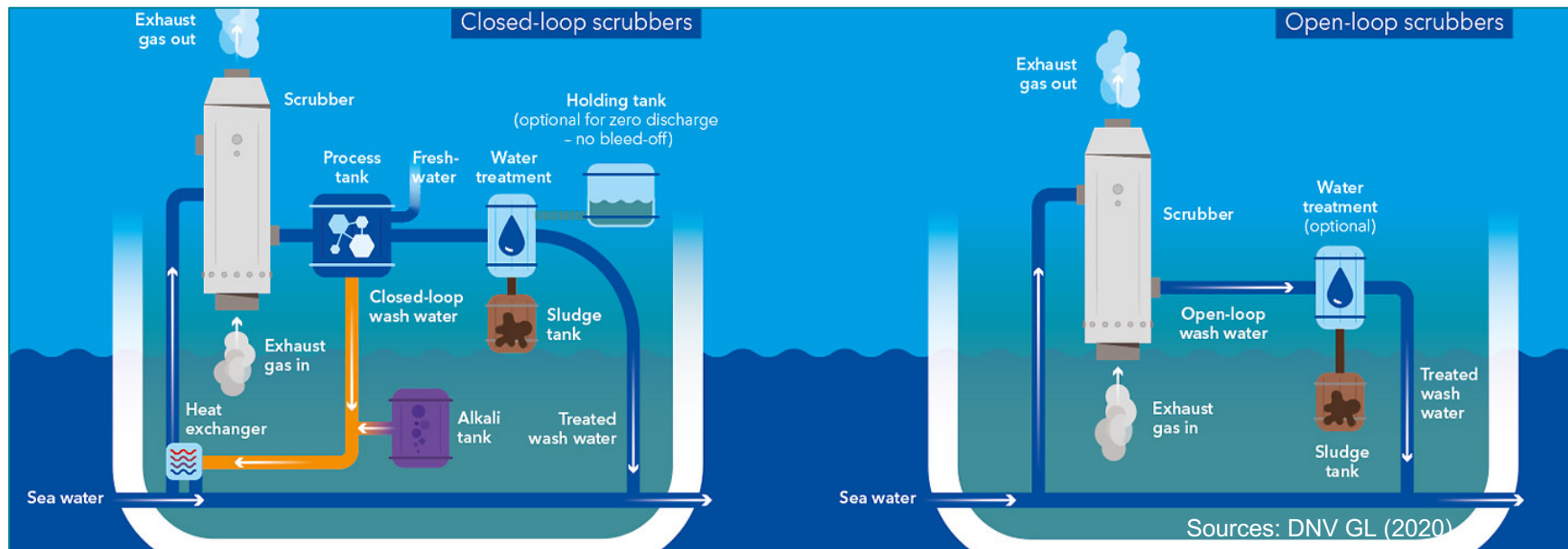
IMO's 2020 fuel sulfur limit



2020 sulfur limit:
0.5% maximum allowable
sulfur content **or alternative
compliance technology**

