

Buoys data QC

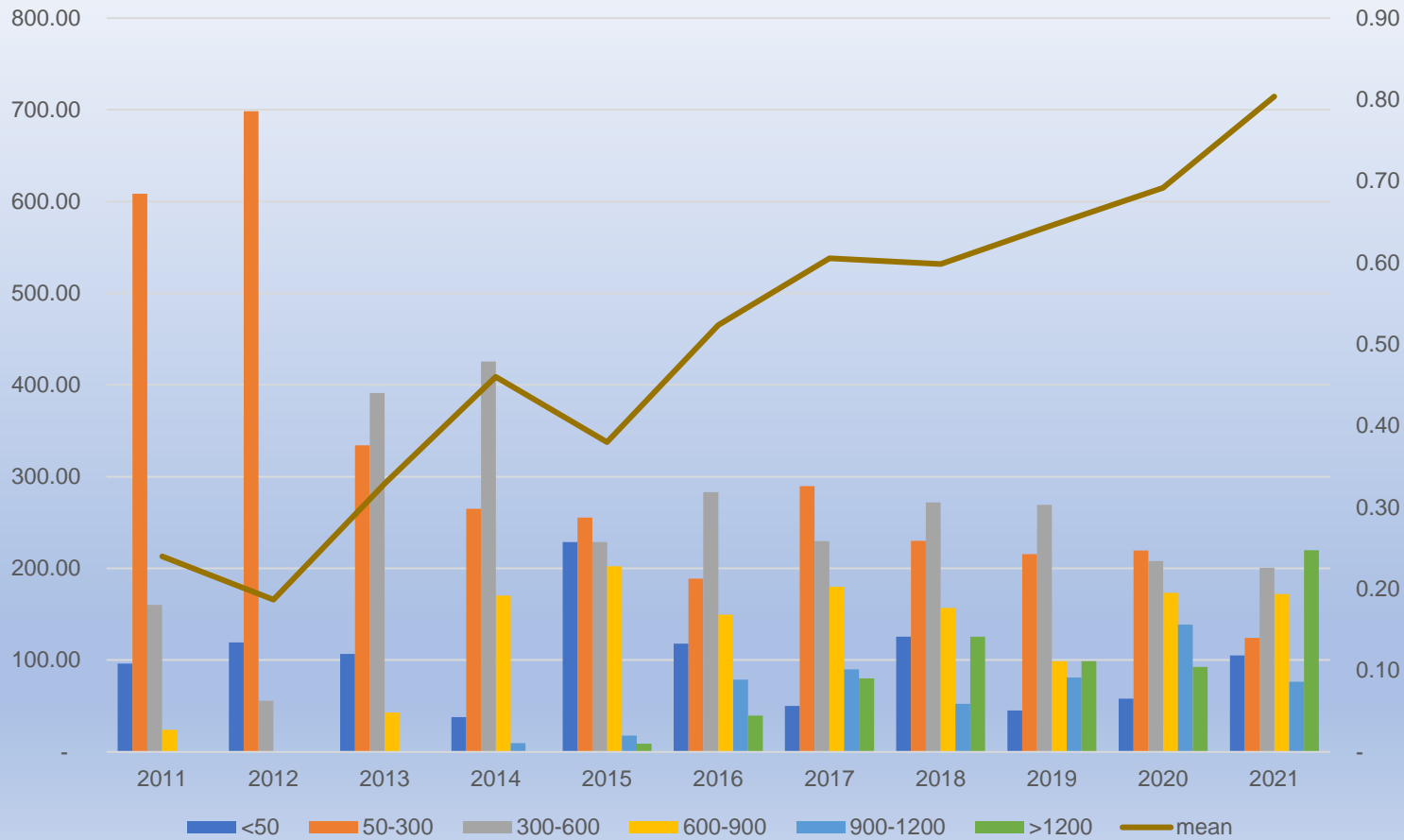
Sébastien Péré



EUMETNET
EUROPEAN METEOROLOGICAL
SERVICES NETWORK

1. Life expectancy & Quality
2. Controls Check list
3. Actions synthesis
4. About recycling

baro life expectancy (days)
mean and repartition 2011-2021



