Airborne Marpol Annex VI Monitoring in Belgium: Current Status

RBINS – OD Nature – MUMM – SURV

Shipping and Environment Conference

4-6/09/2019 – Gothenburg

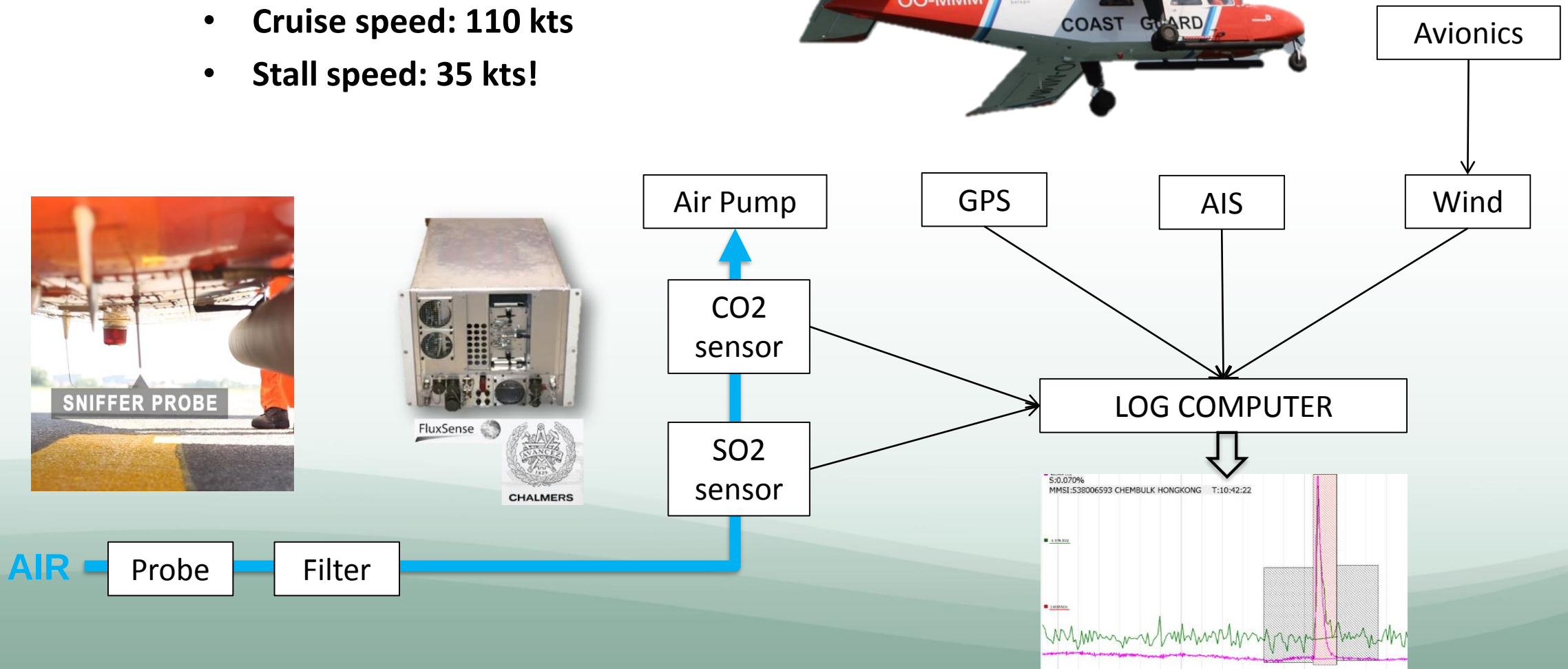
Marpol Annex VI compliance monitoring

Belgian Sniffer program:

- Methodology
- Results
- Future prospects

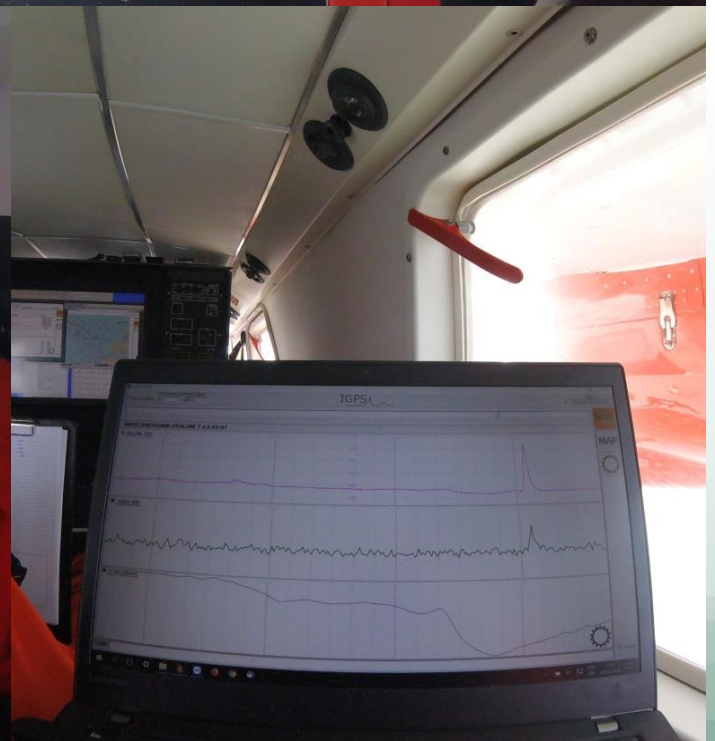
Equipment: Platform and Sniffer

- Britten Norman Islander
- Range: max 4 hr (4 POB)
- **Cruise speed: 110 kts**
- **Stall speed: 35 kts!**




EXIT


COAST GUARD


IGPS

Reporting and communication

- Non compliant observations: Flight report (Position, MMSI, Destination, ETA, **FSC**)