Scrubbers uptake in 2019 was
four times higher than in the
previous year

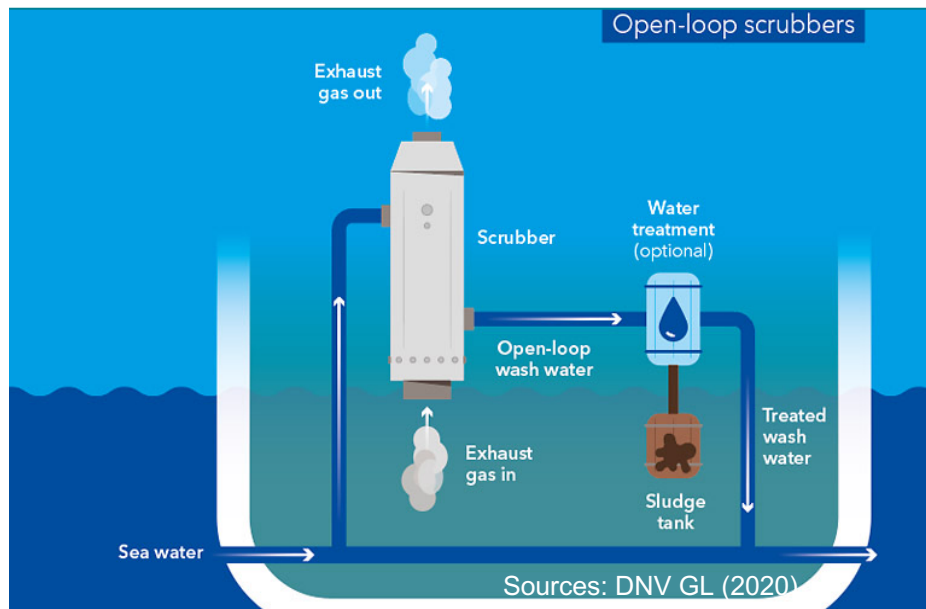
Scrubbers. Washwater



Scrubbers. Washwater

Scrubber washwater

- Acidic (low pH value)
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Nitrates
- Heavy Metals



Comer, B., Georgeff, E., & Osipova, L. (2020). *Air emissions and water pollution discharges from ships with scrubbers*. ICCT. <https://theicct.org/publications/air-water-pollution-scrubbers-2020>

Modelling global scrubber washwater discharges under IMO's 2020 fuel sulfur limit

Datasets and model assumptions

Shipping traffic (2019)

Systematic Assessment
of Vessels Emissions
(SAVE)

