CompMon

Compliance monitoring pilot for Marpol Annex VI

Data sharing and reporting

Jari Waldén, Lasse Johansson, Jukka-Pekka Jalkanen and Ari Karppinen
Finnish Meteorological Institute
Atmospheric Composition
Jari.walden@fmi.fi

CompMon

Data share

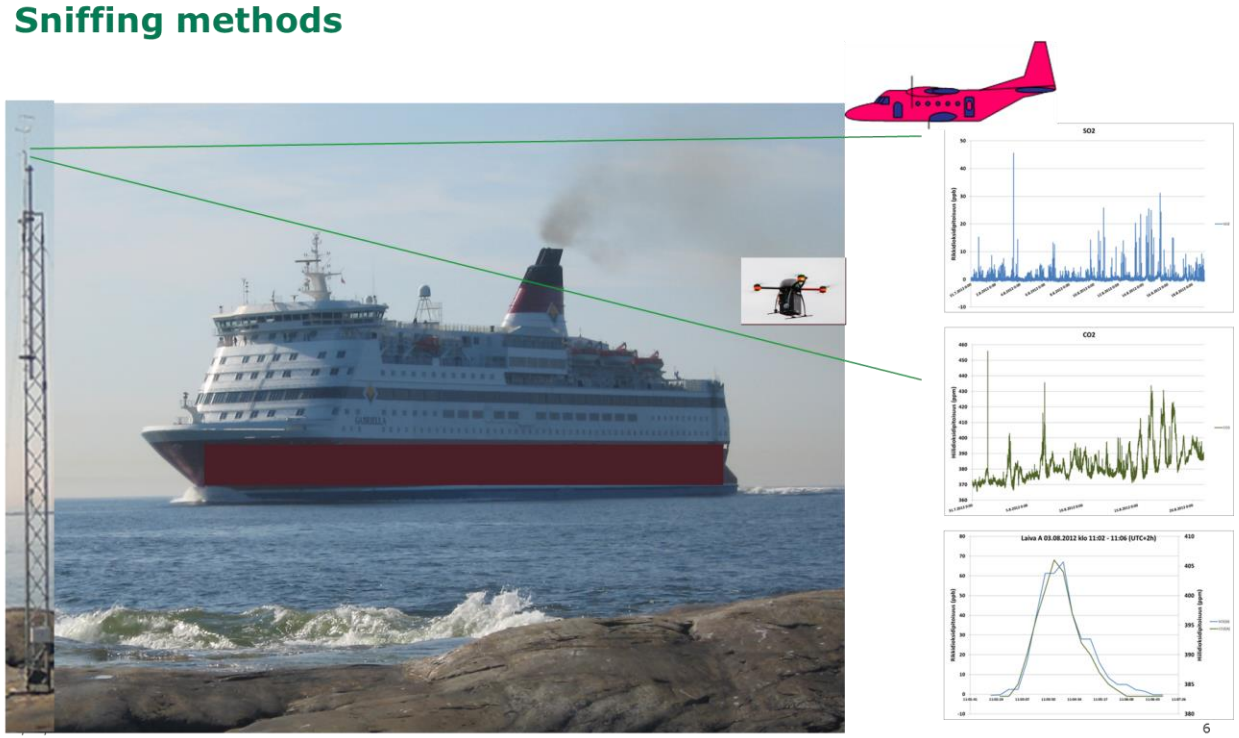
Objectives

- To set up the guidelines for the sharing the data among the CompMon partners, and for third parties.
  - CompMon partners: national authorities, universities, research Institutes
  - Third parties: non-beneficiary partners of CompMon (Denmark, Germany,)
- To define the content, format and target quality of Data Levels that are prepared from the sniffing measurements
- To agree with the partners upon the use of the comprehensive database

CompMon

Data share

Content of Data



- The data includes
  - remote sensing observation results of individual ships
    - sniffing measurements at different measurement platforms (fixed and moving platforms) and different measurement methods
  - bunker analysis results,
  - details of the vessel and the observation platform.