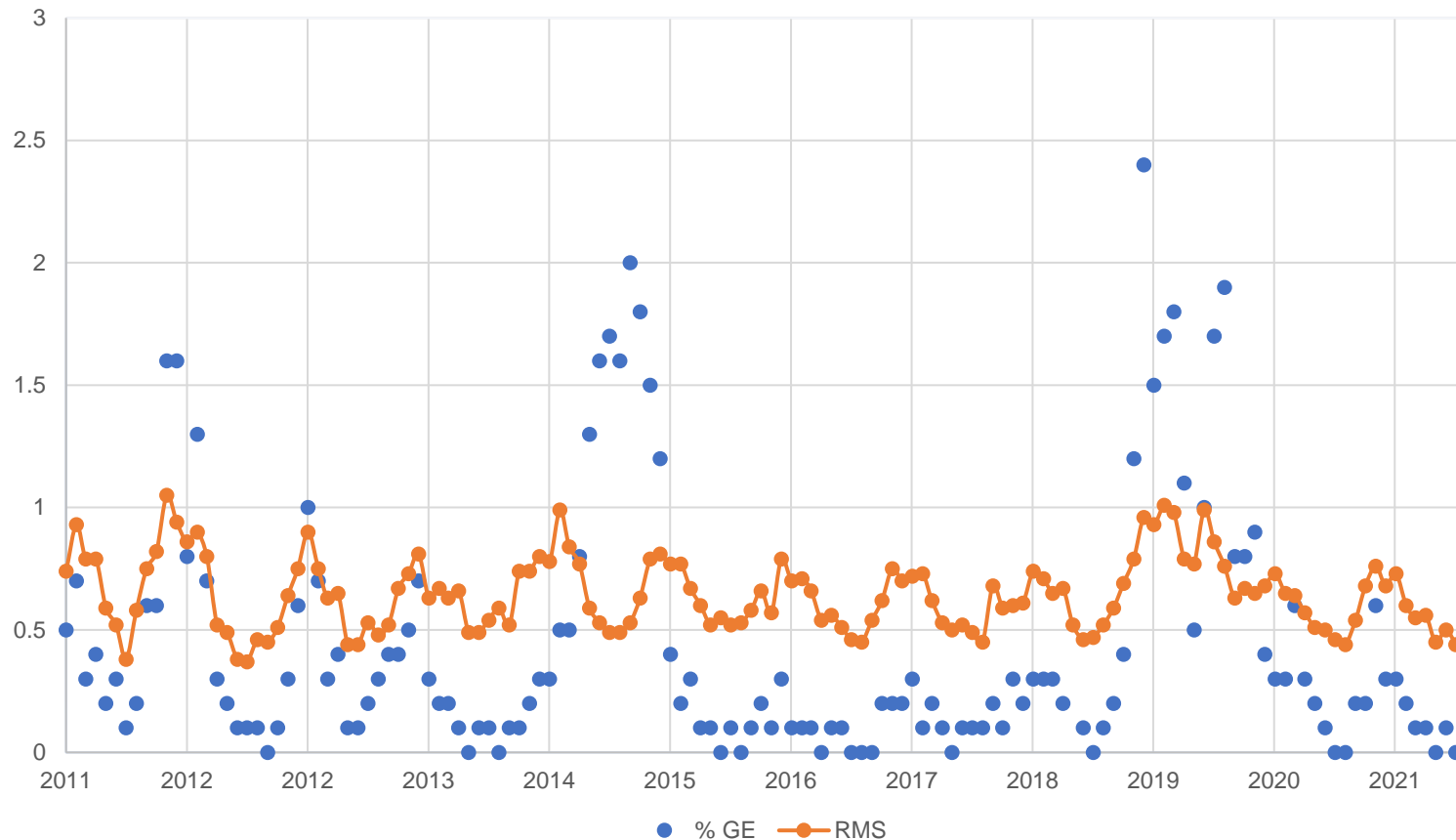
mean
6 different class
2011 - 2021

OBS :
Constant increase on mean

In 2021, high increase of
Population >1200 days life
expectancy

EXP:
Buoy Qty
Data QC

Sea Level Pressure Gross Errors and Root Mean Square Error
E Surfmar Buoys (North Atl and Mediterranea)