IHS Markit

AIS Exact Earth

Ships with scrubbers

Clarksons WFR, 2020



Ship energy demand

Washwater discharge (t)
 $[TED * R]$

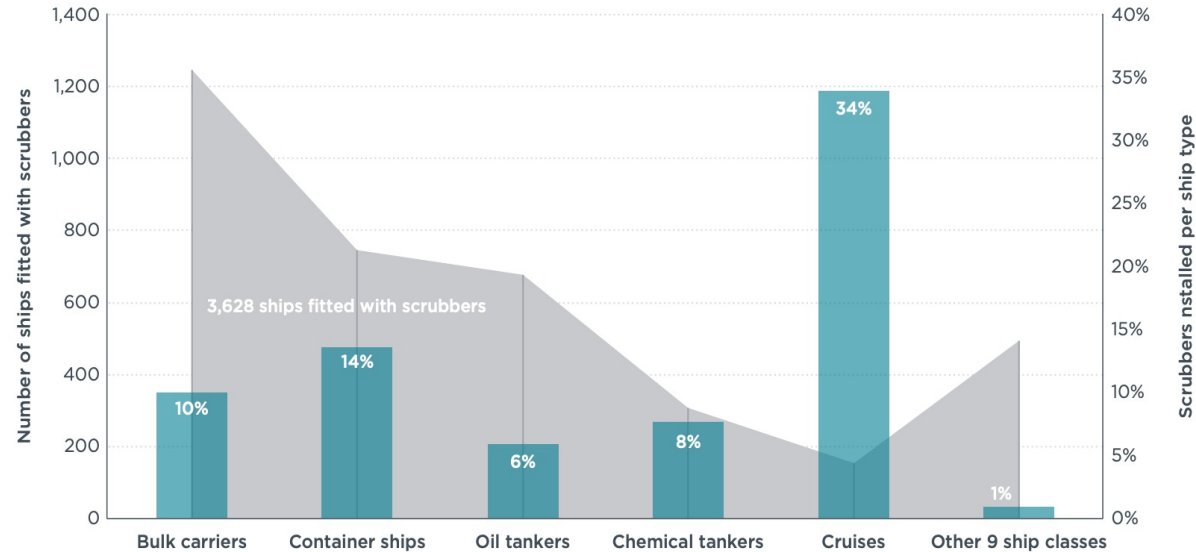
TED - energy demand per ship, MWh

R - scrubber washwater flow rate, t/MWh

$R_{\text{open loop}} = 45 \text{ t/MWh}$

$R_{\text{closed loop}} = 0.1 \text{ t/MWh}$

Results. Fleet of scrubber-equipped ships

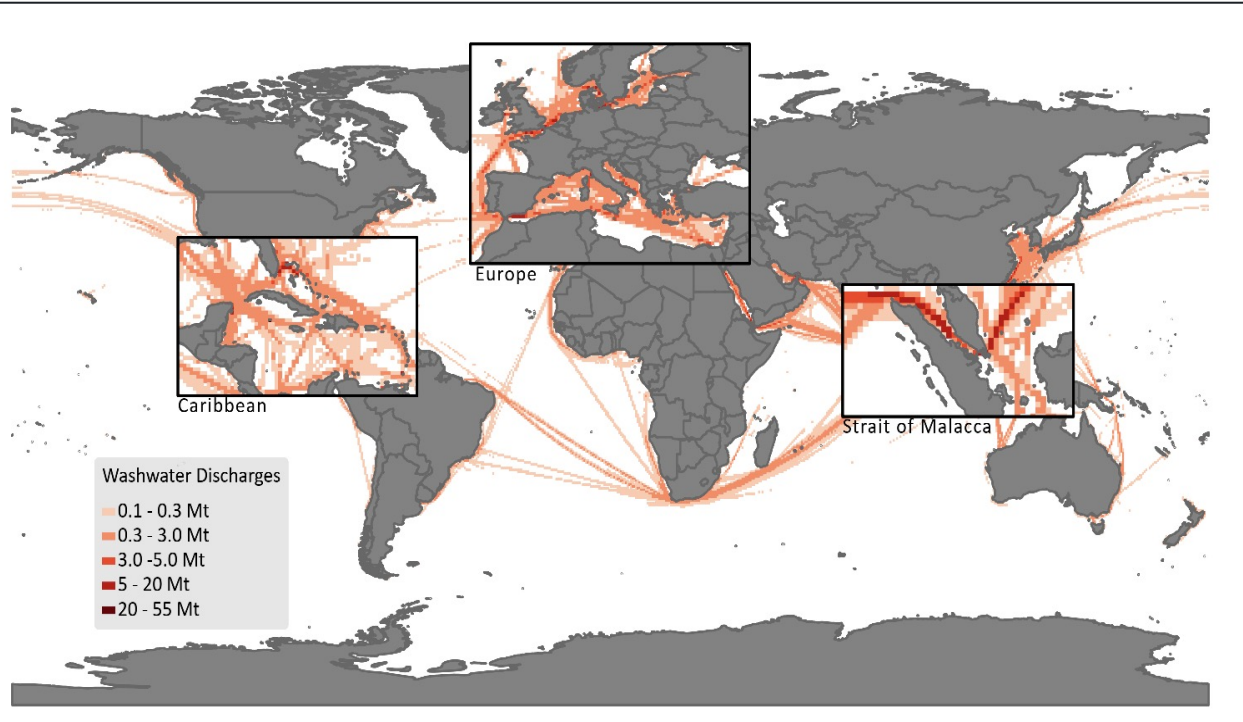


Highlights

3628 ships: 85% open-loop, 14% hybrid, 1% closed-loop

- Bulk carriers, container ships and oil tankers represent 74% of all scrubbers installations
- Cruise ships have the largest share of their fleet outfitted with scrubbers