CompMon

Data sharing means

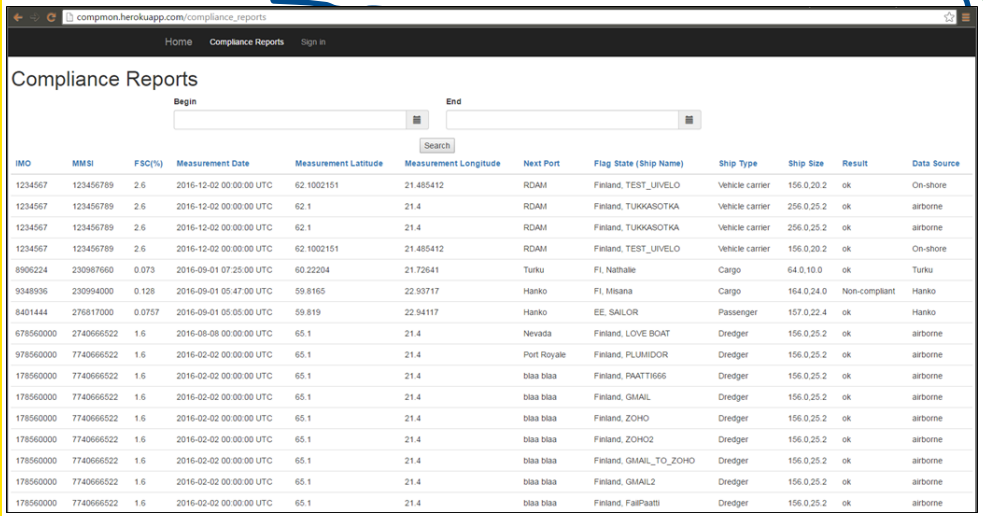
- The sniffing data collected in the Event Database is open to partners, authorities controlling Fuel Sulphur Content and Port State Controls

- All CompMon partners submit their data. Partners sends their data to the same mailbox (compmon.receive@zoho.com).

    - The emails are then automatically transported from the mailbox into the Event Database which will be hosted by outside service provider, Heroku. The access to data base is protected from unauthorized persons through ID and password.

Data share

Heroku: Cloud Platform -as-a-Service (PaaS)



IMO	MMSI	FSC(%)	Measurement Date	Measurement Latitude	Measurement Longitude	Next Port	Flag State (Ship Name)	Ship Type	Ship Size	Result	Data Source
1234567	123456789	2.6	2016-12-02 00:00:00 UTC	62.1002151	21.485412	RDAM	Finland, TEST_UIVELO	Vehicle carrier	156.0,20.2	ok	On-shore
1234567	123456789	2.6	2016-12-02 00:00:00 UTC	62.1	21.4	RDAM	Finland, TUKKASOTKA	Vehicle carrier	256.0,25.2	ok	airborne
1234567	123456789	2.6	2016-12-02 00:00:00 UTC	62.1	21.4	RDAM	Finland, TUKKASOTKA	Vehicle carrier	256.0,25.2	ok	airborne
1234567	123456789	2.6	2016-12-02 00:00:00 UTC	62.1002151	21.485412	RDAM	Finland, TEST_UIVELO	Vehicle carrier	156.0,20.2	ok	On-shore
8906224	230987660	0.073	2016-09-01 07:25:00 UTC	60.22204	21.72641	Turku	FI, Nathalie	Cargo	64.0,10.0	ok	Turku
9348936	230994000	0.128	2016-09-01 05:47:00 UTC	59.8165	22.93717	Hanko	FI, Misana	Cargo	164.0,24.0	Non-compliant	Hanko
8401444	276817000	0.0757	2016-09-01 05:05:00 UTC	59.819	22.94117	Hanko	EE, SAILOR	Passenger	157.0,22.4	ok	Hanko
678560000	2740666522	1.6	2016-08-08 00:00:00 UTC	65.1	21.4	Nevada	Finland, LOVE BOAT	Dredger	156.0,25.2	ok	airborne
978560000	7740666522	1.6	2016-02-02 00:00:00 UTC	65.1	21.4	Port Royale	Finland, PLUMIDOR	Dredger	156.0,25.2	ok	airborne
178560000	7740666522	1.6	2016-02-02 00:00:00 UTC	65.1	21.4	blaa blaa	Finland, PAATTI666	Dredger	156.0,25.2	ok	airborne
178560000	7740666522	1.6	2016-02-02 00:00:00 UTC	65.1	21.4	blaa blaa	Finland, GMAIL	Dredger	156.0,25.2	ok	airborne
178560000	7740666522	1.6	2016-02-02 00:00:00 UTC	65.1	21.4	blaa blaa	Finland, ZOHO	Dredger	156.0,25.2	ok	airborne
178560000	7740666522	1.6	2016-02-02 00:00:00 UTC	65.1	21.4	blaa blaa	Finland, ZOHO2	Dredger	156.0,25.2	ok	airborne
178560000	7740666522	1.6	2016-02-02 00:00:00 UTC	65.1	21.4	blaa blaa	Finland, GMAIL_TO_ZOHO	Dredger	156.0,25.2	ok	airborne
178560000	7740666522	1.6	2016-02-02 00:00:00 UTC	65.1	21.4	blaa blaa	Finland, GMAIL2	Dredger	156.0,25.2	ok	airborne
178560000	7740666522	1.6	2016-02-02 00:00:00 UTC	65.1	21.4	blaa blaa	Finland, FaiPaatti	Dredger	156.0,25.2	ok	airborne

