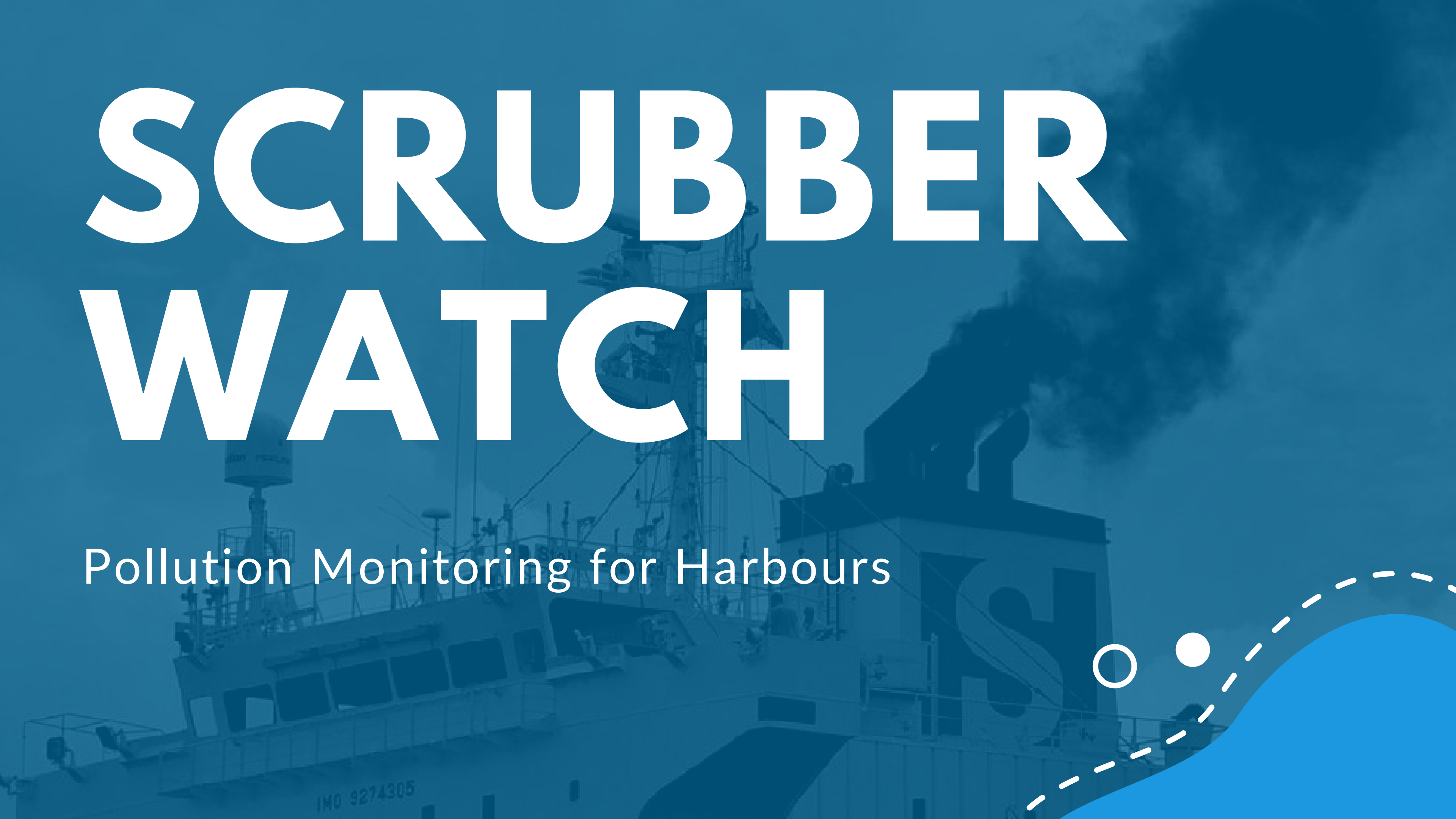


SCRUBBER WATCH

Pollution Monitoring for Harbours



FORGET DIESELGATE, IMO2020 IS COMING!