Results. Discharged washwater globally

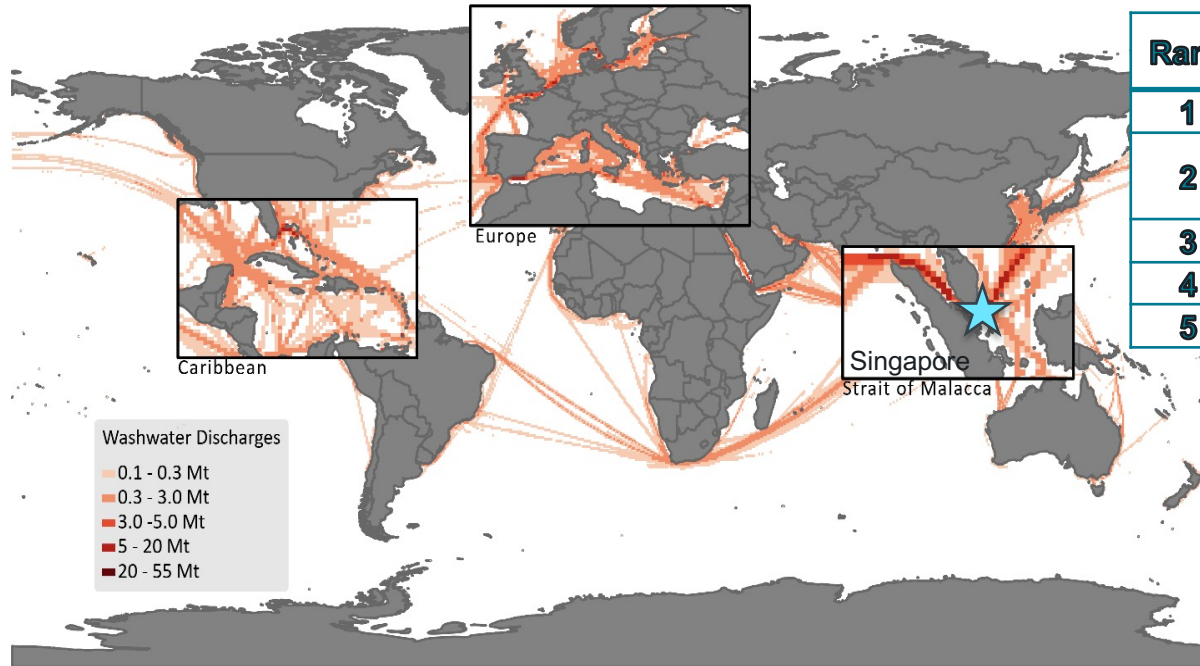


Highlights

Globally: 10 bln t of washwater

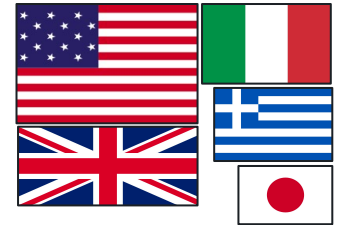
- 421 mln t (4%) will not be discharged due to national regulations
- 80% in EEZ (200 NM)
- Three hotspots: Caribbean, EU and Strait of Malacca

Results. Discharged washwater globally

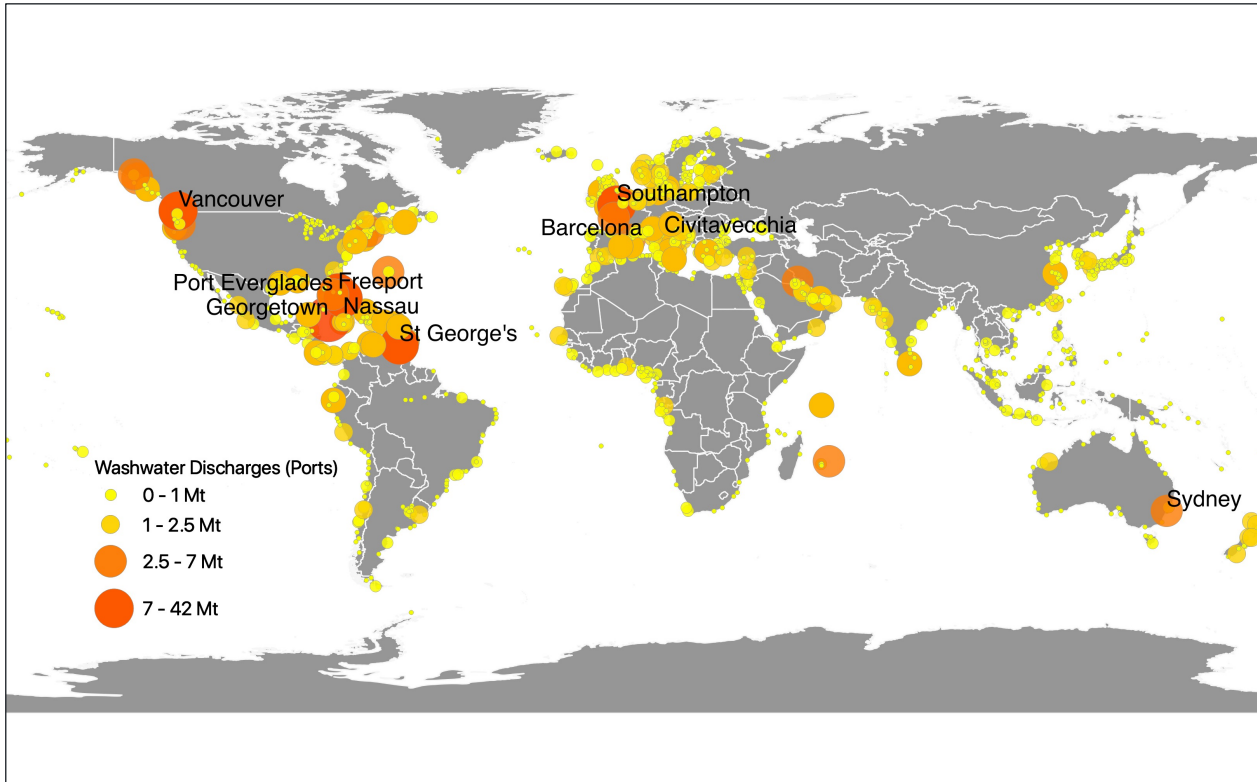


Top 5 countries by washwater discharge

Rank	Name	Area (km ²)	Washwater discharges
1	US	875 000	147 mln t
2	UK	224 000	125 mln t
3	Italy	155 000	102 mln t
4	Greece	184 000	95 mln t
5	Japan	397 000	76 mln t



Results. Ports



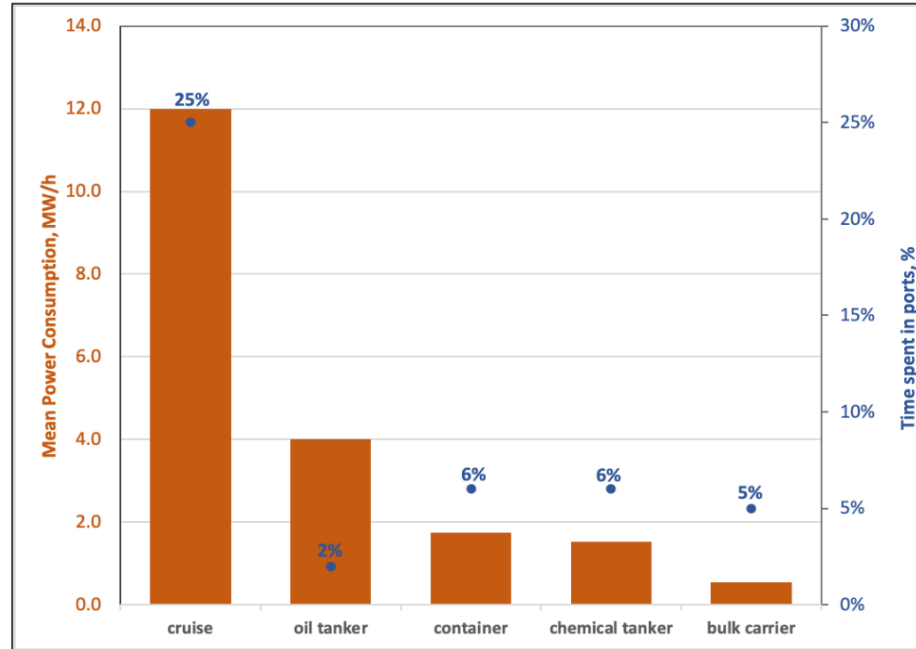
Highlights

Ports: 300 mln t of wastewater

Top 10 ports:

- 83 mln t
- 50% discharges belong to **Georgetown**, Cayman Islands
- **Cruise ships** responsible for 74-100% of discharges

Results. Ports



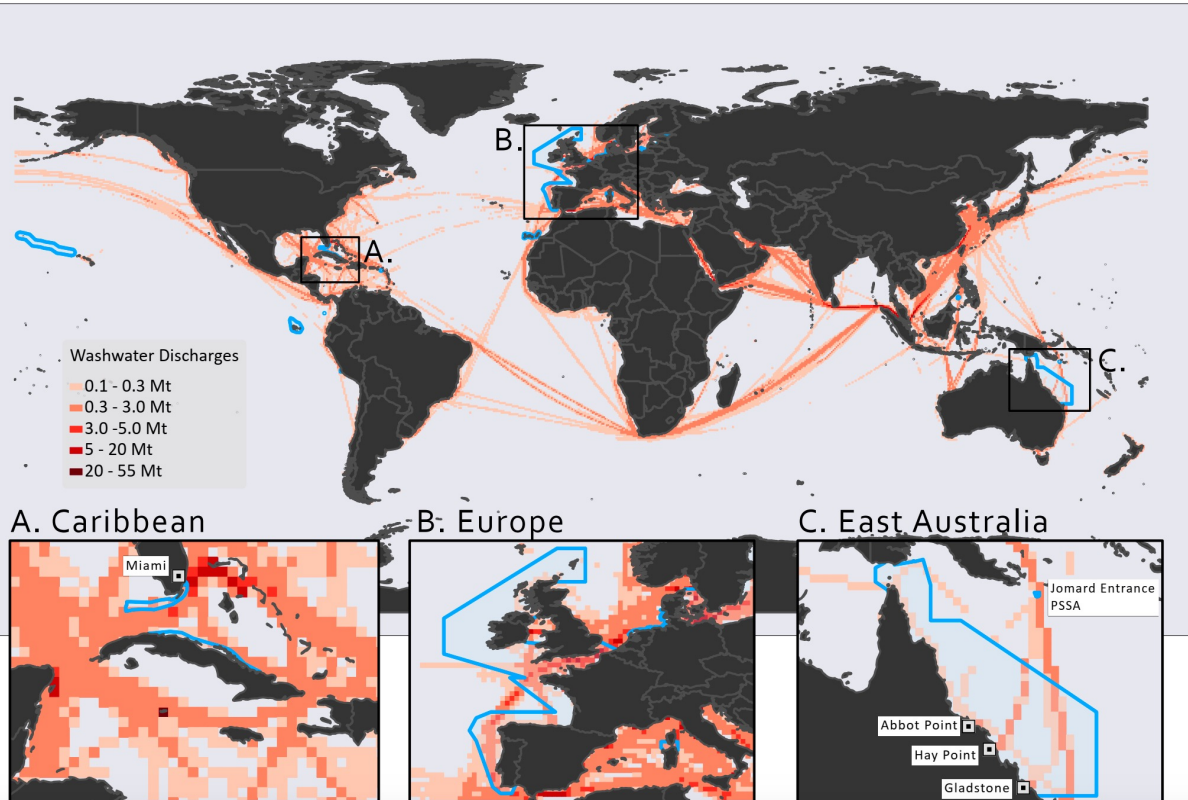
Highlights

Ports: 300 mln t of washwater

Top 10 ports:

- 83 mln t
- 50% discharges belong to **Georgetown**, Cayman Islands
- **Cruise ships** responsible for 74-100% of discharges

Results. Particularly Sensitive Sea Areas



Highlights

PSSAs: 665 mln t of wastewater

- 91% of wastewater belongs to **Western European waters** and **Baltic Sea**
- 32 mln t will be released in the Great Barrier Reef, **Australia**
- **Caribbean:** three PSSAs cover only 1% of all PSSAs area

Policy recommendations

At the IMO level

- Scrubber washwater ban in PSSAs and near-shore waters

At the regional level

- Scrubber discharges ban in national waters
- On-land facilities to properly dispose of sludge
- Joint efforts of the nearby country (e.g. Strait of Malacca)

At the port level

- Scrubber discharges ban in individual ports
- Enforcement of using of onshore power in ports
- Water and sediment pollutants monitoring in ports

Questions?

San Francisco ●

★ Washington, DC
(headquarters)

● Berlin

● Beijing

● New Delhi

Mexico City ○

Bogotá ○

● São Paulo

○ Jakarta