compmon.receive@zoho.com

Locations of CompMon action (approximate)

CompMon

Data sharing means

- Internal use of data (including the IDs of ships) among CompMon partners are allowed.
- Third parties i.e. associated partners of CompMon, can send their data to database.
  - In these cases, agreement for sending the data needs to be done with the database owner (FMI), and all the commitments and rights agreed among the CompMon partners are committed to the third parties
- Data can be used for scientific use, comparison, to inform the SCs, PSCs, and to pin point the possible compliance issues.

CompMon

Data Levels 1 & 2

- Level 1 data (real time data): which includes the information below.

- Level 2 data (validated data): Is the final outcome of the measurements and can quantify the exceedance of regulation with known uncertainty.
  - Time limit: max 3 months from measurements

CompMon

Data format

mail address: compmon.receive@zoho.com
Data Level: 1 &2

IMO: Ship Identification Number: IMO + 7 digit number

MMSI: Maritime Mobile Service Identity is a series of nine digits; to digital selective calling, AIS,

FSC: Fuel Sulphhur Content. S(%) 0.135 %

Uncertainty, U(), U(%): Expanded uncertainty at 95 % confidence level

Quality: Low, medium, high

Compliance: (orange, green, red)

Measurement date; 2016-12-02T00:00:00

Measurement_lat;62.1

Measurement_lng;21.4

Next_port;RDAM

CompMon

Data format

Ship_nation: Finland

Ship name: TUKKASOTKA

Ship type: Vehicle carrier

Ship size: 256.0,25.2

Ship position: (Long, Lat)

Speed over the ground (SOG):

Ship course of ground (COG):

Wind speed:

Wind direction:

Measurement method: sniffer, optical, lab-analysis

Sensor type: SO2: UV-fluor. (EN 14212), EC
NO2 Chemiluminescence (EN 14211), EC
CO2: CRD, IR,

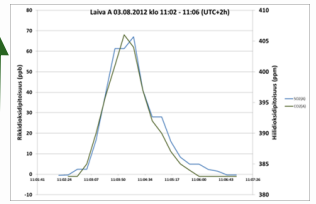
Measurement_platform: fixed, ship, aircraft (RPAS, helicopter, airplane)

Data owner: Charmers, e.g

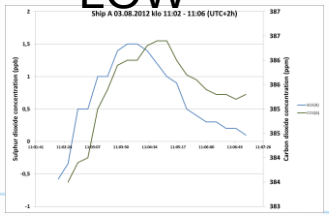
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