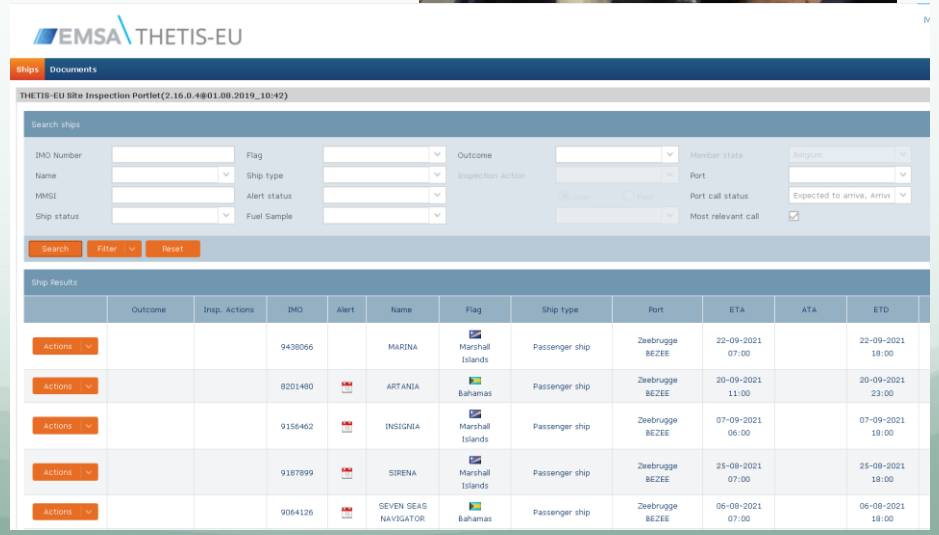
  → **PSC**

  → **Inspection with Fuel Sample**

- Database with all observations on cloud

  → Thetis-EU link

	Compliant	Non Compliance
Reporting Time	>1hr after flight	Near real time
Reporting Means	Web-database	Mail



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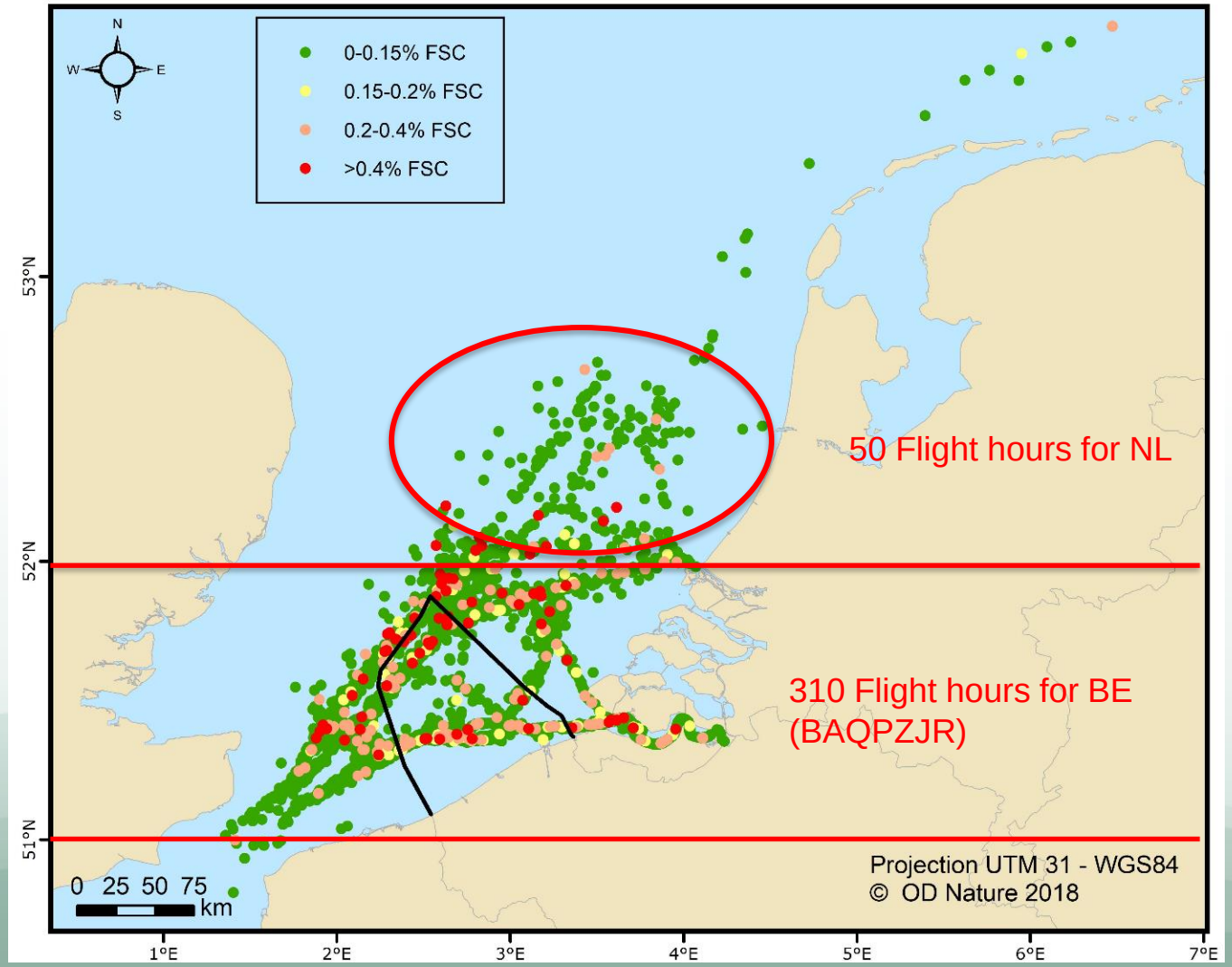
Monitoring Results (2015-2019)

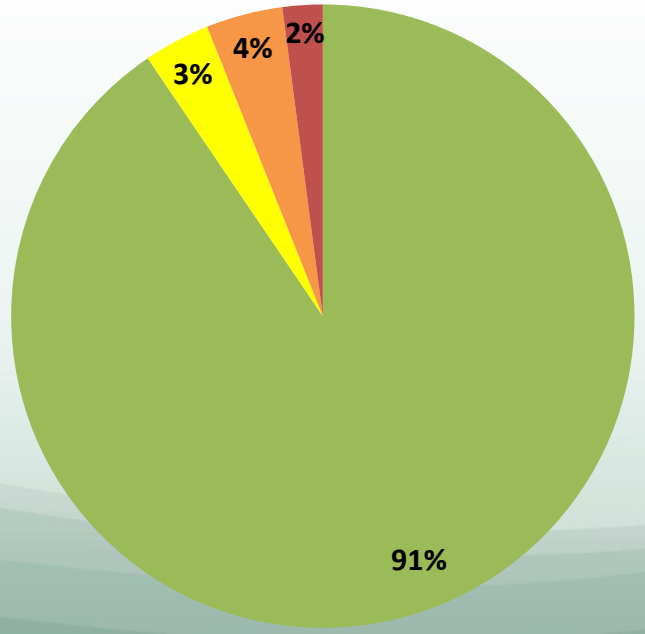


- 360 flight hours
- 3900 ships monitored

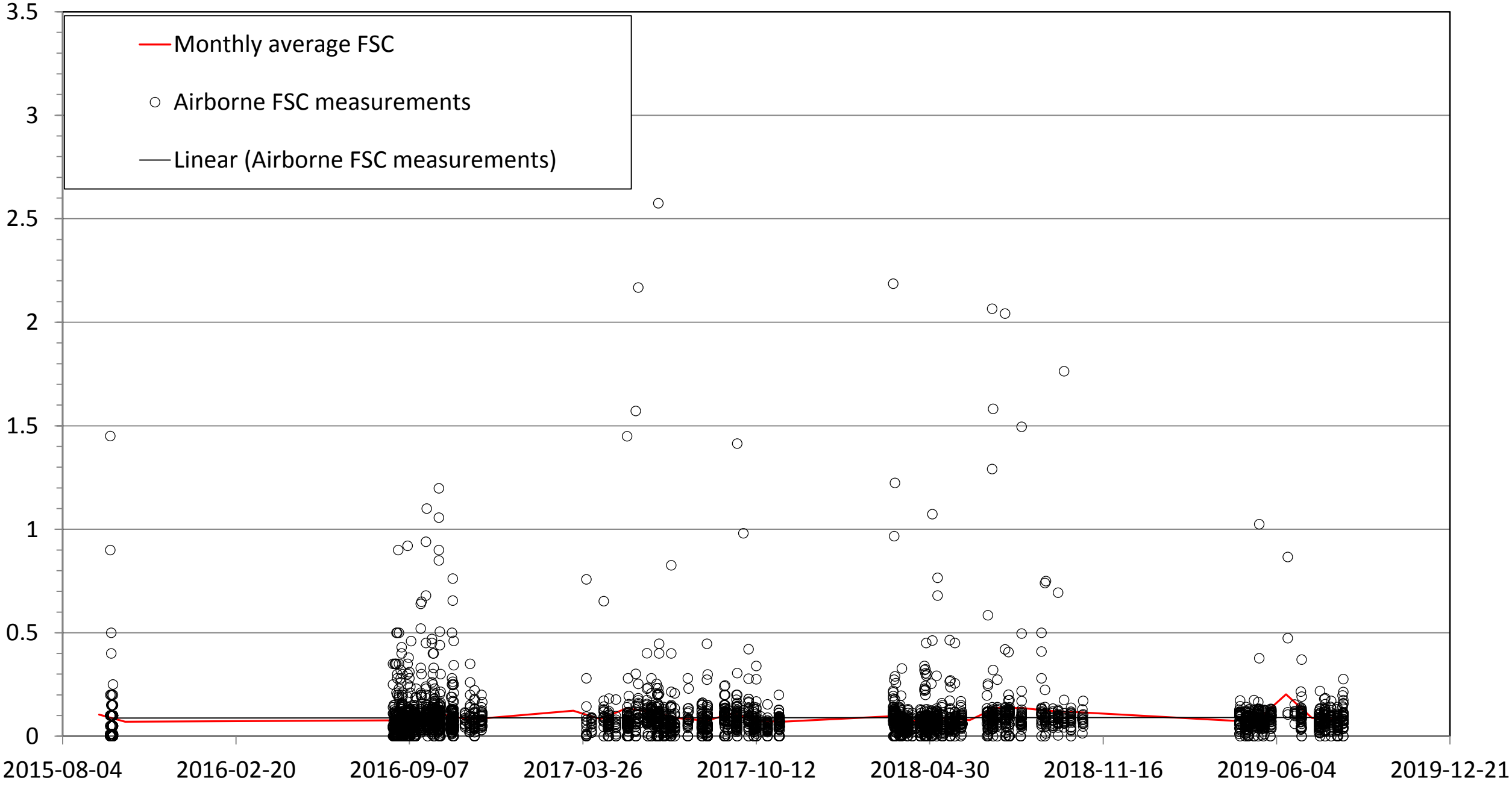
→ >10 x [PSC Fuel samples] in < 40 days/yr

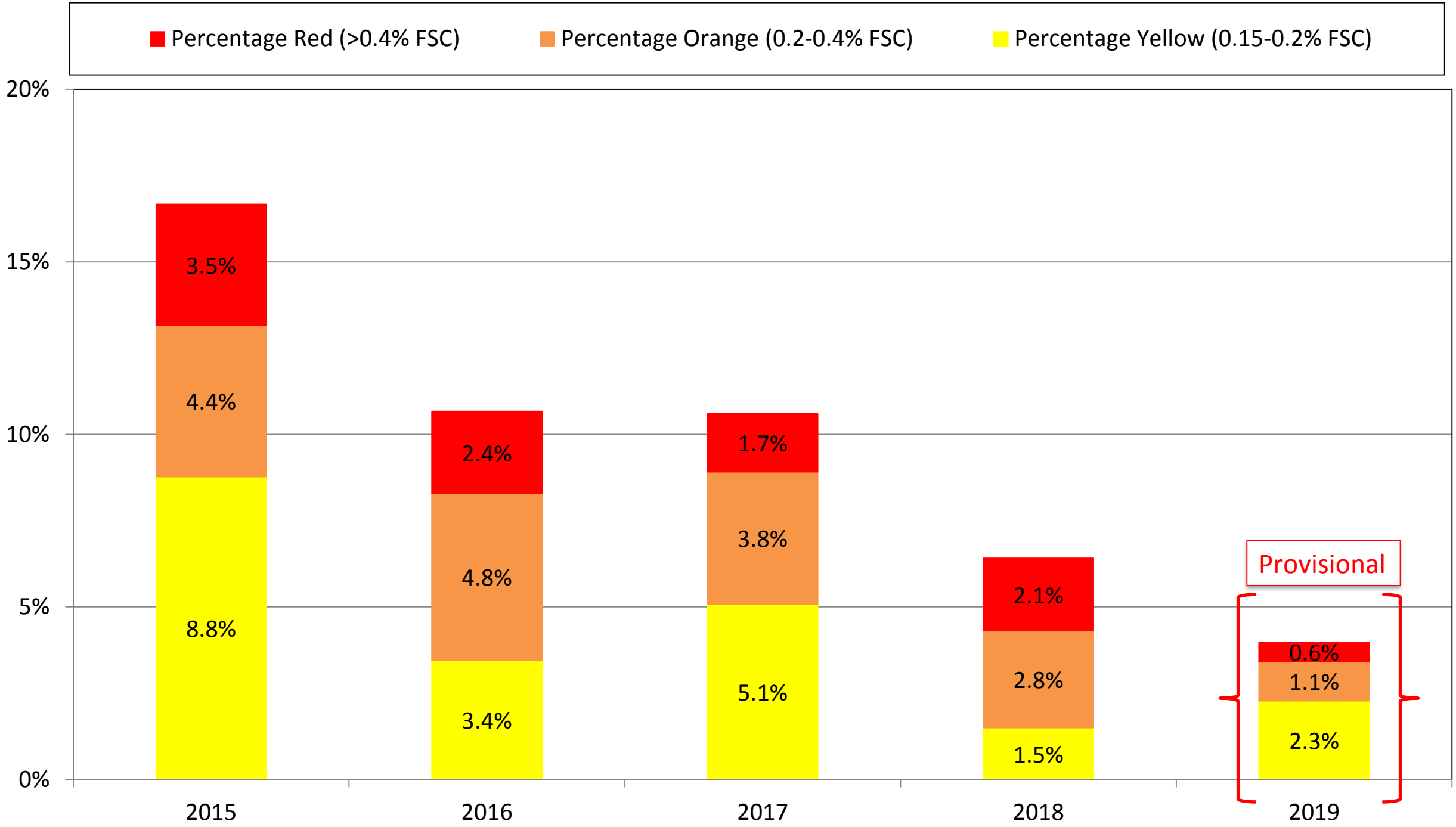
- 340 possible non-compliant ships (FSC >0.15%)

➔ 1 possible non-compliant ship per flight hour

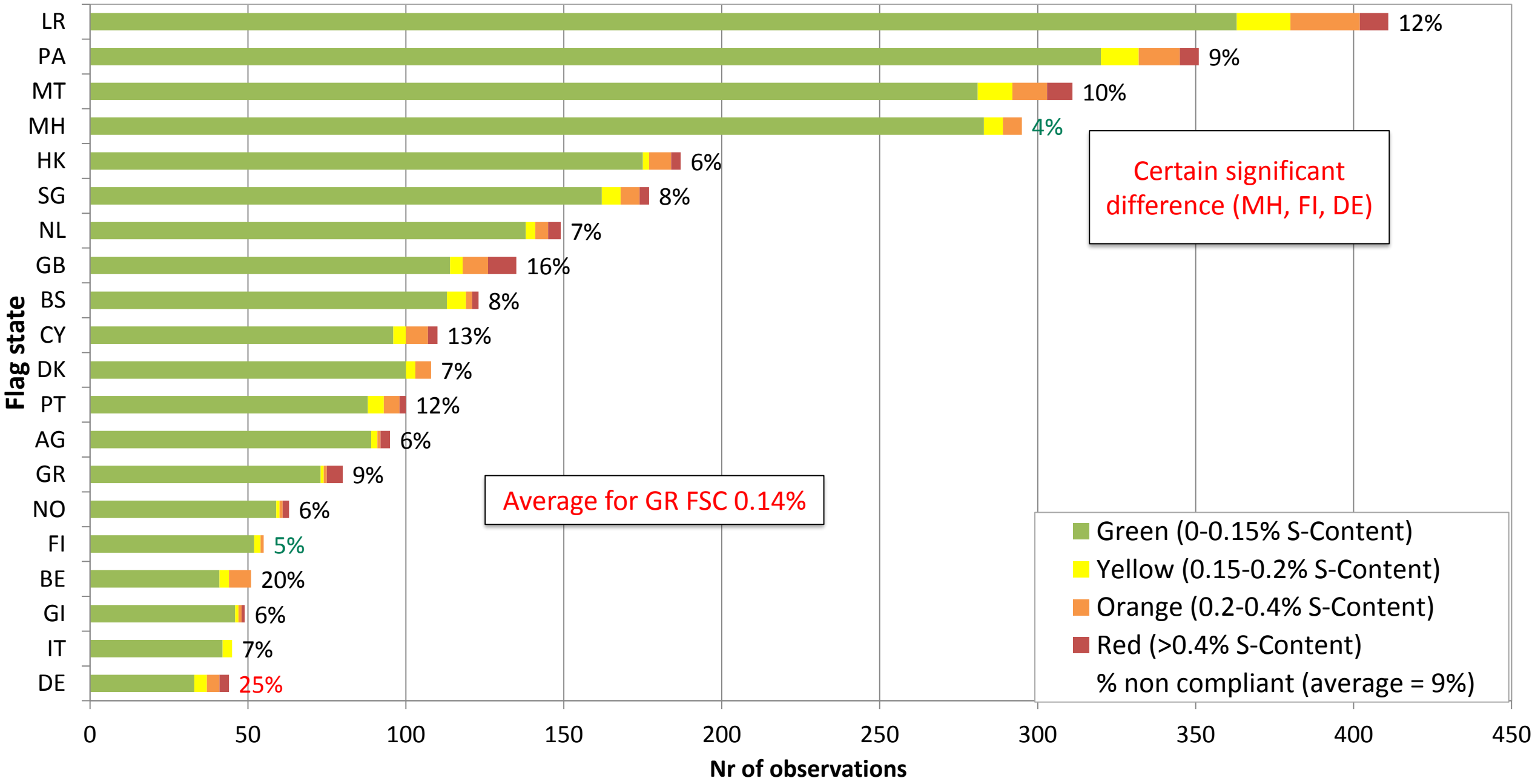


FSC Distribution (2015-2019)