QC goals

Keep high level for data

%GE < 0,5%

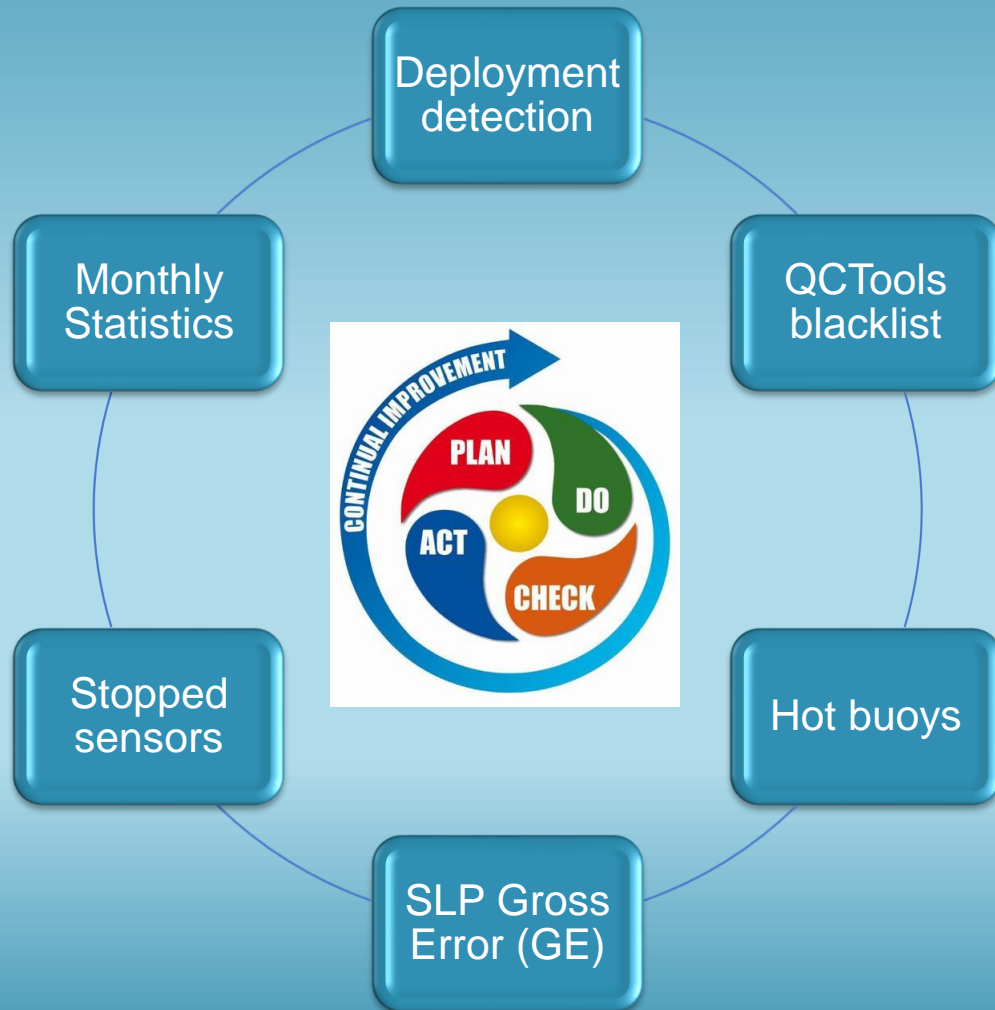
RMS < 1,5

Means :

Tools improvement

SLP Gross Error : > 10 hPa

CONTROLS



GOALS
+ Availability
+ Quality

1.CONTROLS

• New deployment	Daily	auto
• e-surfmar SLP blacklist	Daily	auto
• All Other blacklist (SLP, SST, position, Ashore)	2/week	auto
• Hot Buoys (anomaly, land prox, ...)	1..15 days	manual
• Individual SLP Gross Error evol	weekly	auto
• Stopped sensors	weekly	manual
• Statistics comparison data/model	monthly	auto(octopus)
• Buoy review	monthly	auto

New deployment detection

- Daily automatic detection based on IMEI of stored or in board buoys

Limits : Iridium TRS has to be activated

CONTROLS - QCTools Blacklists

MARINE OBSERVATION MONITORING
Quality Control Tools

Data Buoys
Buoy and VOS monthly statistics

Monthly Statistics
!! **NEW tool** for Buoy and VOS monthly statistics (extended)
Statistics of comparisons with models outputs established by different meteorological centres. Enter the parameter and the station(s) you wish.

Blacklists
BUOYS Blacklists Synthesis
BUOYS Pressure (Global)
BUOYS Pressure (Surfmar)
BUOYS Pressure (MF)
BUOYS SST (Global)
BUOYS Positions (Global)
BUOYS Ashore (Global)
Some explanations here

Daily Data plots
Plots of data and differences with model outputs for BUOYS and VOS

Other Tools
Google Earth BUOYS map
Nearest BUOYS
BUOYS location on map
Thermistor String BUOYS
Thermistor String BUOYS (new)

VOS Ships
VOS Blacklists Synthesis
VOS Pressure (Global)
VOS Pressure (Surfmar)
VOS Positions (Global)
VOS Wind (Surfmar)
VOS Unknown (Global)
VOS Pressure (US)
VOS Timeliness (Surfmar)
S-AWS Timeliness (Surfmar)
Blacklists (daily updated) :
List of stations with dubious values for a given parameter (wind, sst, pressure, ...) for all stations or E-SURFMAR stations only.

Plots of data and plots of differences with some model outputs (QC plots) over the past 30 days for buoys or VOS.

<https://esurfmar.meteo.fr/qctools/>

Daily update
(except SST -> weekly)

MARINE OBSERVATION MONITORING
Quality Control Tools : blacklists

QC Statistics - Platforms providing dubious AP values

List of platforms for which over the past 30 days :
- the number of gross errors is higher than 2 and higher than 5%,
- standard deviation is higher than 3 hPa,
- or bias is higher than 5 hPa in absolute value.