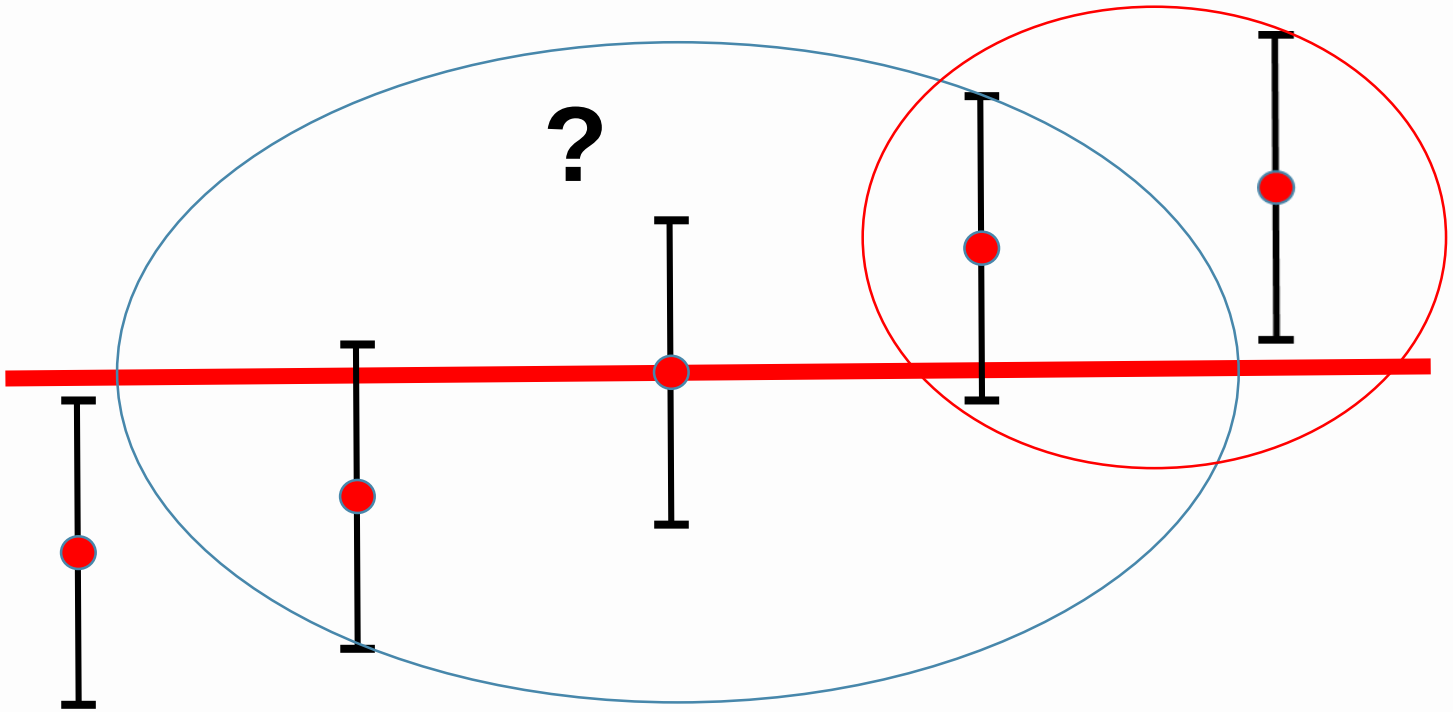
What is exceedance ?

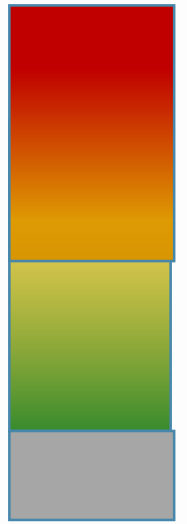
HIGH



LOW







FSC 0.1 %

Uncertainty of result: Expanded (95 %)