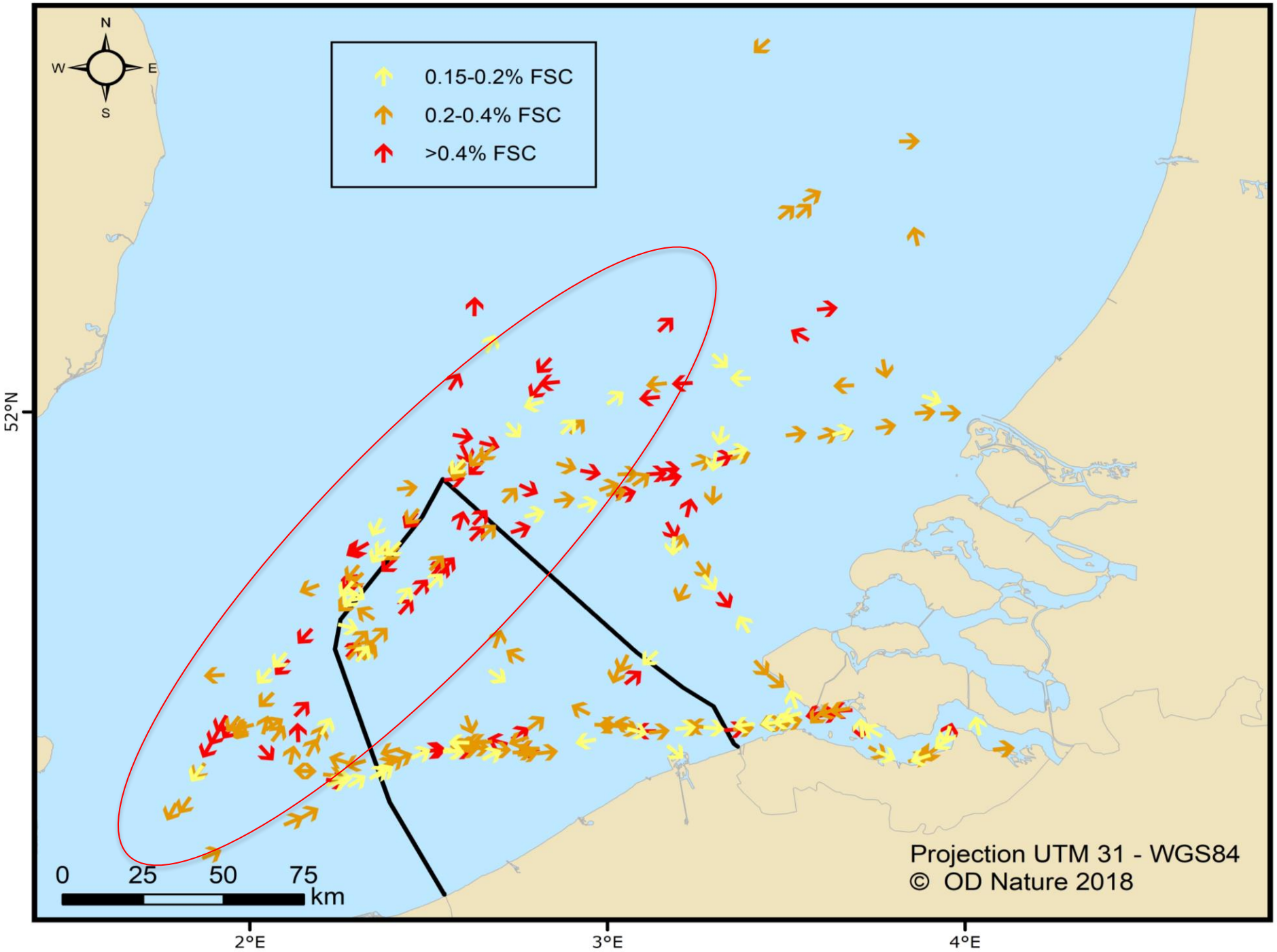



Percentage Red (>0.4% FSC)
Percentage Orange (0.2-0.4% FSC)
Percentage Yellow (0.15-0.2% FSC)
20%
15%
10%
5%
0%
3.5%
4.4%
8.8%
2.4%
4.8%
3.4%
1.7%
3.8%
5.1%
2.1%
2.8%
1.5%
0.6%
1.1%
2.3%
Provisional
2015
2016
2017
2018
2019

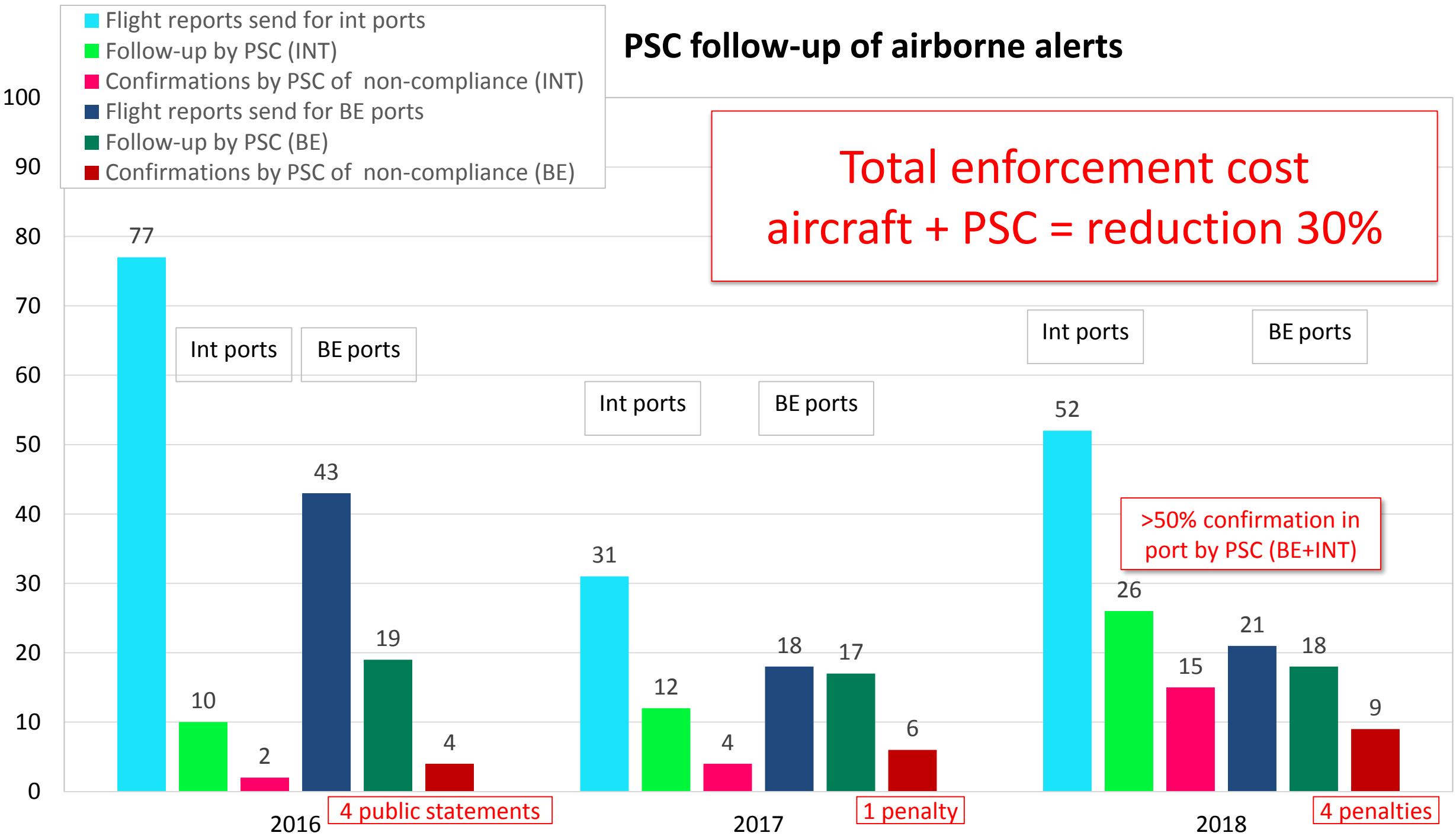
Top 20 of 58 observed Flag States

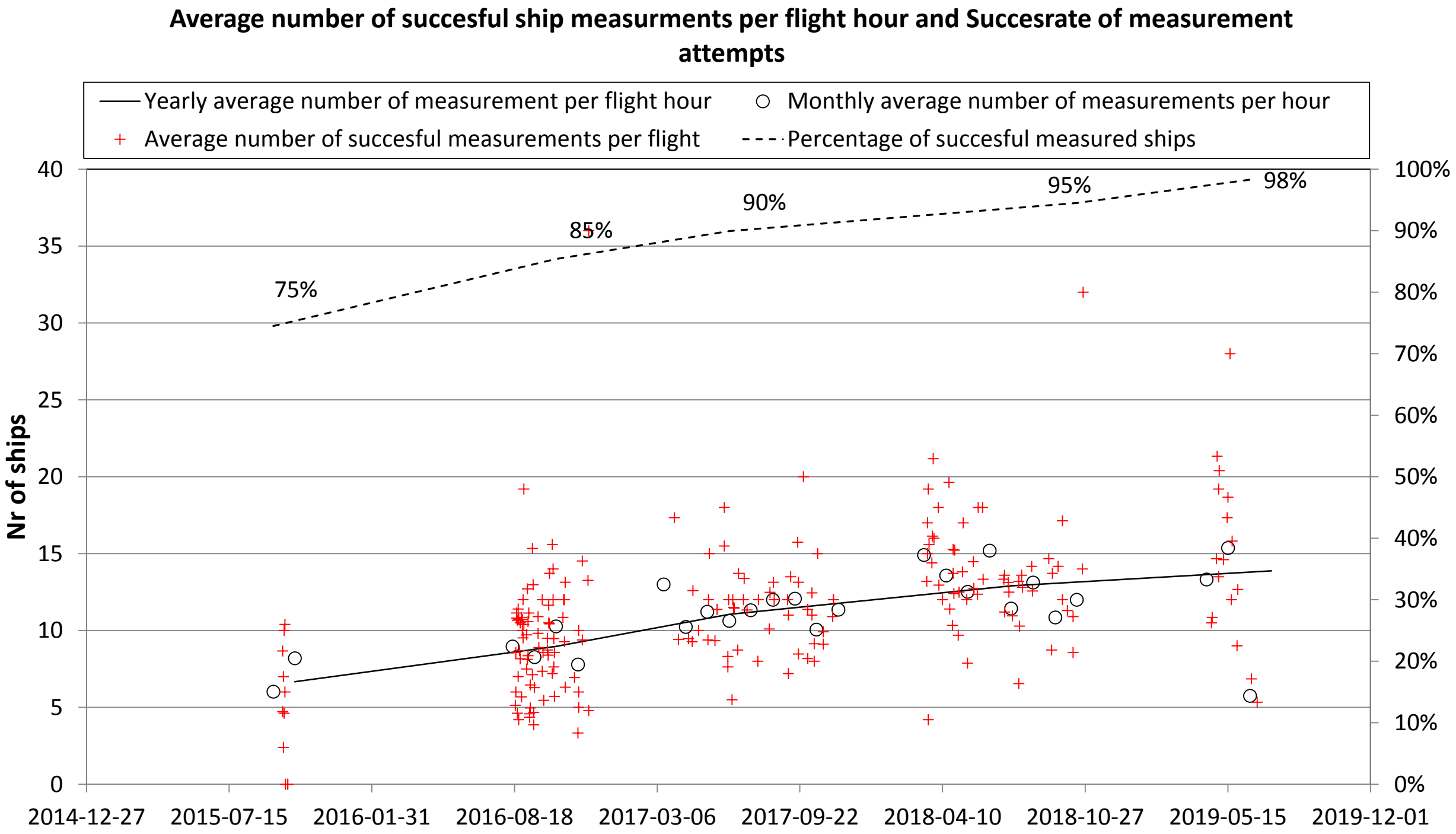


museum
Operational Directorate Natural Environment
OD Nature | OD Natuur | DO Nature

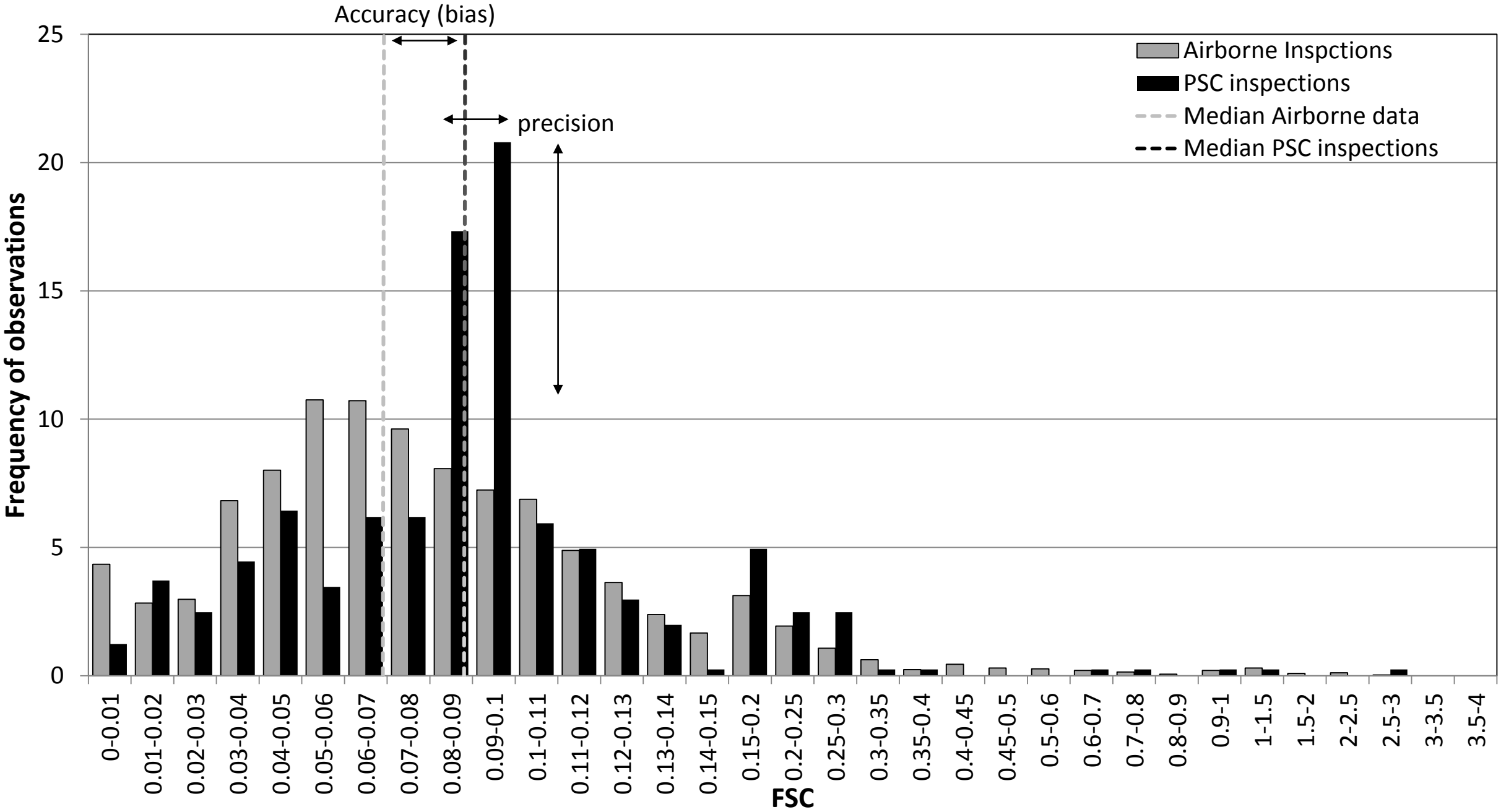


PSC follow-up of airborne alerts

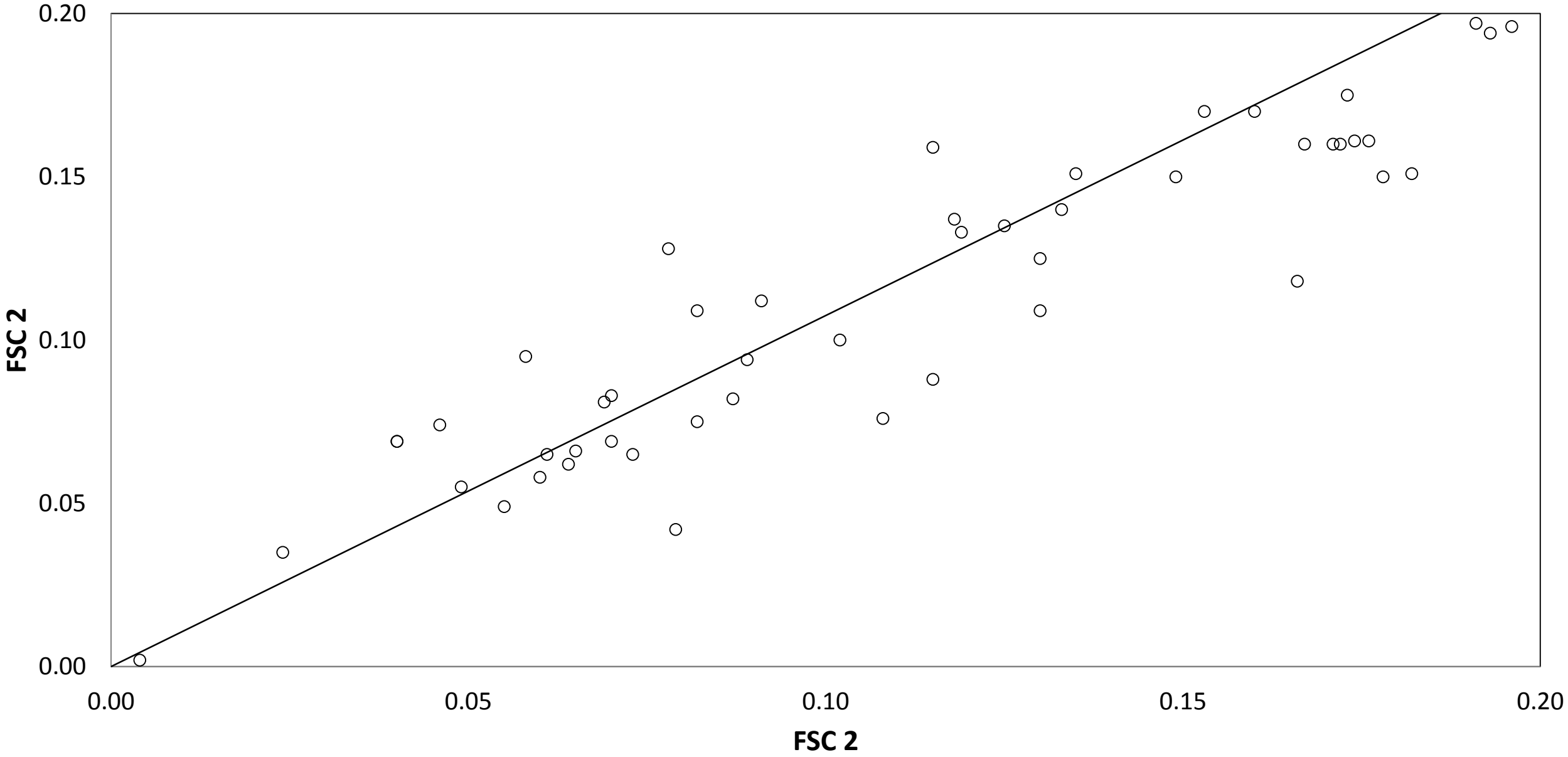



Average number of succesful ship measurments per flight hour and Succesrate of measurement attempts
Yearly average number of measurement per flight hour
Monthly average number of measurements per hour
Average number of succesful measurements per flight
Percentage of succesful measured ships
Nr of ships
75%
85%
90%
95%
98%
0
5
10
15
20
25
30
35
40
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
2014-12-27
2015-07-15
2016-01-31
2016-08-18
2017-03-06
2017-09-22
2018-04-10
2018-10-27
2019-05-15
2019-12-01

Airborne vs PSC inspection results (2016-2018)



Evaluation difference repetitive measurements (FSC1 and FSC2)
STD difference= 0.02 R^2=0.846



Evaluation color flag thresholds

- Uncertainty: combination accuracy + precision
- Precision: combination intra reproducibility variation and supplementary uncertainty factors (eg. uncertainty calibration)

$$U = |b| + 2\ u_{tot}$$

$$u_{tot} = \sqrt{(CV_{Rw})^2 + \sum (u_{\sup,i})^2}$$

$$CV_{Rw} = \frac{1}{\sqrt{2}} \sqrt{\frac{\sum_{i=1}^{n} \left(\frac{x_{i1} - x_{i2}}{0.5(x_{i1} + x_{i2})} \right)^2}{n}} \times 100(\%)$$

- Red flag: 99% CI FSC > 0.15%
- Orange Flag: 95% CI FSC > 0.15%
- Yellow flag: 68% CI FSC > 0.11%

False positives

- Green Flag: 95% CI FSC <0.20%

False negatives

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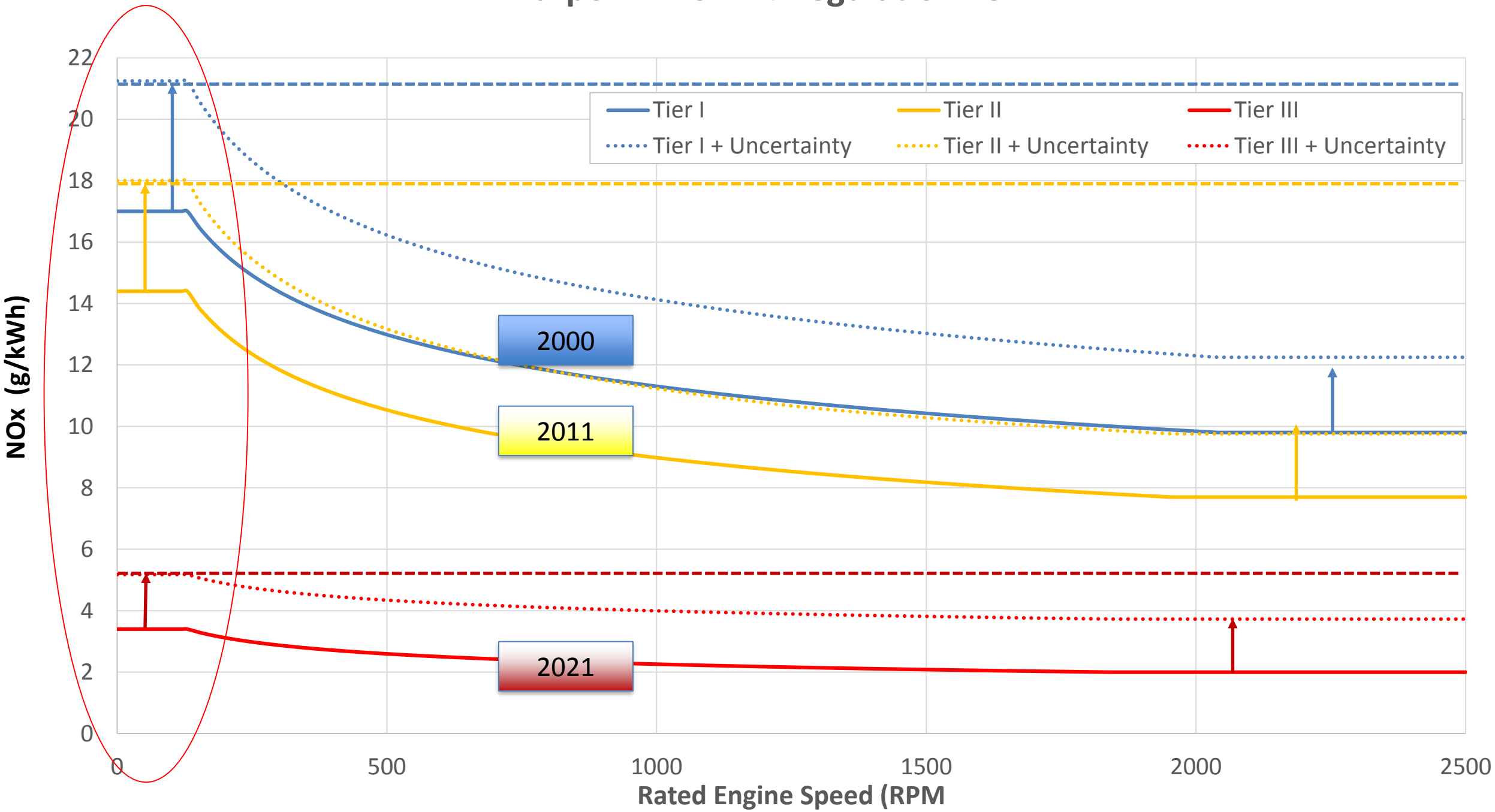
Marpol Annex VI: Regulation 13



BC need for field data → IMO