Last update : Fri Oct 21 12:37:11 2022

WMO	Argos/IMEI	Prgm	Own	End Date	Lat	Lon	Nobs	GE	Bias	Sd	Stat	Data	Comp	Near	Map
1601598		GDP-MF	Meteo Franc	20221003	-35.9	137.7	244	22	2.4	2.8	●	●	●	●	●
2302614				20220926	6.1	80.2	95	22	-2.3	4.6	●	●	●	●	●
2302620				20221020	11.2	79.8	621	73	-0.6	3.9	●	●	●	●	●
3301581	66914820	AOML	National Oc	20221020	-34.0	119.8	685	70	1.9	3.2	●	●	●	●	●
3801550				20221020	88.2	-131.4	719	38	-0.2	0.3	●	●	●	●	●
4101654				20220928	72.3	15.0	95	0	-0.3	3.5	●	●	●	●	●
4101849				20220928	20.2	-68.8	169	90	-1.1	5.4	●	●	●	●	●
4201647				20220926	31.2	-89.3	45	45			●	●	●	●	●
4400062		NOAA-CBI		20221020	38.6	-76.4	12261	781	1.2	1.7	●	●	●	●	●
4401850	66391380	AOML	National Oc	20220927	66.8	13.1	136	136			●	●	●	●	●
4500012				20221020	43.6	-77.4	4313	1568	-9.6	0.3	●	●	●	●	●
4500186				20221020	42.4	-87.8	7312	940	-1.6	4.1	●	●	●	●	●
4601783				20221020	59.8	-147.8	485	485			●	●	●	●	●
4701658	300234063518450	EC DB	ENVIRONMENT	20221020	71.8	-95.4	705	145	2.9	4.9	●	●	●	●	●

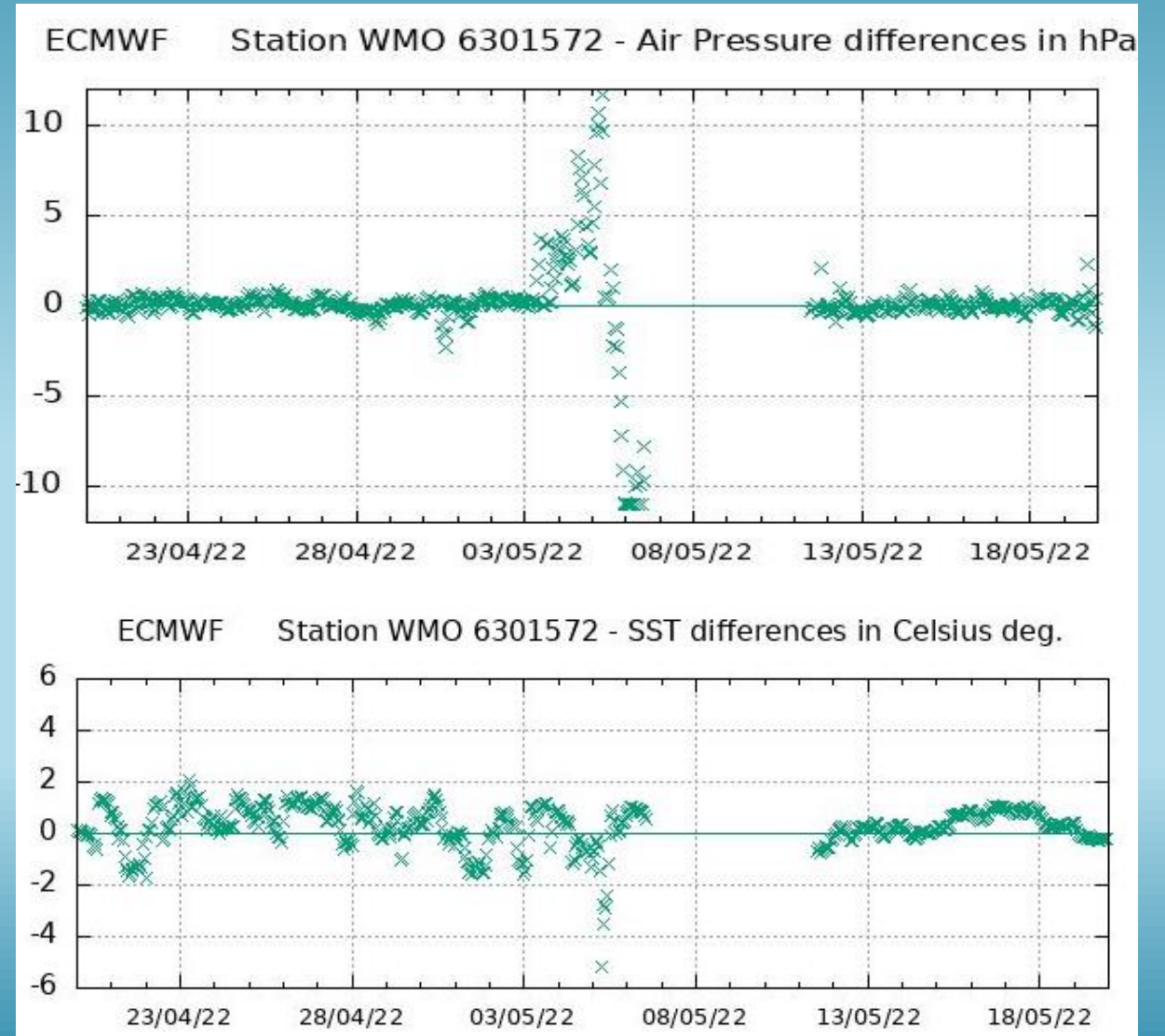
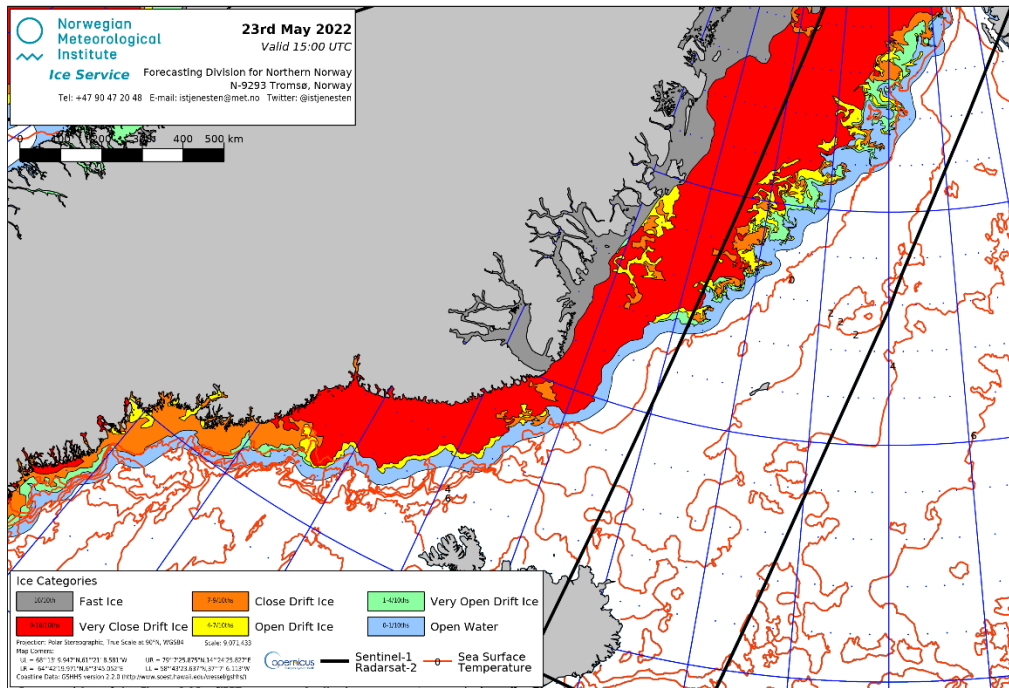
Hot Buoys

Buoy life is not a long, quiet river

Manual control when a buoy deserve a special attention :

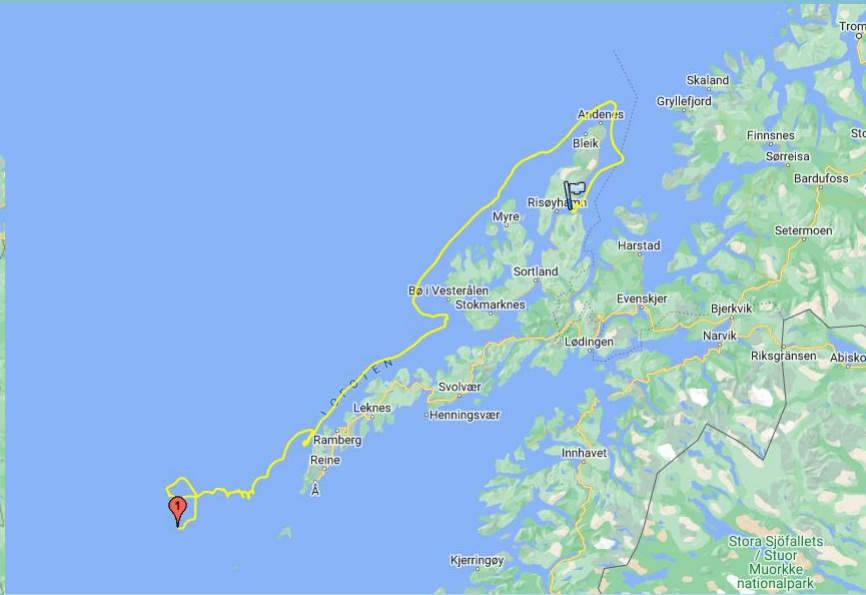
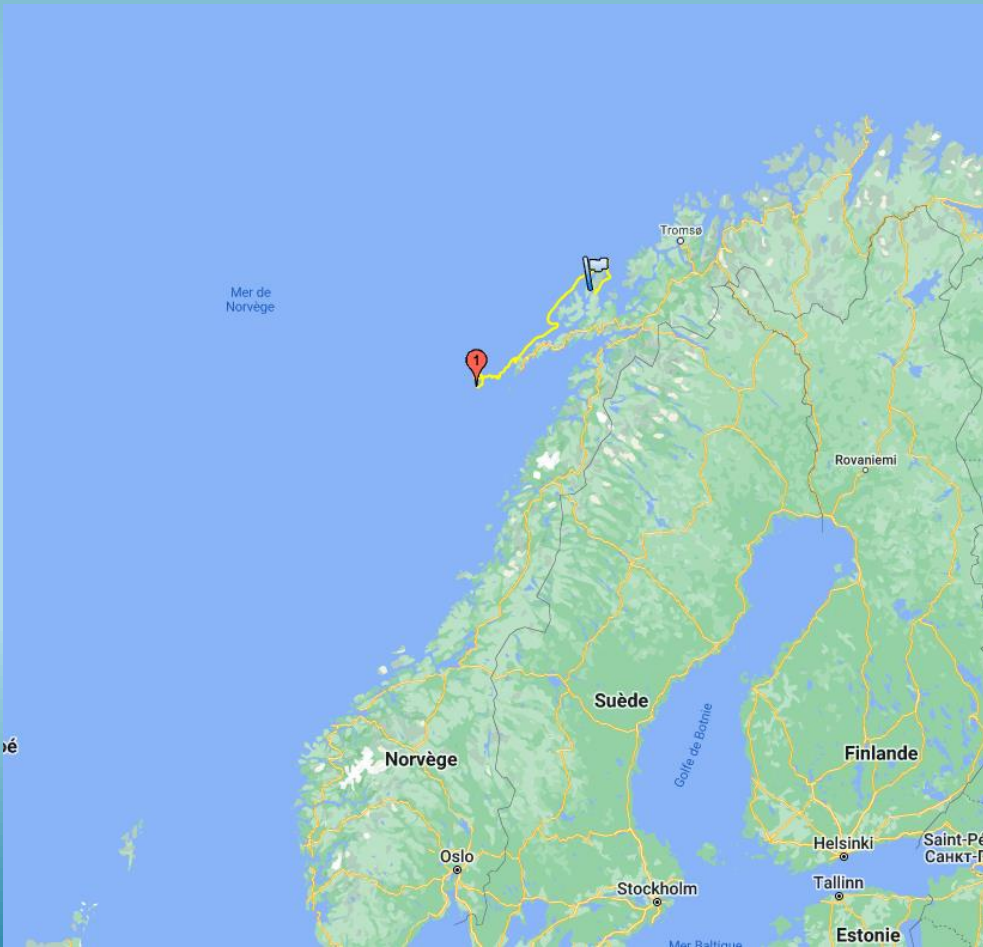
- Land prox
- Intermittent data anomaly (SLP, SST, GPS)
- Iced
- Bias correction ...

Example : buoy # 6301572



Land proximity

case # 4101842



SLP Bias correction

(according DBCP technical document N°37)

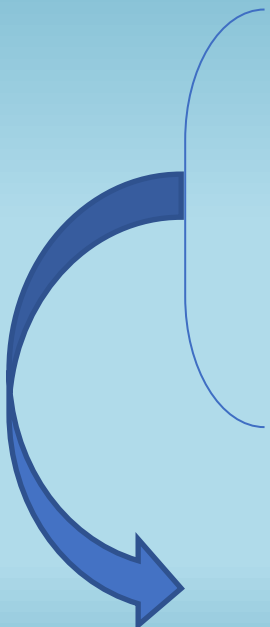
Detect Bias with blacklist and monthly statistic

Evaluate faisability and and apply correction

Periodic check (accuracy of correction and evolution)

SLP Bias correction

Detect Bias with blacklist and monthly statistic

- 
- Daily update of QCTools SLP E-surfmar blacklist
Gross error - bias – std / RMS
 - Monthly update of QCTools comparison score with Meteo France and ECMWF model

Studies of buoys with a bias greater than 0,5 hPa

SLP Bias correction

Evaluate faisability and and apply correction

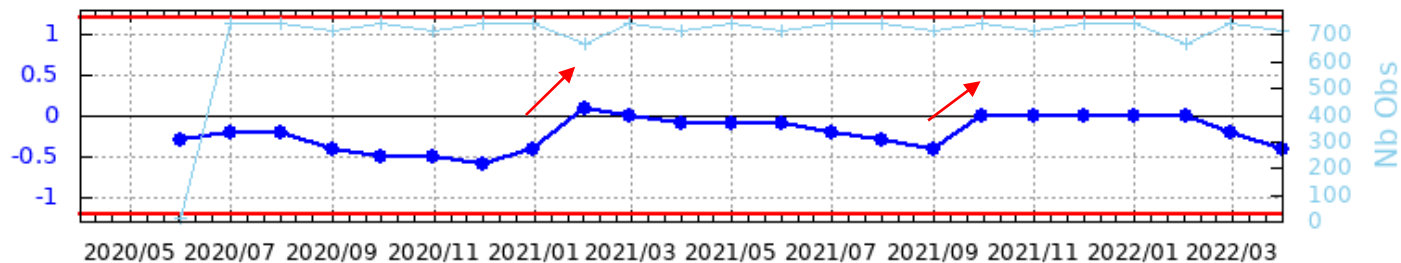
Periodic check

- Check the variability :
 - Constant bias over a week
 - Acceptable standard deviation ($<1,5$)
- Bias correction applied before GTS insercion
- Periodic check (hot buoys)
 - in the following days to check correction accuracy
 - in the following weeks to control an eventual degradation

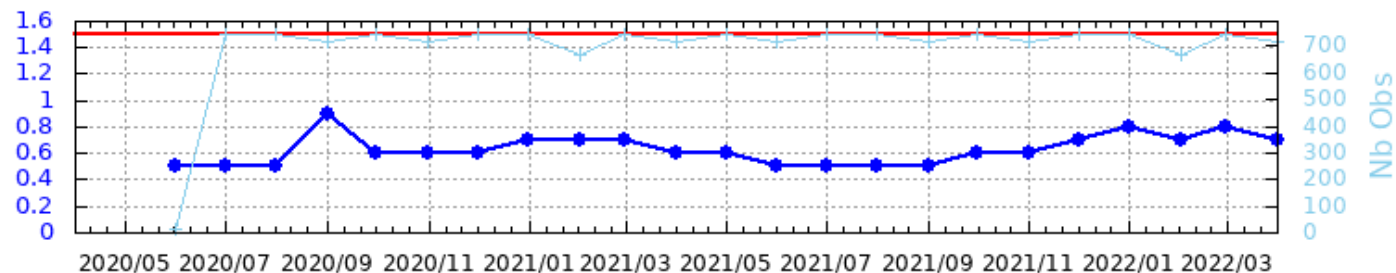
SLP Bias correction



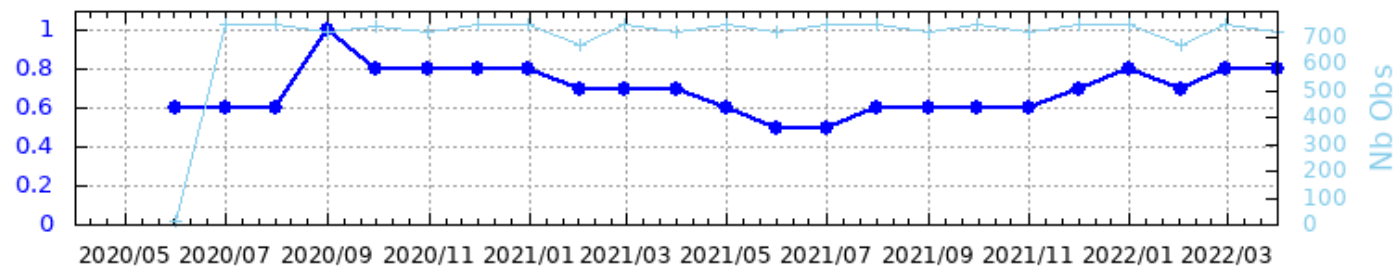
Bias Station WMO 4401854 - Air Pressure (hPa)



Standard Deviation Station WMO 4401854 - Air Pressure (hPa)

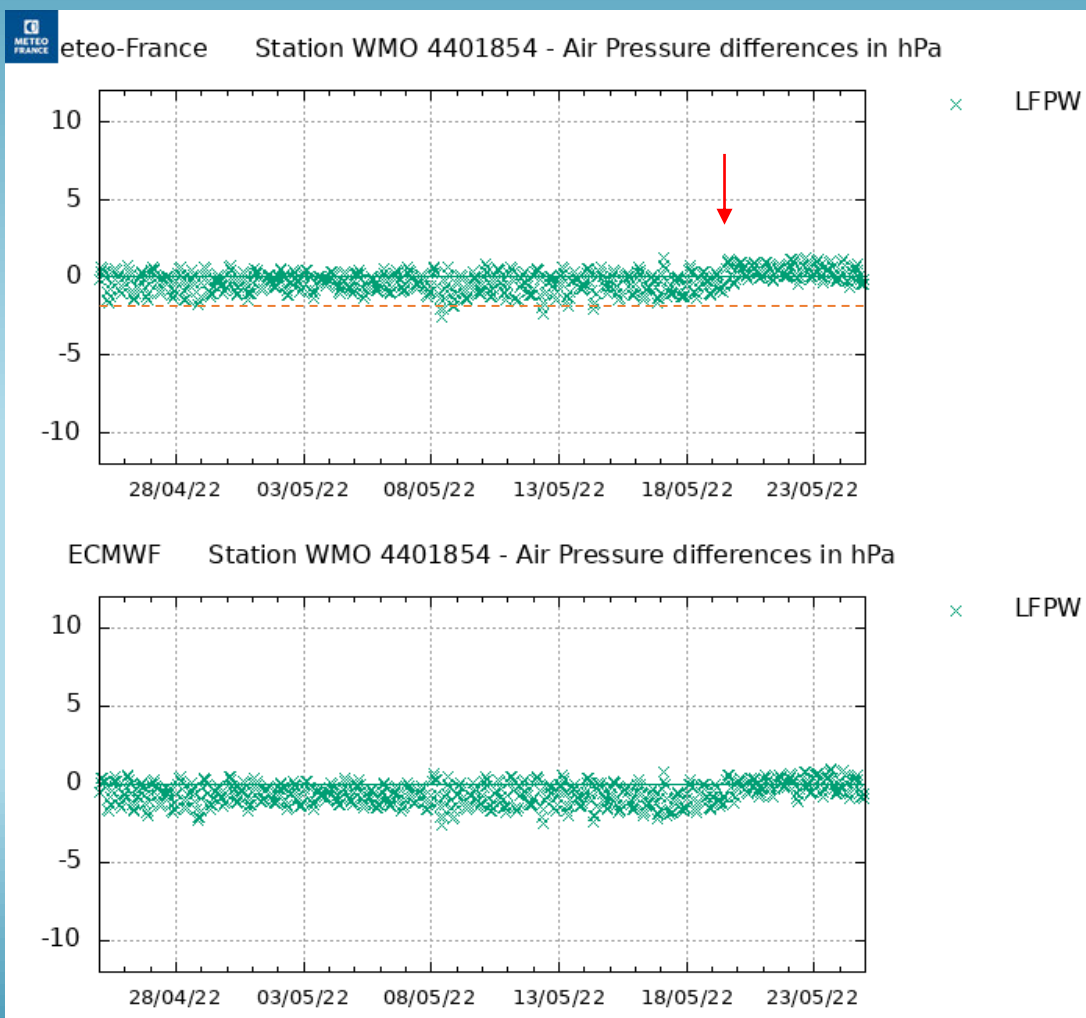


RMS Station WMO 4401854 - Air Pressure (hPa)



Date	Corr	Tot
21/01/21	+0,7	+0,7
18/09/21	+0,5	+1,2
19/5/22	+0,8	+2,0

SLP Bias correction



Date	Corr	Tot
21/01/21	+0,7	+0,7
18/09/21	+0,5	+1,2
19/5/22	+0,8	+2,0

SLP Bias correction summary

Today 35 e-surfmar drifter have a bias correction on 124 buoys broadcast by CMM :	28%
7 have more than 2 corrections	: 5%
Mean bias of Buoy with 1-2 corrections	: 0,7 hPa

Advantage : improve data quality and sensor life expectancy

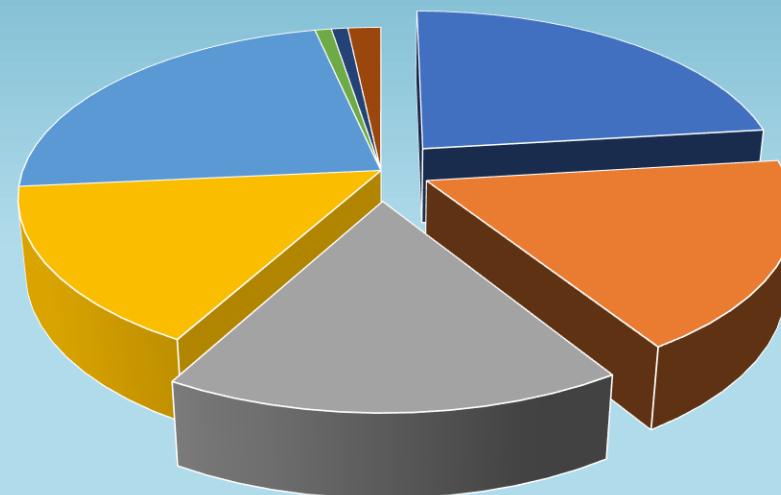
Perimeter : only buoys broadcast by CMM

2. QC actions in 2022

2/3 done to improve SLP quality and on GTS and life expectancy of barometers :

- stopped (GE/std/bias)
- bias correction
- revalidated

2022 E-surfmar QC event



- | | | |
|--------------------|-----------------------|----------------------|
| ■ P stop (GE, std) | ■ P bias | ■ P return |
| ■ Ashore | ■ drogue (not ashore) | ■ sst stop (GE, std) |
| ■ sst return | ■ GPS error | |

Collect & recycling

Goals

- Reduce plastic pollution
- Optimize buoy's life expectancy -> reduce cost and carbon footprint

Status

- 2 collect & re deployment (Spain, Germany)
- 5 recovery action successful (Germany, Netherlands, Ireland, Spain, Australia)

Evolution

Generalize these action based on goodwill of participants

No buoys recovery in 2021 -> lot of room for improvement

Buoys data QC



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