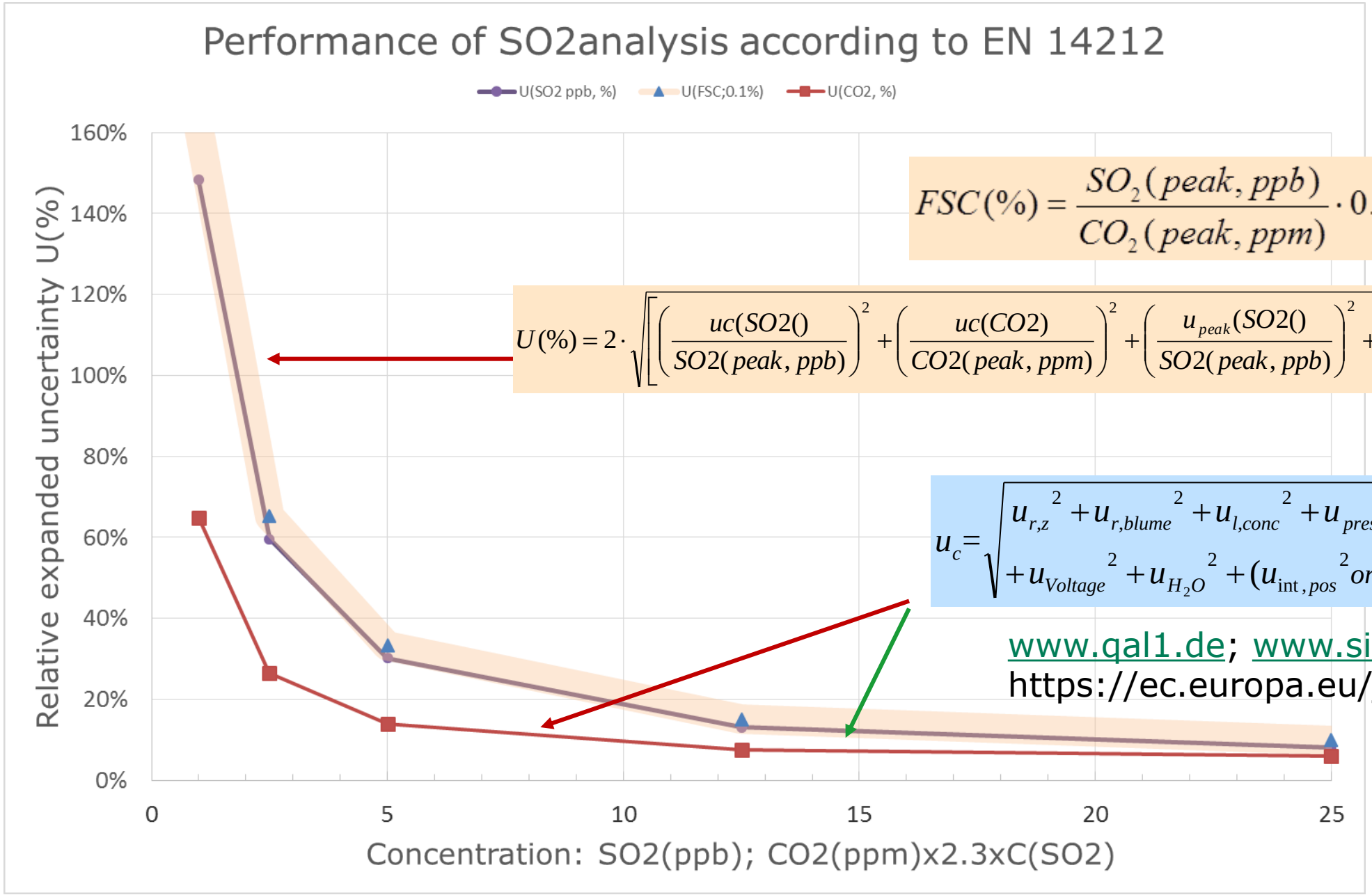
Result

Evenly distributed over whole range

DIRECTIVE 2012/33/EU: exceeds LV, no explanation on how?

CompMon

Expanded uncertainty of the FSC in %: Type tested analyzers



$$FSC(\%) = \frac{SO_2(peak, ppb)}{CO_2(peak, ppm)} \cdot 0.23$$

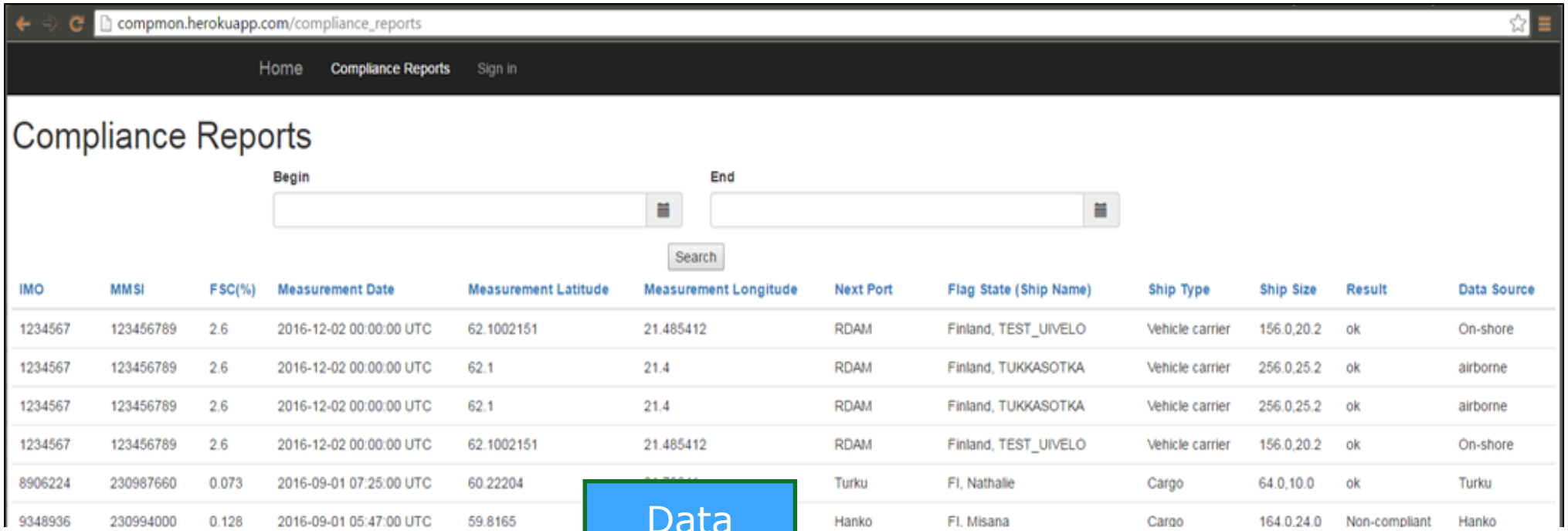
$$U(\%) = 2 \cdot \sqrt{\left[\left(\frac{uc(SO2()}{SO2(peak, ppb)}\right)^2 + \left(\frac{uc(CO2)}{CO2(peak, ppm)}\right)^2 + \left(\frac{u_{peak}(SO2()}{SO2(peak, ppb)}\right)^2 + \left(\frac{u_{peak}(CO2)}{CO2(peak, ppm)}\right)^2\right]}$$