3500x

MORE SOX THAN
CAR DIESEL ENGINES



IMO2020

EGCS ARE REQUIRED FOR HFO

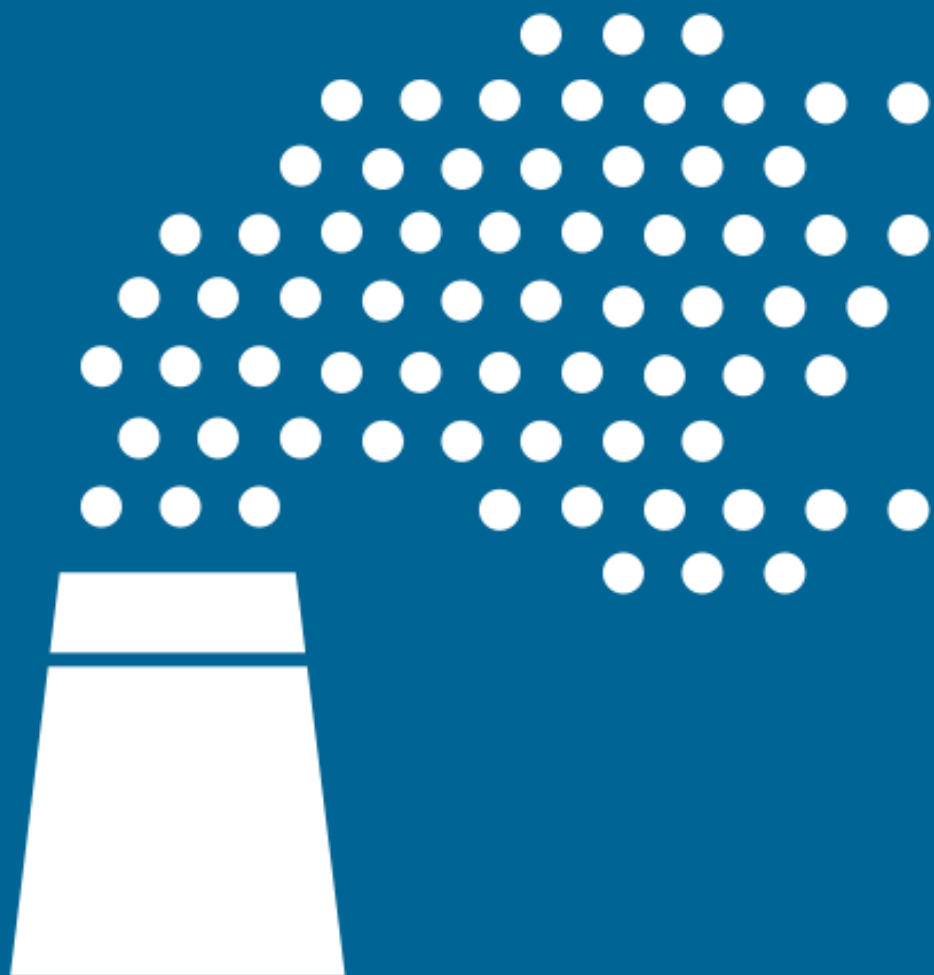
Scrubbers for HFO are required from January 1st 2020

MIGHT NOT WORK

Can be turned off, are hard to control, might be fake

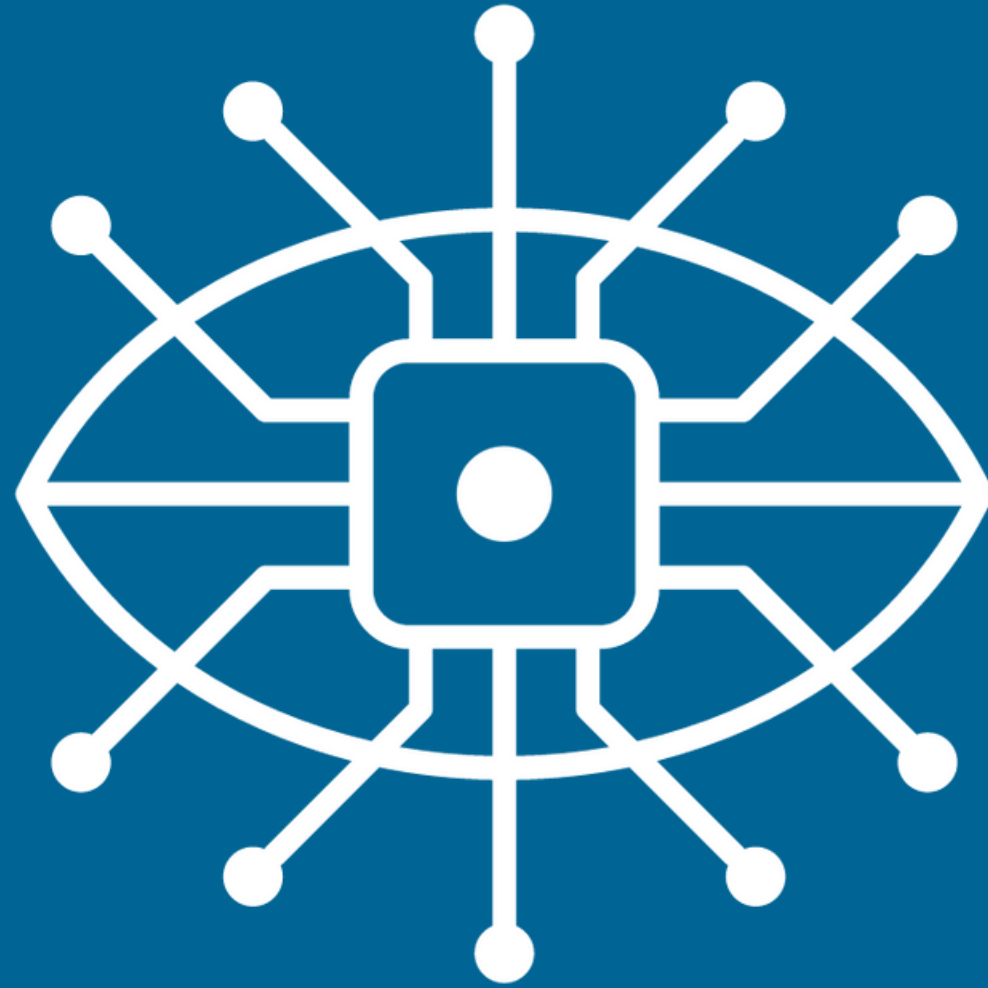
TRADITIONAL MONITORING IS HARD

Sensors must be put into the chimney of the ship



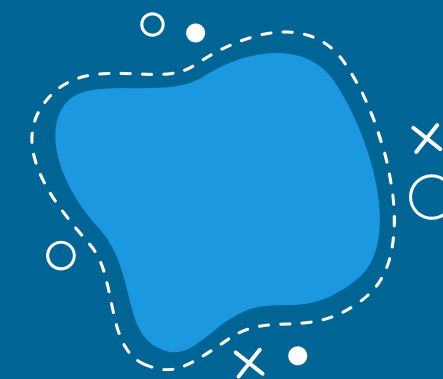
<http://www.hfw.com/IMO-2020-Scrubbers-A-good-investment>

SIMPLE, CHEAP, OPEN



COMPUTER VISION





MONITORING AS A SERVICE

Service provider for port authorities,
police and environmental
organizations.



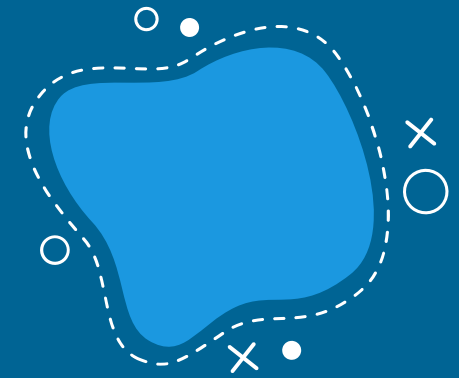
POLLUTION DASHBOARD

DEMO

<http://127.0.0.1:8050/>



LOOKOUT



BEYOND HAMBURG

Global data can be collected and used to refine algorithms and intelligent actions.

EXCHANGE BLACKLIST DATA

Global data can be collected and used to refine algorithms and intelligent actions.

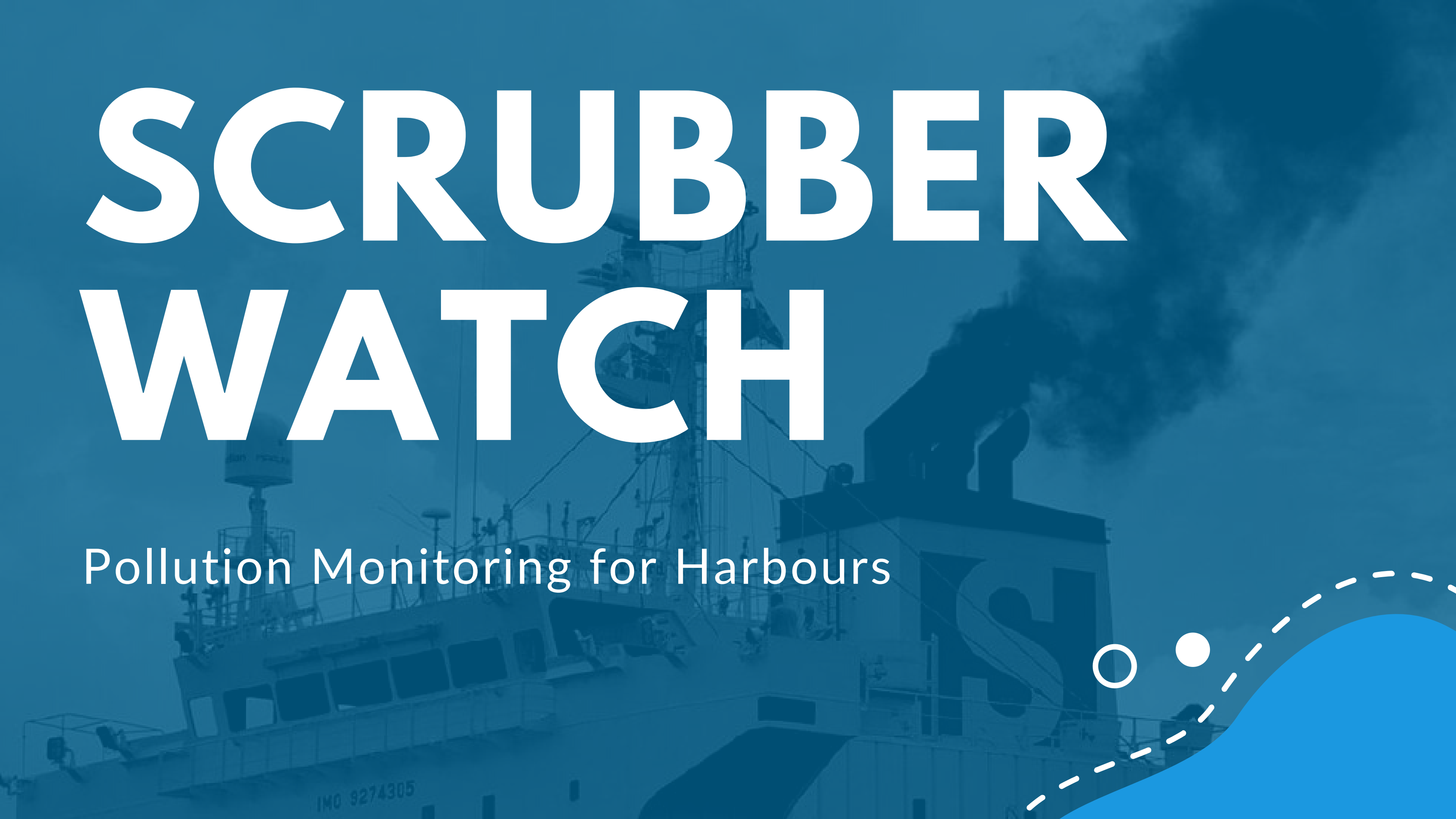
USE DRONES

On water and in the air to collect image information early on.

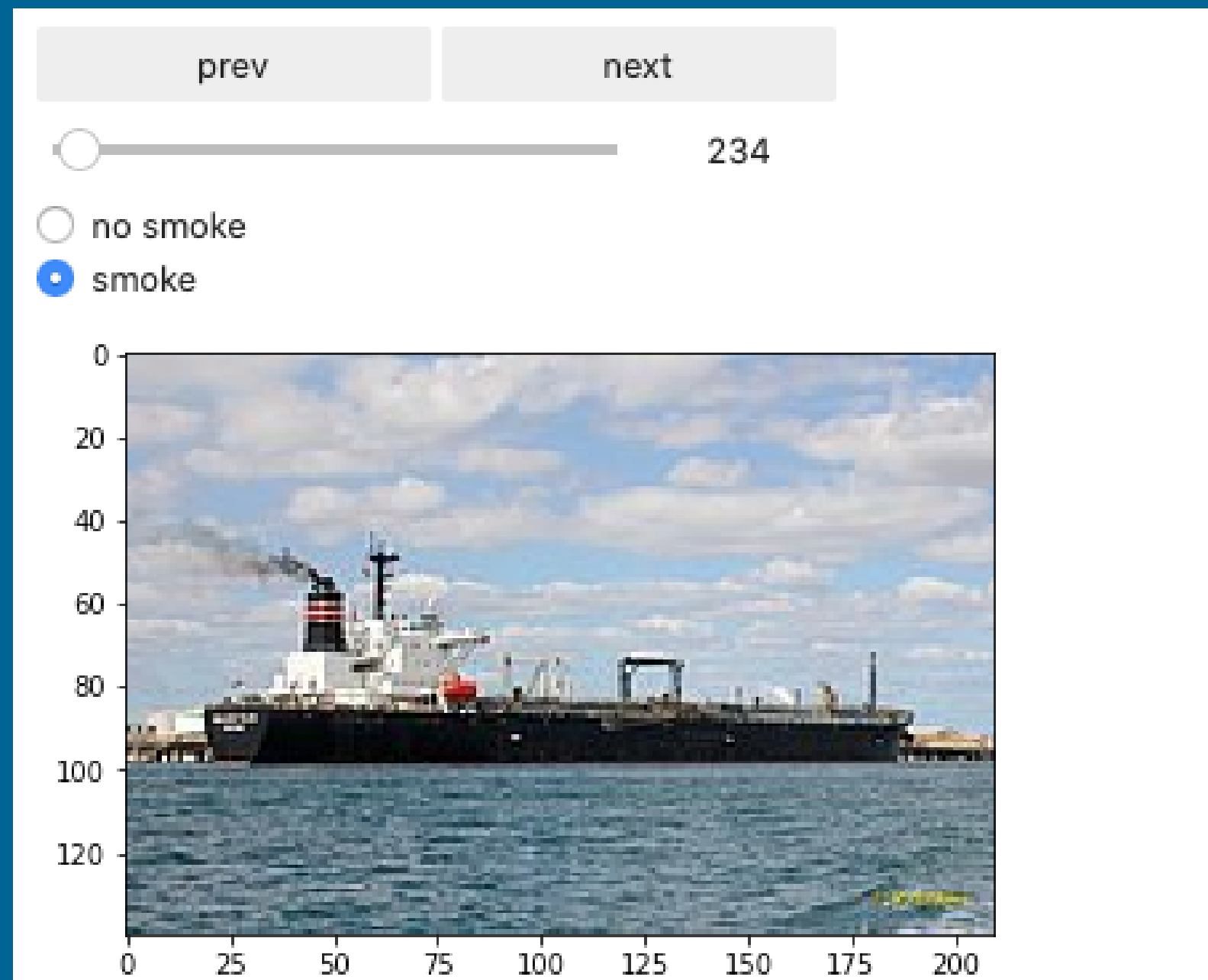


SCRUBBER WATCH

Pollution Monitoring for Harbours



Data Annotation



Model Training

```
epoch    train_loss  valid_loss  accuracy  f_beta    time
0         0.183994   0.188664   0.953795  0.945615  00:24
Better model found at epoch 0 with f_beta value: 0.9456149935722351.
1         0.184840   0.195134   0.953795  0.945615  00:25
2         0.169974   0.196119   0.953795  0.945615  00:25
3         0.148804   0.189754   0.953795  0.945615  00:25
4         0.148937   0.193145   0.953795  0.945615  00:26
```

ResNet101

Trained on ~2000 images
manually annotated

Dashboard Data

Real Pollution Data from 5 measurement stations around
hamburg

Live data from the smartPort Map -- HACKY!

Pollution-Meter based on the last 24 hours and defined
standards

GitHub Repo

Machine Learning Models

Annotation Tool

Data Analysis from the previous project

Slides

<https://github.com/MaximilianFranz/deephack>

References

- Drone from the Netherlands to tackle ship emission monitoring
 - <https://shipandbunker.com/news/emea/678197-netherlands-super-drone-to-monitor-ship-emissions>
- Air monitoring website
 - <http://map.breeze-technologies.de/c/9.9849081,53.5098216,10>
- IMO 2020
 - <https://www.hapag-lloyd.com/de/about-us/sustainability/imo-2020.html>
 - https://de.kuehne-nagel.com/de_de/seefracht/imo-2020-faqs/