$$u_c = \sqrt{\begin{array}{l} u_{r,z}^{\ 2} + u_{r,blume}^{\ 2} + u_{l,conc}^{\ 2} + u_{press}^{\ 2} + u_{temp,air}^{\ 2} + u_{temp.env}^{\ 2} \\ + u_{Voltage}^{\ 2} + u_{H_2O}^{\ 2} + (u_{\mathrm{int},pos}^{\ 2} \text{ or } u_{\mathrm{int},neg}^{\ 2}) + u_{calib}^{\ 2} \end{array}}$$

www.qal1.de; www.sira.uk;
https://ec.europa.eu/jrc/en/aquila

CompMon

Event Database



IMO	MMSI	FSC(%)	Measurement Date	Measurement Latitude	Measurement Longitude	Next Port	Flag State (Ship Name)	Ship Type	Ship Size	Result	Data Source
1234567	123456789	2.6	2016-12-02 00:00:00 UTC	62.1002151	21.485412	RDAM	Finland, TEST_UIVELO	Vehicle carrier	156.0,20.2	ok	On-shore
1234567	123456789	2.6	2016-12-02 00:00:00 UTC	62.1	21.4	RDAM	Finland, TUKKASOTKA	Vehicle carrier	256.0,25.2	ok	airborne
1234567	123456789	2.6	2016-12-02 00:00:00 UTC	62.1	21.4	RDAM	Finland, TUKKASOTKA	Vehicle carrier	256.0,25.2	ok	airborne
1234567	123456789	2.6	2016-12-02 00:00:00 UTC	62.1002151	21.485412	RDAM	Finland, TEST_UIVELO	Vehicle carrier	156.0,20.2	ok	On-shore
8906224	230987660	0.073	2016-09-01 07:25:00 UTC	60.22204		Turku	FI, Nathalie	Cargo	64.0,10.0	ok	Turku
9348936	230994000	0.128	2016-09-01 05:47:00 UTC	59.8165		Hanko	FI, Misana	Cargo	164.0,24.0	Non-compliant	Hanko

Data Sharing

- CompMon & Third parties
  - Authorities (Fuel Sulphur Control, Port State Control)
  - Scientific use (Universities, Research Institute)
  - New innovatives (new methods, standardization, satellite observation,)
- Reporting (see presentatation by Caroline Petrini)
- Global use

CompMon

Experiences and improvments

- Document of Data Sharing for common understanding
- Data sharing in practice
- Regional use to Global use
- Methods for expressing uncertainty of results
- Judging the qualiy of measurements
- Definition to demonstrate the exceedance
- Standardization for sniffing method (standardized methods (EN 14211), sensors TC 264 WI 00264179
- New Work Item for “Determination od Sulphur Content in the Marine Fuel by Sniffing Method”

CompMon

Compliance monitoring pilot for Marpol Annex VI

www.compmon.eu

Co-financed by the European Union
Connecting Europe Facility

EUSBSR
EU STRATEGY FOR THE BALTIC SEA REGION
POLICY AREA 'SHIP'

Partners

Trafi
Finnish Transport Safety Agency

TRANSPORT STYRELSEN

Federal Public Service
Mobility and Transport

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

FINNISH METEOROLOGICAL INSTITUTE

CHALMERS

Inspectie Leefomgeving en Transport
Ministerie van Infrastructuur en Milieu

explicit

Åbo Akademi University

Ministry of Environment and Food of Denmark
Environmental Protection Agency

BSH
BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE