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MOCCA

D4.3.3 Report on Delayed-Mode processing on the MOCCA fleet

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[1] As indicated in the "Technical and Scientific description of the Euro-Argo ERIC" April 2018 attached to the Euro-Argo Statutes.

[2] Integers correspond to submitted versions.

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1. INTRODUCTION

This document compiles the activities on Delayed-Mode Quality Control (DMQC) processing of the MOCCA fleet (Figure 1). Data processing for MOCCA floats is compliant and makes use of the Argo Data System.

The Real-Time (RT) processing of the MOCCA fleet is organised through Euro-Argo data centres, as described in the deliverable D4.2.4 Report on Real-Time processing of the MOCCA fleet.

The DMQC of MOCCA floats is performed by Euro-Argo MOCCA partners delayed-mode operators according to the area of deployment and taking into account their area of expertise. It is further described in the deliverable D4.1.1 Organization of Float Data Management among DAC and DM-operators.

The following map illustrates the repartition of RT and DM processing among MOCCA partners:

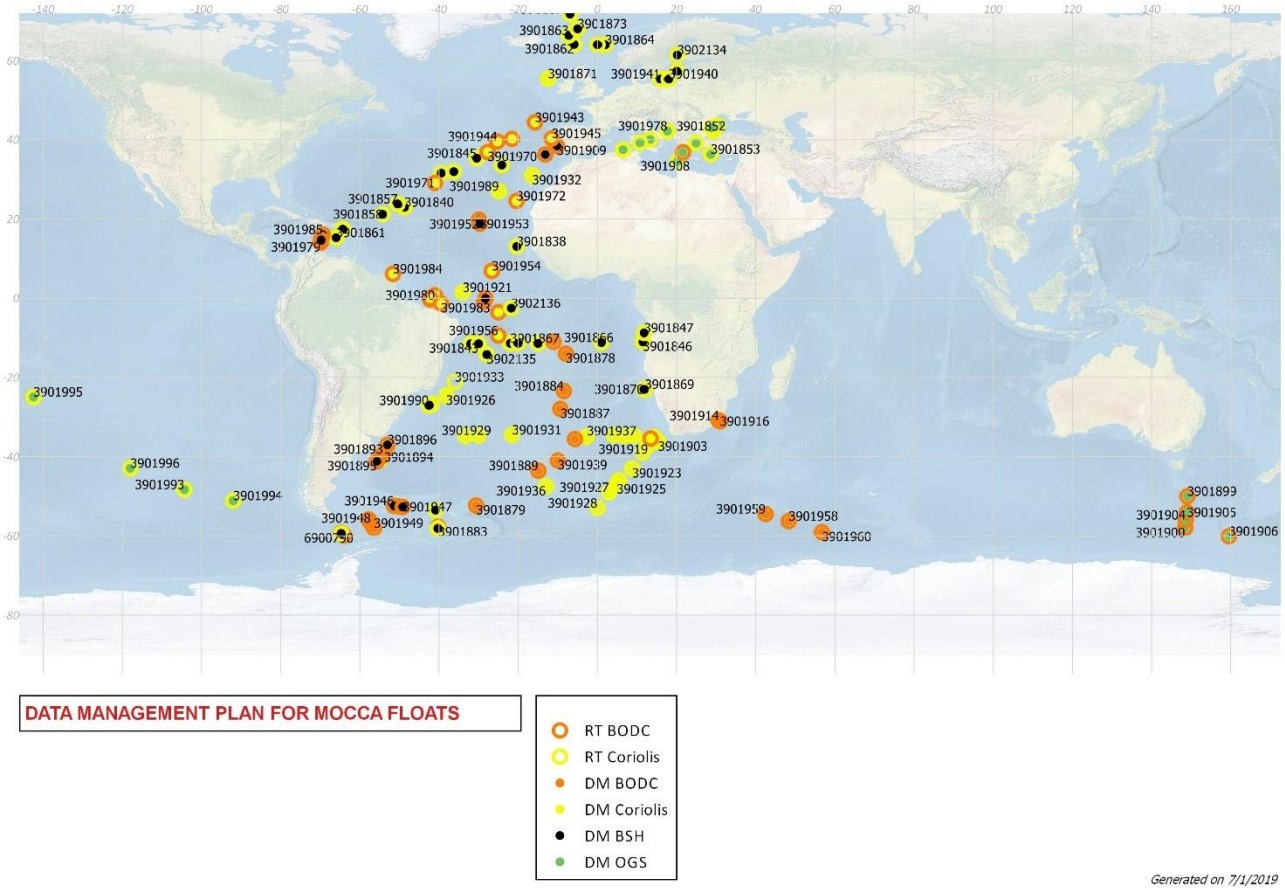


Figure 1: MOCCA data processing allocation between partners for Real-Time and Delayed-Mode. Points depict the Argo deployment positions.

2. METHODOLOGY

The DMQC of Argo floats follows guidelines provided by the Argo Data Management Team (ADMT), and is documented in the following manuals:

- Argo user's manual V3.2 (*http://dx.doi.org/10.13155/29825*)
- Argo quality control manual for CTD and trajectory data, version 3.1 (*http://dx.doi.org/10.13155/33951*)

Each DM operator might use its own tools but by essence Argo data is corrected in delayed mode using agreed procedures. In the frame of the MOCCA project a **DMQC workshop** was organised in April 2018 by the Euro-Argo ERIC and the DMQC experts within Europe. Some of the key achievements were a review of the DMQC methodology among operators, sharing of tools or MATLAB codes, discussions about the reference databases to be used to control the data.

Information about the workshop can be accessed on the workshop webpage:
http://www.euro-argo.eu/News-Meetings/Meetings/Others/1st-European-Argo-Delayed-Mode-QC-Workshop

Talks and practical work material may be downloaded from the cloud link:
https://cloud.ifremer.fr/index.php/s/ifgoDyTIDGkjr5E

This report will not focus on the methodology of DMQC but rather on summarising the status of MOCCA float DMQC. **Detailed information about DMQC pathway is available from the manuals and presentations mentioned above.**

Nevertheless, a brief overview of the DMQC workflow is described hereafter.

2.1. DMQC workflow

RT processing is carried out by DACs (Data Assembly Centres). Procedures flag the gross errors in the data but some subtle errors may remain like sensor drift and or offset (Figure 2), float trajectory problems, etc. Elaborate procedures have been devised, based on statistical methods, and scientific expertise from principal investigators (PIs). The procedures are constantly assessed and updated as necessary. A minimum of 1 year of data is needed before the delayed mode processing can be performed.

The improvement of data quality from RT data to quality controlled delayed-mode data is achieved by comparing Argo to other observations (climatology, altimetry, reference databases, deployment CTD, etc.) and visual inspection by an operator. Pressure, temperature and salinity data are extensively analysed. Especially salinity data needs to be carefully examined since over time, the conductivity sensor can experience instrumental drift that gives salinity measurements an artificial trend. By using deep climatological reference deep CTD data (Figure 3) and objective analysis, we can estimate what salinity should be at float locations.

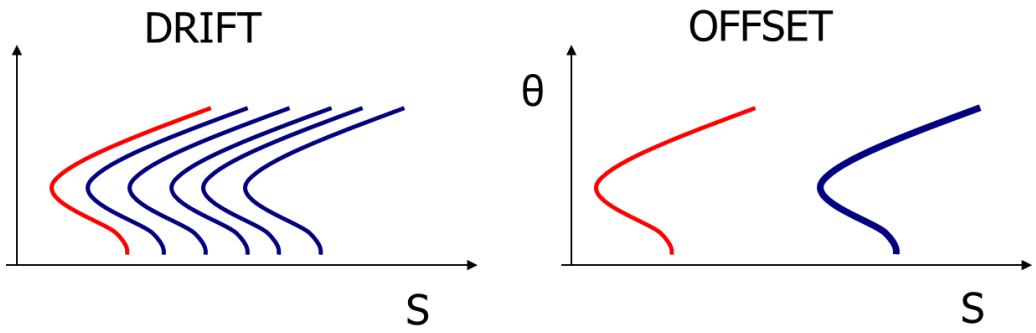


Figure 2: Example of drift or offset problems in the salinity time series. Red is the first collected profile and blues are the next ones.

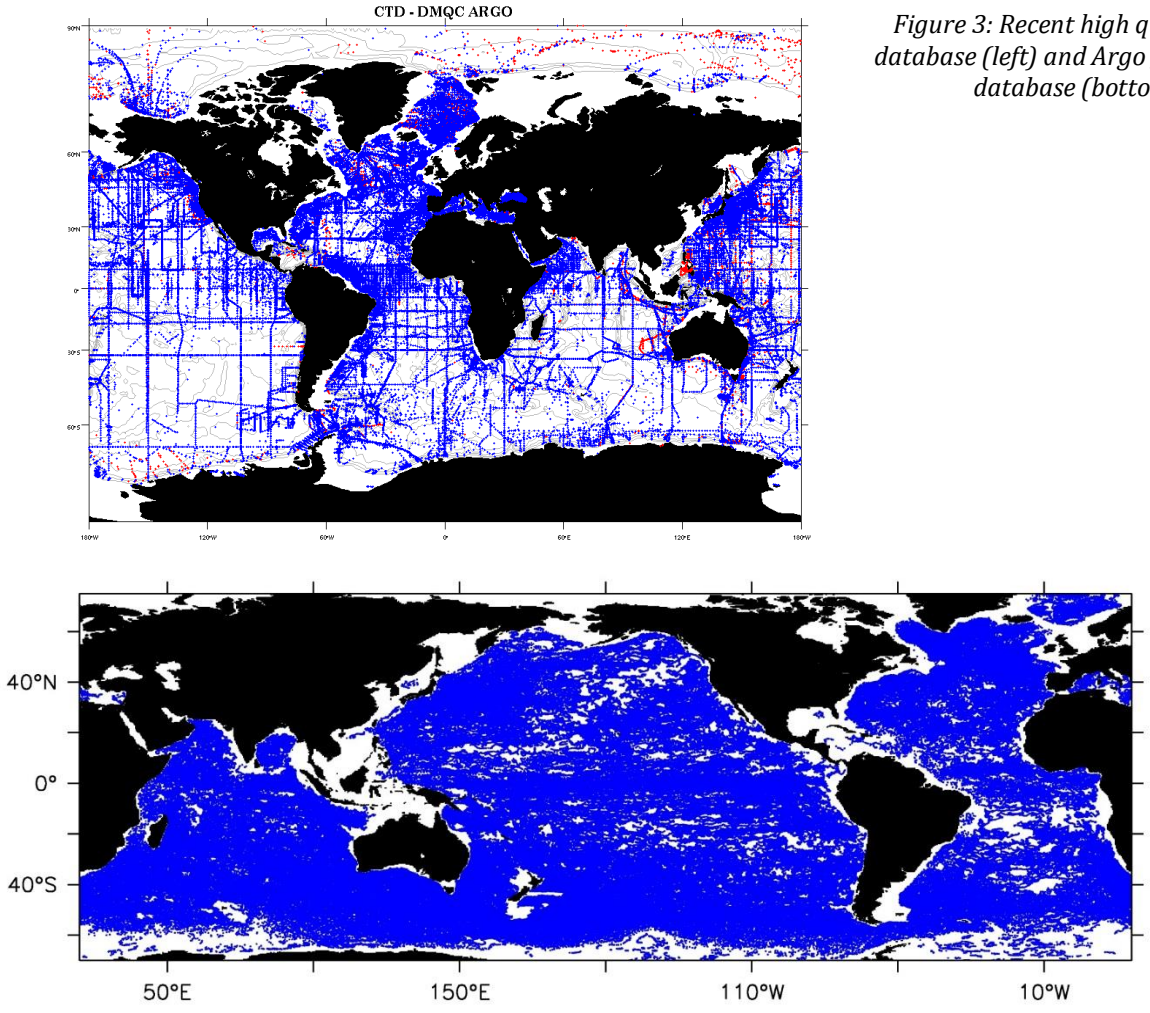


Figure 3: Recent high quality CTD database (left) and Argo good profile database (bottom).

A typical DMQC process includes:

- Visual inspection of the main float characteristics (cycle settings, mission number, etc.)
- Review of float trajectory, positions and dates, raw sections, raw theta/S diagrams
- Verification of RT QC flags
- Quality check on basic parameters (surface pressure, battery, etc.)

- Choice of reference CTDs and Argo profiles databases for comparison
- OW[3] method configuration and runs
- Comparison with deployment CTD profile (if available)
- Comparison with the closest (in time and space) CTD reference profiles and good Argo float profiles (if available)
- Look at sections based on the adjusted data and respective theta/S diagrams
- Analysis and decisions by the DM operator: changing QC flags, applying correction or calibration to one or more parameters
- Production and submission of D files[4] and submission to the relevant DAC

2.2. Timeline

Recommendations from ADMT are to complete the **first DMQC not later than one year after float deployment**. Indeed, the operator needs to look at a significant number of measurements to detect potential drifts in the dataset.

Then it is encouraged to **revisit the DMQC at minimum every two years**. If potential drifts or problems were identified during the first DMQC then the revisit should take place sooner.

Feedback from **Objective Analysis** or **MinMax[5] Test** (statistical tests performed monthly at Coriolis) and **Altimetry Test** (performed by CLS) are also part of the Argo Quality Control Process**. In case of warnings issued for a float that has not been quality controlled already, it is highly recommended that the DM operator** in charge of the float performs a **first DMQC even if the float is recently deployed.**

[3] Owens, W.B. and A.P.S. Wong, 2009. An improved calibration method for the drift of the conductivity sensor on autonomous CTD profiling floats by θ - S climatology. DeepSea Res. Part I, 56, 450-457. https://doi.org/10.1016/j.dsr.2008.09.008

[4] Argo netCDF profile file that has been through the delayed-mode process. It replaces the real-time file (R).

[5] Gourrion et al., in press: Improved statistical method for quality control of hydrographic observations. Journal of Atmospheric and Oceanic Technology

3. MOCCA FLOATS MAPS

More than **20 000 Argo CTD profiles have been collected by the MOCCA fleet** to date (April 2020), as can be seen in Figure 4:

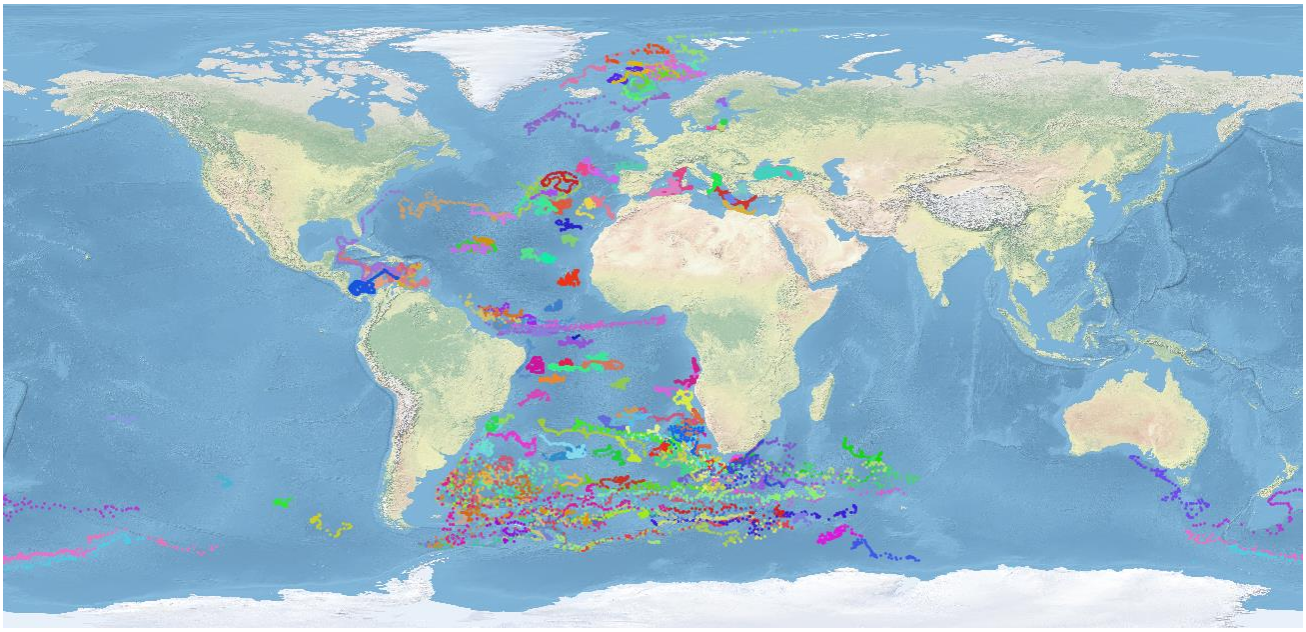


Figure 4 : MOCCA observations locations (1 colour per float).

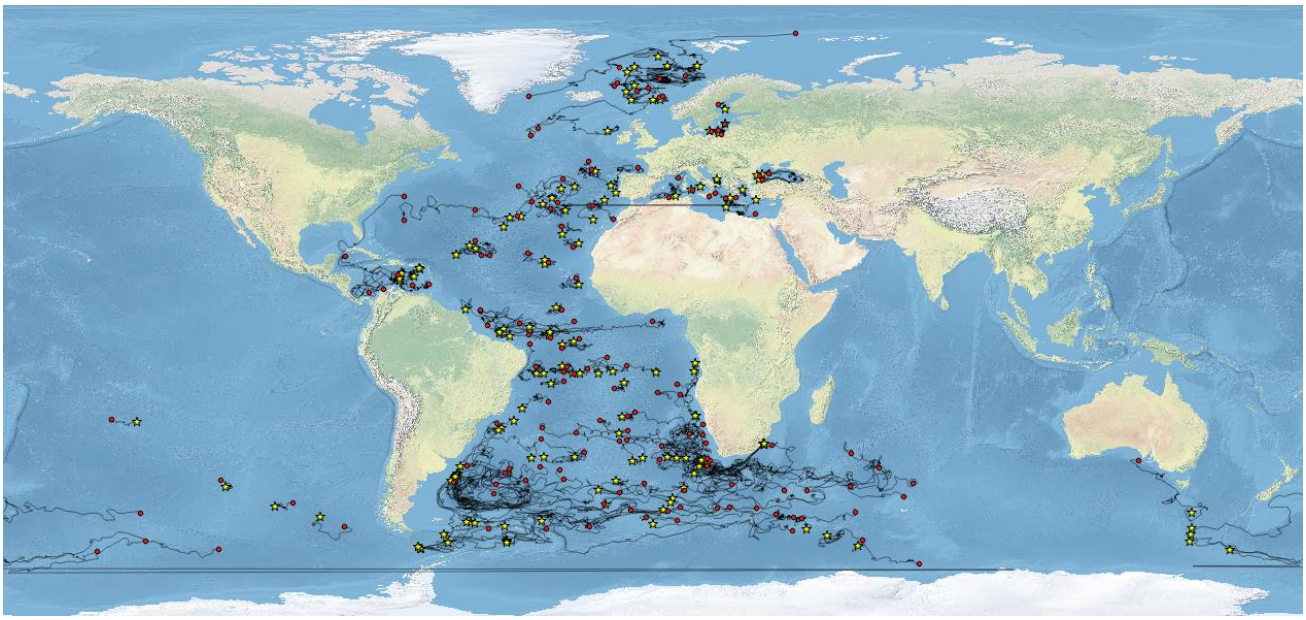


Figure 5: MOCCA deployment locations (yellow stars), latest locations (red circle) and trajectories of floats (black line).

The MOCCA deployments and subsequent trajectories (Figure 5) provides a good coverage of European and Caribbean marginal seas, Nordic seas, South Atlantic and substantial measurements along the ACC (Antarctic Circumpolar Current) in the South Indian and South Pacific oceans.

4. MOCCA FLOATS DMQC STATUS

4.1. MOCCA floats table

Table 1 describes the MOCCA fleet with information about the WMO number of each float, its serial number, transmission type, ship and cruise of deployment, date and position of deployment, sub-MOCCA programme and partner allocation for RT and DM.

WMO	S/N	Transmission	Ship	Cruise	Deployment	Latitude	Longitude	Program	RT	DM
3901838	AR2600-16FR001	IRIDIUM	FS METEOR	M129	23/08/2016	13.0717	-20.3583	MOCCA-GER	Coriolis	BSH
3901839	AR2600-16FR002	IRIDIUM	FS METEOR	M127	25/06/2016	31.9500	-36.2800	MOCCA-GER	Coriolis	BSH
3901840	AR2600-16FR003	IRIDIUM	FS METEOR	M127	29/05/2016	22.9700	-48.7300	MOCCA-GER	Coriolis	BSH
3901841	AR2600-16FR004	IRIDIUM	FS METEOR	M129	31/07/2016	33.62	-24.15	MOCCA-GER	Coriolis	BSH
3901842	AR2600-16FR005	IRIDIUM	FS METEOR	M131	08/10/2016	-11.5013	-32.0005	MOCCA-GER	Coriolis	BSH
3901843	AR2600-16FR006	IRIDIUM	FS METEOR	M131	09/10/2016	-11.4827	-30.0008	MOCCA-GER	Coriolis	BSH
3901844	AR2600-16FR007	IRIDIUM	FS METEOR	M131	13/10/2016	-11.434	-14.9992	MOCCA-GER	Coriolis	BSH
3901845	AR2600-16FR008	IRIDIUM	FS METEOR	M127	26/06/2016	35.3400	-30.4900	MOCCA-GER	Coriolis	BSH
3901846	AR2600-16FR009	IRIDIUM	FS METEOR	M131	20/10/2016	-11.0175	11.4998	MOCCA-GER	Coriolis	BSH
3901847	AR2600-16FR010	IRIDIUM	FS METEOR	M131	22/10/2016	-8.7505	11.8	MOCCA-GER	Coriolis	BSH
3901848	AR2600-16FR011	OFF	BELLE POULE	MED	04/06/2016	40.0800	13.3400	MOCCA-IT	Coriolis	OGS
3901849	AR2600-16FR012	IRIDIUM	BELLE POULE	MED	05/06/2016	39.2600	10.7700	MOCCA-IT	Coriolis	OGS
3901850	AR2600-16FR013	IRIDIUM	OCEANIA	AREX2016	24/06/2016	73.5100	12.2400	MOCCA-POL	Coriolis	BSH
3901851	AR2600-16FR014	IRIDIUM	OCEANIA	AREX2016	25/06/2016	73.5300	4.0400	MOCCA-POL	Coriolis	BSH
3901852	AI2600-16FR015	IRIDIUM	TURKEY	BLACK SEA	06/12/2016	42.1844	29.3343	MOCCA-EU	Coriolis	OGS
3901853	AI2600-16FR016	IRIDIUM	TURKEY	CILICIAN BASIN	28/10/2016	36.3468	28.657	MOCCA-EU	Coriolis	OGS
3901854	AI2600-16FR017	IRIDIUM	ROMANIA	BLACK SEA	02/11/2016	43.5752	30.4416	MOCCA-EU	Coriolis	OGS
3901855	AI2600-16FR018	IRIDIUM	BULGARIA	BLACK SEA	22/10/2016	43.1053	28.8788	MOCCA-EU	Coriolis	OGS
3901856	AR2600-16FR019	IRIDIUM	PELAGIA	PELAGIA_TR	09/08/2016	31.573	-39.459	MOCCA-EU	Coriolis	BSH
3901857	AR2600-16FR020	IRIDIUM	PELAGIA	PELAGIA_TR	12/08/2016	23.804	-50.4702	MOCCA-EU	Coriolis	BSH
3901858	AR2600-16FR021	IRIDIUM	PELAGIA	PELAGIA_TR	14/08/2016	21.1817	-54.2483	MOCCA-EU	Coriolis	BSH
3901859	AR2600-16FR022	IRIDIUM	PELAGIA	64PE614	01/09/2016	17.45	-64.381	MOCCA-EU	Coriolis	BSH
3901860	AR2600-16FR023	IRIDIUM	PELAGIA	64PE614	05/09/2016	17.3467	-64.235	MOCCA-EU	Coriolis	BSH
3901861	AR2600-16FR024	IRIDIUM	PELAGIA	64PE614	06/09/2016	15.2817	-65.9983	MOCCA-EU	Coriolis	BSH
3901862	AR2600-16FR025	IRIDIUM	Beautemps-Beaupré	NARVAL	11/08/2016	64.0744	-5.8695	MOCCA-EU	Coriolis	BSH
3901863	AR2600-16FR026	IRIDIUM	Beautemps-Beaupré	NARVAL	12/08/2016	66.33	-7.22	MOCCA-EU	Coriolis	BSH
3901864	AR2600-16FR027	IRIDIUM	Beautemps-Beaupré	NARVAL	08/09/2016	63.9797	1.9976	MOCCA-EU	Coriolis	BSH
3901865	AR2600-16FR028	IRIDIUM	Beautemps-Beaupré	NARVAL	08/09/2016	64	0	MOCCA-EU	Coriolis	BSH
3901866	AR2600-16FR029	IRIDIUM	FS METEOR	M131	17/10/2016	-11.1852	1.0013	MOCCA-EU	Coriolis	BSH
3901867	AR2600-16FR030	IRIDIUM	FS METEOR	M131	11/10/2016	-11.3833	-22	MOCCA-EU	Coriolis	BSH
3901868	AR2600-16FR031	IRIDIUM	FS METEOR	M131	12/10/2016	-11.3648	-19.9973	MOCCA-EU	Coriolis	BSH
3901869	AR2600-16FR032	IRIDIUM	FS METEOR	EEZ	10/11/2016	-23	12	MOCCA-EU	Coriolis	BSH
3901870	AR2600-16FR033	IRIDIUM	FS METEOR	EEZ	10/11/2016	-23.0007	11.7487	MOCCA-EU	Coriolis	BSH
3901871	AR2600-16FR034	IRIDIUM	CELTIC VOYAGER	CV16030	29/08/2016	55.4133	-12.475	MOCCA-EU	Coriolis	Coriolis
3901872	AR2600-16FR035	IRIDIUM	HAAKON MOSBY	2016618	23/08/2016	71.7229	-6.913	MOCCA-EU	Coriolis	BSH

3901873	AR2600-16FR036	IRIDIUM	HAAKON MOSBY	2016618	04/09/2016	67.9926	-4.9936	MOCCA-EU	Coriolis	BSH
3901874	AR2600-16FR037	IRIDIUM	HAAKON MOSBY	2016618	22/08/2016	75.96	1.56	MOCCA-EU	Coriolis	BSH
3901875	AR2600-16FR038	IRIDIUM	HAAKON MOSBY	2016618	23/08/2016	72.9994	-5.0001	MOCCA-EU	Coriolis	BSH
3901876	AI2600-16FR039	IRIDIUM	PLANCIUS	KNMI	17/10/2016	-26.6633	-41.71	MOCCA-NETH	Coriolis	BSH
3901877	AI2600-16FR040	IRIDIUM	PLANCIUS	KNMI	21/10/2016	-40.6317	-54.7167	MOCCA-NETH	Coriolis	BSH
3901878	AI2600-16FR041	IRIDIUM	PLANCIUS	KNMI	19/04/2017	-13.9917	-7.9583	MOCCA-NETH	BODC	BODC
3901879	AI2600-16FR042	IRIDIUM	PLANCIUS	KNMI	03/04/2017	-52.3133	-30.64	MOCCA-NETH	BODC	BODC
3901880	AI2600-16FR043	IRIDIUM	PLANCIUS	KNMI	20/04/2017	-10.9983	-11.9983	MOCCA-NETH	BODC	BODC
3901881	AI2600-16FR044	IRIDIUM	PLANCIUS	KNMI	22/01/2017	-52.5314	-50.2682	MOCCA-NETH	BODC	BODC
3901882	AI2600-16FR045	IRIDIUM	PLANCIUS	KNMI	04/03/2017	-59.7346	-64.1988	MOCCA-NETH	BODC	BODC
3901883	AI2600-16FR046	IRIDIUM	PLANCIUS	KNMI	28/01/2017	-57.8178	-40.2158	MOCCA-NETH	BODC	BODC
3901884	AI2600-16FR047	IRIDIUM	PLANCIUS	KNMI	14/04/2017	-23.4183	-8.4783	MOCCA-NETH	BODC	BODC
3901885	AI2600-16FR048	IRIDIUM	PLANCIUS	KNMI	19/12/2016	-59.8805	-64.0436	MOCCA-NETH	BODC	BODC
3901886	AI2600-16FR049	IRIDIUM	PLANCIUS	KNMI	24/03/2017	-59.2467	-64.76	MOCCA-NETH	BODC	BODC
3901887	AI2600-16FR050	IRIDIUM	PLANCIUS	KNMI	13/04/2017	-27.95	-9.3517	MOCCA-NETH	BODC	BODC
3901888	AI2600-16FR051	IRIDIUM	PLANCIUS	KNMI	25/02/2017	-57.6815	-40.2235	MOCCA-NETH	BODC	BODC
3901889	AI2600-16FR052	IRIDIUM	PLANCIUS	KNMI	06/04/2017	-43.5233	-14.905	MOCCA-NETH	BODC	BODC
3901890	AI2600-16FR053	IRIDIUM	POSEIDON	AEGEAN	03/04/2017	39.1633	24.928	MOCCA-EU	Coriolis	OGS
3901891	AI2600-16FR054	IRIDIUM	HESPERIDES	RETRO-BMC	14/04/2017	-39.8803	-54.4889	MOCCA-EU	BODC	BODC
3901892	AI2600-16FR055	IRIDIUM	HESPERIDES	RETRO-BMC	14/04/2017	-39.5867	-54.2867	MOCCA-EU	BODC	BODC
3901893	AI2600-16FR056	IRIDIUM	HESPERIDES	RETRO-BMC	15/04/2017	-39.3758	-54.116	MOCCA-EU	BODC	BODC
3901894	AI2600-16FR057	IRIDIUM	HESPERIDES	RETRO-BMC	15/04/2017	-39.001	-53.8722	MOCCA-EU	BODC	BODC
3901895	AI2600-16FR058	IRIDIUM	HESPERIDES	HESPERIDES_TR	14/04/2017	-41.1893	-55.713	MOCCA-EU	BODC	BSH
3901896	AI2600-16FR059	IRIDIUM	HESPERIDES	HESPERIDES_TR	24/04/2017	-36.9977	-53.0213	MOCCA-EU	BODC	BSH
3901897	AI2600-16FR060	IRIDIUM	HESPERIDES	HESPERIDES_TR	10/05/2017	-0.8742	-28.6443	MOCCA-EU	BODC	BSH
3901898	AI2600-16FR061	IRIDIUM	HESPERIDES	HESPERIDES_TR	10/05/2017	0	-28.258	MOCCA-EU	BODC	BSH
3901899	AI2600-16FR062	IRIDIUM	OGS EXPLORA	Tasmania - Ross Sea	22/01/2017	-50.0037	149.0205	MOCCA-EU	BODC	OGS
3901900	AI2600-16FR063	IRIDIUM	OGS EXPLORA	Tasmania - Ross Sea	24/01/2017	-58.0117	148.4747	MOCCA-EU	BODC	OGS
3901901	AI2600-16FR064	IRIDIUM	METEOR	M133	16/12/2016	-36.2335	15.326	MOCCA-EU	Coriolis	Coriolis
3901902	AI2600-16FR065	IRIDIUM	METEOR	M133	16/12/2016	-36.2328	15.3282	MOCCA-EU	Coriolis	Coriolis
3901903	AI2600-16FR066	IRIDIUM	METEOR	M133	16/12/2016	-36.2317	15.331	MOCCA-EU	Coriolis	Coriolis
3901904	AI2600-16FR067	IRIDIUM	OGS EXPLORA	Tasmania - Ross Sea	24/01/2017	-55.985	148.6202	MOCCA-EU	BODC	OGS
3901905	AI2600-16FR068	IRIDIUM	OGS EXPLORA	Tasmania - Ross Sea	23/01/2017	-54.0553	148.9278	MOCCA-EU	BODC	OGS
3901906	AI2600-16FR069	IRIDIUM	OGS EXPLORA	Tasmania - Ross Sea	10/03/2017	-60.1	159.52	MOCCA-EU	BODC	OGS
3901907	AI2600-16FR070	IRIDIUM	BTBP	PROTEUS	21/01/2017	37.4865	6.4797	MOCCA-IT	Coriolis	OGS
3901908	AI2600-16FR071	IRIDIUM	BTBP	PROTEUS	25/01/2017	34.5008	20.2458	MOCCA-IT	Coriolis	OGS
3901909	AI2600-16FR072	IRIDIUM	NORUEGA	IPMA	29/12/2016	38.4407	-10.2171	MOCCA-EU	BODC	BSH
3901910	AI2600-16FR073	IRIDIUM	OCEANIA	AREX2017	29/06/2017	73.5008	12.2253	MOCCA-POL	Coriolis	BSH
3901911	AI2600-16FR074	IRIDIUM	OCEANIA	AREX2017	27/06/2017	73.5102	4.0647	MOCCA-POL	Coriolis	BSH
3901912	AI2600-16FR075	IRIDIUM	ALGOA	ASCA	10/08/2017	-30.8776	30.6909	MOCCA-EU	BODC	BODC
3901913	AI2600-16FR076	IRIDIUM	ALGOA	ASCA	10/08/2017	-31.0101	30.9068	MOCCA-EU	BODC	BODC
3901914	AI2600-16FR077	IRIDIUM	ALGOA	ASCA	10/08/2017	-30.9172	30.7555	MOCCA-EU	BODC	BODC
3901915	AI2600-16FR078	IRIDIUM	ALGOA	ASCA	10/08/2017	-30.9656	30.832	MOCCA-EU	BODC	BODC
3901916	AI2600-16FR079	IRIDIUM	ALGOA	ASCA	10/08/2017	-31.0609	30.9813	MOCCA-EU	BODC	BODC
3901917	AI2600-16FR080	IRIDIUM	ALGOA	ASCA	10/08/2017	-30.83456	30.62351	MOCCA-EU	BODC	BODC
3901918	AL2500-16FR016	ARGOS	SA Agulhas II	SANAE	01/12/2016	-35	14.25	MOCCA-EU	Coriolis	Coriolis

3901919	AL2500-16FR017	ARGOS	SA Agulhas II	SANAE	01/12/2016	-37	12.7915	MOCCA-EU	Coriolis	Coriolis
3901920	AL2500-16FR018	ARGOS	SA Agulhas II	SANAE	02/12/2016	-39	11.49	MOCCA-EU	Coriolis	Coriolis
3901921	AL2500-16FR019	ARGOS	HESPERIDES	HESPERIDES_TR	19/05/2018	1.45	-34.01	MOCCA-EU	Coriolis	Coriolis
3901922	AL2500-16FR020	ARGOS	SA Agulhas II	GOUGH	07/10/2017	-34.9197	-2.6788	MOCCA-EU	Coriolis	Coriolis
3901923	AL2500-16FR021	ARGOS	SA Agulhas II	SANAE	03/12/2016	-43	8.7793	MOCCA-EU	Coriolis	Coriolis
3901924	AL2500-16FR022	ARGOS	SA Agulhas II	SANAE	04/12/2016	-46	5.403	MOCCA-EU	Coriolis	Coriolis
3901925	AL2500-16FR023	ARGOS	SA Agulhas II	SANAE	04/12/2016	-47.02	4.9	MOCCA-EU	Coriolis	Coriolis
3901926	AL2500-16FR024	ARGOS	PLANCIUS	PLANCIUS_TR	31/10/2017	-24.5917	-38.2258	MOCCA-EU	Coriolis	Coriolis
3901927	AL2500-16FR025	ARGOS	SA Agulhas II	SANAE	05/12/2016	-49.01	2.9458	MOCCA-EU	Coriolis	Coriolis
3901928	AL2500-16FR026	ARGOS	SA Agulhas II	SANAE	06/12/2016	-53	0	MOCCA-EU	Coriolis	Coriolis
3901929	AL2500-16FR027	ARGOS	MARIA S MERIAN	MSM60	22/01/2017	-34.6283	-29.9508	MOCCA-EU	Coriolis	Coriolis
3901930	AL2500-16FR028	ARGOS	MARIA S MERIAN	MSM60	24/01/2017	-34.7572	-33.4006	MOCCA-EU	Coriolis	Coriolis
3901931	AL2500-16FR029	ARGOS	MARIA S MERIAN	MSM60	19/01/2017	-34.5019	-21.5253	MOCCA-EU	Coriolis	Coriolis
3901932	AL2500-16FR030	ARGOS	HESPERIDES	HESPERIDES_TR	08/06/2018	31	-16.4875	MOCCA-EU	Coriolis	Coriolis
3901933	AL2500-16FR031	ARGOS	PLANCIUS	PLANCIUS_TR	31/10/2017	-21.16	-35.9996	MOCCA-EU	Coriolis	coriolis
3901934	AL2500-16FR032	ARGOS	MARIA S MERIAN	MSM60	10/01/2017	-34.5069	4.1219	MOCCA-EU	Coriolis	Coriolis
3901935	AL2500-16FR033	ARGOS	MARIA S MERIAN	MSM60	08/01/2017	-34.6839	9.3347	MOCCA-EU	Coriolis	Coriolis
3901936	AL2500-16FR034	ARGOS	SA Agulhas II	GOUGH	20/09/2017	-47.5	-13	MOCCA-EU	Coriolis	Coriolis
3901937	AL2500-16FR035	ARGOS	MARIA S MERIAN	MSM60	09/01/2017	-34.7525	6.76	MOCCA-EU	Coriolis	Coriolis
3901938	AI2600-16FR081	IRIDIUM	SA Agulhas II	GOUGH	06/10/2017	-35.5436	-5.6777	MOCCA-EU	BODC	BODC
3901939	AI2600-16FR082	IRIDIUM	SA Agulhas II	GOUGH	18/09/2017	-40.94	-10	MOCCA-EU	BODC	BODC
3901941	AI2600-16FR084	IRIDIUM	OCEANIA	BALTIC	21/09/2017	55.3338	15.916	MOCCA-EU	Coriolis	BSH
3901942	AI2600-16FR085	IRIDIUM	TAMOURE	MARTIN	20/09/2017	36.2983	-13.1633	MOCCA-EU	BODC	BSH
3901943	AI2600-16FR086	IRIDIUM	PIERRE DE FERMAT	ORANGE MARINE	20/09/2017	44.39	-15.7633	MOCCA-EU	BODC	Coriolis
3901944	AI2600-16FR087	IRIDIUM	PIERRE DE FERMAT	ORANGE MARINE	22/09/2017	39.5676	-25.2586	MOCCA-EU	BODC	Coriolis
3901945	AI2600-16FR088	IRIDIUM	PIERRE DE FERMAT	ORANGE MARINE	04/11/2017	40.3248	-11.5367	MOCCA-EU	BODC	Coriolis
3901946	AI2600-16FR089	IRIDIUM	PLANCIUS	PLANCIUS_TR	23/01/2018	-52.42	-51.3817	MOCCA-EU	BODC	BSH
3901947	AI2600-16FR090	IRIDIUM	PLANCIUS	PLANCIUS_TR	23/01/2018	-52.6833	-49.175	MOCCA-EU	BODC	BSH
3901948	AI2600-16FR091	IRIDIUM	RRS James Clark Ross	JR17001	17/12/2017	-56.78335	-57.23179	MOCCA-EU	BODC	BODC
3901949	AI2600-16FR092	IRIDIUM	RRS James Clark Ross	JR17001	16/12/2017	-58.04956	-56.44746	MOCCA-EU	BODC	BODC
3901950	AI2600-16FR093	IRIDIUM	RRS James Clark Ross	JR17001	18/12/2017	-55.83342	-57.82059	MOCCA-EU	BODC	BODC
3901951	AI2600-16FR094	IRIDIUM	RSS DISCOVERY	AMT27	28/09/2017	40.2173	-21.5348	MOCCA-EU	BODC	Coriolis
3901952	AI2600-16FR095	IRIDIUM	RSS DISCOVERY	AMT27	05/10/2017	19.8383	-29.9343	MOCCA-EU	BODC	BSH
3901953	AI2600-16FR096	IRIDIUM	RSS DISCOVERY	AMT27	05/10/2017	18.7857	-29.6822	MOCCA-EU	BODC	BSH
3901954	AI2600-16FR097	IRIDIUM	RSS DISCOVERY	AMT27	09/10/2017	6.8803	-26.686	MOCCA-EU	BODC	Coriolis
3901955	AI2600-16FR098	IRIDIUM	RSS DISCOVERY	AMT27	13/10/2017	-3.5392	-24.994	MOCCA-EU	BODC	Coriolis
3901956	AI2600-16FR099	IRIDIUM	RSS DISCOVERY	AMT27	15/10/2017	-9.4225	-25.0287	MOCCA-EU	BODC	Coriolis
3901957	AI2600-16FR100	IRIDIUM	R/V AEGEO	DIMITRIS	20/05/2018	36.838	21.6072	MOCCA-EU	BODC	OGS
3901958	AI2600-16FR101	IRIDIUM	Katharsis II	ANTARCTIC CIRCLE	03/01/2018	-56.2767	48.3305	MOCCA-EU	BODC	BODC
3901959	AI2600-16FR102	IRIDIUM	Katharsis II	ANTARCTIC CIRCLE	02/01/2018	-54.4942	42.5025	MOCCA-EU	BODC	BODC
3901960	AI2600-16FR103	IRIDIUM	Katharsis II	ANTARCTIC CIRCLE	05/01/2018	-59.0596	56.7322	MOCCA-EU	BODC	BODC
3901964	AI2600-16FR107	IRIDIUM	SA Agulhas II	SEAmester Cruise	25/07/2017	-35.4178	13.4487	MOCCA-EU	BODC	Coriolis
3901965	AI2600-16FR108	IRIDIUM	SA Agulhas II	SEAmester Cruise	25/07/2017	-35.4178	13.4487	MOCCA-EU	BODC	Coriolis
3901970	AI2600-16FR113	IRIDIUM	PIERRE DE FERMAT	ORANGE MARINE	20/07/2018	36.9044	-27.7112	MOCCA-EU	BODC	Coriolis
3901971	AI2600-16FR114	IRIDIUM	PIERRE DE FERMAT	ORANGE MARINE	23/07/2018	29.106	-41.0321	MOCCA-EU	BODC	Coriolis
3901972	AI2600-16FR115	IRIDIUM	FS SONNE	SO259-3	25/12/2017	24.5326	-20.426	MOCCA-EU	BODC	Coriolis

3901978	AI2600-16FR121	IRIDIUM	Nase More	Adriatique	05/07/2017	42.212	17.7096	MOCCA-IT	Coriolis	OGS
3901979	AI2600-16FR122	IRIDIUM	PELAGIA	NICO	06/02/2018	14.0497	-69.9363	MOCCA-EU	BODC	BSH
3901980	AI2600-16FR123	IRIDIUM	HESPERIDES	RETRO-EZR	08/05/2018	0.7678	-41.0492	MOCCA-EU	BODC	Coriolis
3901981	AI2600-16FR124	IRIDIUM	HESPERIDES	RETRO-EZR	04/05/2018	-0.3295	-42.2318	MOCCA-EU	BODC	Coriolis
3901982	AI2600-16FR125	IRIDIUM	HESPERIDES	RETRO-EZR	02/05/2018	0.034	-42.2935	MOCCA-EU	BODC	Coriolis
3901983	AI2600-16FR126	IRIDIUM	HESPERIDES	RETRO-EZR	29/04/2018	-1.3168	-39.5186	MOCCA-EU	BODC	Coriolis
3901984	AI2600-16FR127	IRIDIUM	PIERRE DE FERMAT	ORANGE MARINE	26/08/2018	6.145	-51.6417	MOCCA-EU	BODC	Coriolis
3901985	AI2600-16FR128	IRIDIUM	PELAGIA	NICO	07/02/2018	16.067	-69.3668	MOCCA-EU	BODC	BSH
3901986	AI2600-16FR129	IRIDIUM	PELAGIA	NICO	06/02/2018	14.0507	-69.9365	MOCCA-EU	BODC	BSH
3901987	AI2600-16FR130	IRIDIUM	PELAGIA	NICO	06/02/2018	14.73333	-69.7933	MOCCA-EU	BODC	BSH
3901940	AI2600-16FR083	IRIDIUM	OCEANIA	BALTIC	20/09/2017	55.3333	18.0133	MOCCA-EU	Coriolis	BSH
3902133	AI2600-16FR083	IRIDIUM	OCEANIA	BALTIC	20/09/2017	55.3333	18.0133	MOCCA-EU	Coriolis	BSH
6900790	AR2600-16FR026	IRIDIUM	PLANCIUS	PLA-21	21/11/2018	-59.3917	-64.7067	MOCCA-EU	Coriolis	BSH
3902134	AI2600-17EU010	IRIDIUM		BALTIC BOTHNIAN	04/10/2018	61.4	20.1833	MOCCA-EU	Coriolis	BSH
3902135	AI2600-17EU011	IRIDIUM	SONNE	SO259-3	01/01/2018	-14.2138	-27.9402	MOCCA-EU	Coriolis	BSH
3902136	AI2600-17EU012	IRIDIUM	SONNE	SO259-3	30/12/2017	-2.5008	-21.7597	MOCCA-EU	Coriolis	BSH
3902137	AI2600-17EU013	IRIDIUM		BALTIC GOTLAND DEEP	09/11/2018	57.3137	20.0725	MOCCA-EU	Coriolis	BSH
3901989	AI2600-17EU014	IRIDIUM	VAYA	LA LONGUE ROUTE	08/09/2018	26.9996	-24.8784	MOCCA-EU	Coriolis	Coriolis
3901990	AI2600-17EU015	IRIDIUM	PLANCIUS		25/10/2018	-27.0583	-42.5800	MOCCA-EU	Coriolis	BSH
3901991	AI2600-17EU016	IRIDIUM	PLANCIUS		13/12/2018	-58.0970	-40.2962	MOCCA-EU	Coriolis	BSH
3901992	AI2600-17EU017	IRIDIUM	PLANCIUS		27/12/2018	-53.4850	-40.8967	MOCCA-EU	Coriolis	BSH
3901993	AI2600-17EU018	IRIDIUM	DESCARTES	ORANGE MARINE	28/12/2018	-48.3200	-104.3133	MOCCA-EU	Coriolis	OGS
3901994	AI2600-17EU019	IRIDIUM	DESCARTES	ORANGE MARINE	30/12/2018	-51.1117	-91.9917	MOCCA-EU	Coriolis	OGS
3901995	AI2600-17EU020	IRIDIUM	DESCARTES	ORANGE MARINE	20/12/2018	-24.9333	-142.4600	MOCCA-EU	Coriolis	OGS
3901996	AI2600-17EU021	IRIDIUM	DESCARTES	ORANGE MARINE	26/12/2018	-42.9195	-117.9937	MOCCA-EU	Coriolis	OGS

Table 1: MOCCA detailed deployment information.

4.2. MOCCA floats DMQC progress

The progress made for the DMQC of the MOCCA fleet is shown from Figure 6 to Figure 8. The detailed index file on the GDAC (*ftp://ftp.ifremer.fr/ifremer/argo/etc/argo_profile_detailled_index.txt*) is used to make the analysis.

To date (April 2020), **D files have been submitted for 146 floats** (Figure 6).

WMO	RT	DM	first_cycle_date	DM_done	float_age	float_more1year	greylist	obs_number	obs_more1year
3901940	Coriolis	BSH	20170922090500		938	1		7	7
3901941	Coriolis	BSH	20170923090800		937	1		378	284
3902133	Coriolis	BSH	20171108090000		891	1		344	263
3902134	Coriolis	BSH	20181004151230		560	1		284	150
3902137	Coriolis	BSH	20181110091330		524	1		295	113
3901990	Coriolis	BSH	20181027145420		537	1		54	18

Table 2: Remaining MOCCA floats eligible to DMQC.

Among the 6 floats eligible that have not been DMQC, 5 floats are in the Baltic Sea where the DMQC methodology has not yet been defined for such shallow environment. As part of WP4 Data Management, activities are planned until the end the MOCCA project to **develop a strategy for the DMQC in the Baltic Sea**.

Some of the envisaged approaches include:

- organising the recovery of the floats and send the CTD heads back to SBE (in the USA) for post-calibration in the laboratory and possible retrospective corrections of offset/drift;
- plan collocated CTD measurements from ships (or other observation networks) to compare the float data to other reference data and quality assessment;
- a mix of solutions 1 and 2, providing feedback on whether or not collocated measurements are sufficient for quality assessment or a post-calibration is needed.

This will be envisaged with the collaboration of Polish and Finnish partners.
In September 2019 a MOCCA float has been recovered in the Baltic Sea (more information on *https://www.euro-argo.eu/EU-Projects/MOCCA-2015-2020/News/MOCCA-float-3901941-was-successfully-recovered*) and the CTD head has been sent back to Sea-Bird for a post calibration and assessment of a possible drift. Results are not known at the moment, and delays are expected due to the Covid-19 crisis.

1 float in the South Atlantic has been deployed more than 1 year ago so in theory is eligible for DMQC. It will be DMQCed by the end of the project.

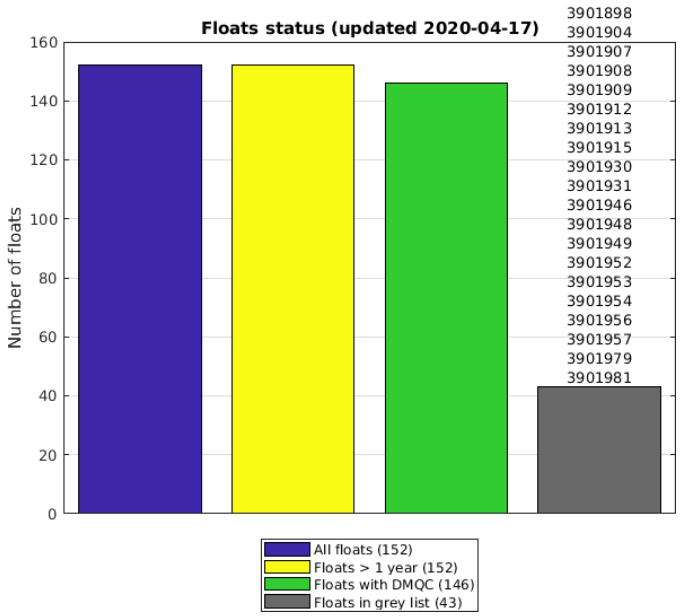


Figure 6: MOCCA DMQC progress: number of floats that have been quality controlled.

76% of MOCCA observations (1 observation = 1 CTD profile collected) **have already been quality controlled**, and **88% of observations aged more than 1 year have already been quality controlled** (Figure 8)**.**

DMQC is well advanced for every partner (Figure 7 and Figure 8).

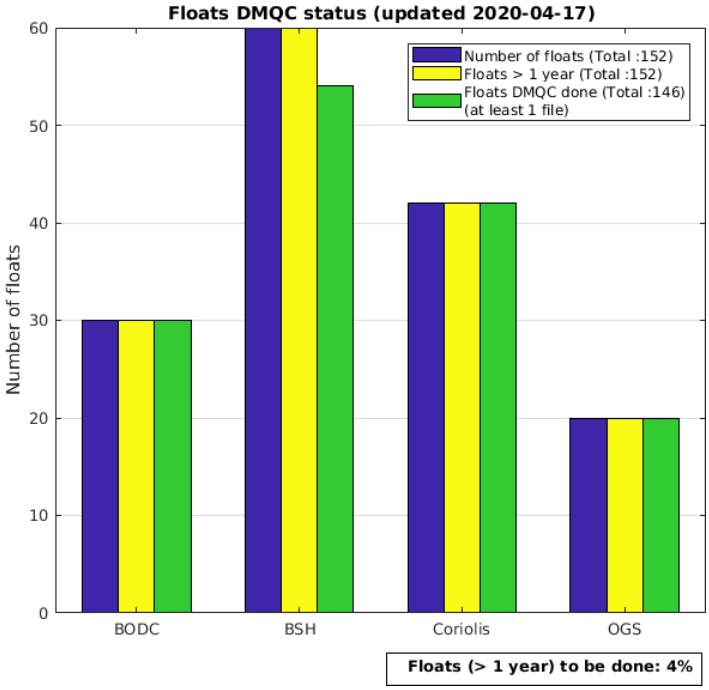


Figure 7: MOCCA DMQC progress: for each DM operator, number of floats allocated, number of floats eligible to DMQC, number of floats that have been quality controlled at least once.

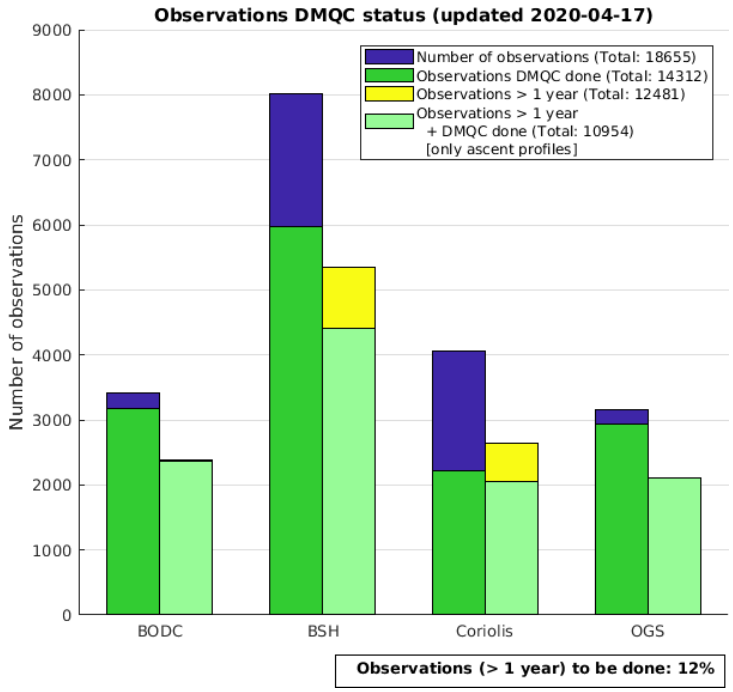


Figure 8: MOCCA DMQC progress: for each DM operator, number of observations available for allocated floats (left bars, blue) and number of observations that have been already quality controlled (left bars, green); number of observations eligible (i.e. > 1 year) to DMQC (right bars, yellow) and number of eligible observations that have been already quality controlled (right bars, light green).

Looking at Figure 9 we can see that the oldest observations from 2016 have all been quality controlled, as well as most of the ones from 2017 and 2018 (except for the Baltic floats). Figure 10 shows the age distribution of observations that are not yet quality controlled: most of them are younger that the usual target of 1 year defined to start the DMQC.

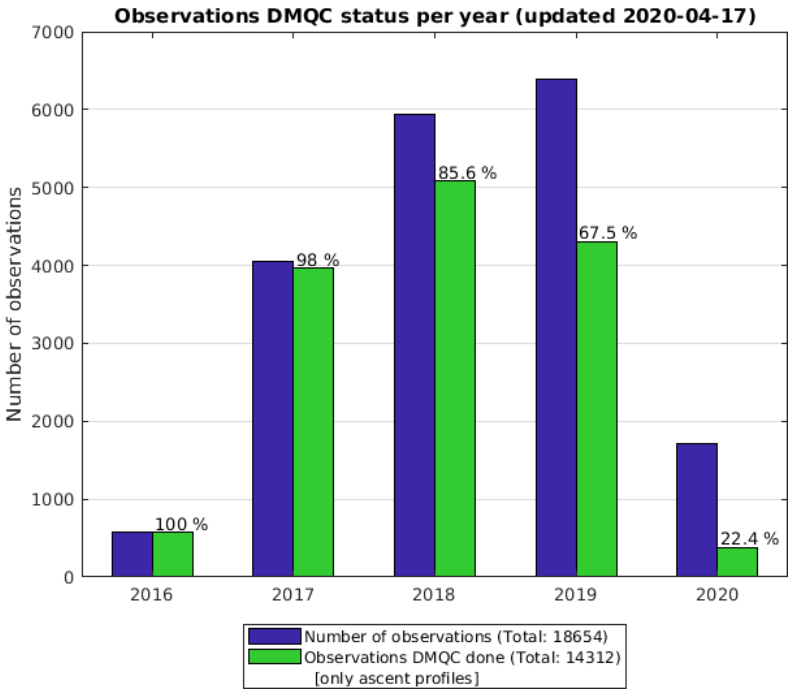


Figure 9: Number of available MOCCA observations per year and their processing status.

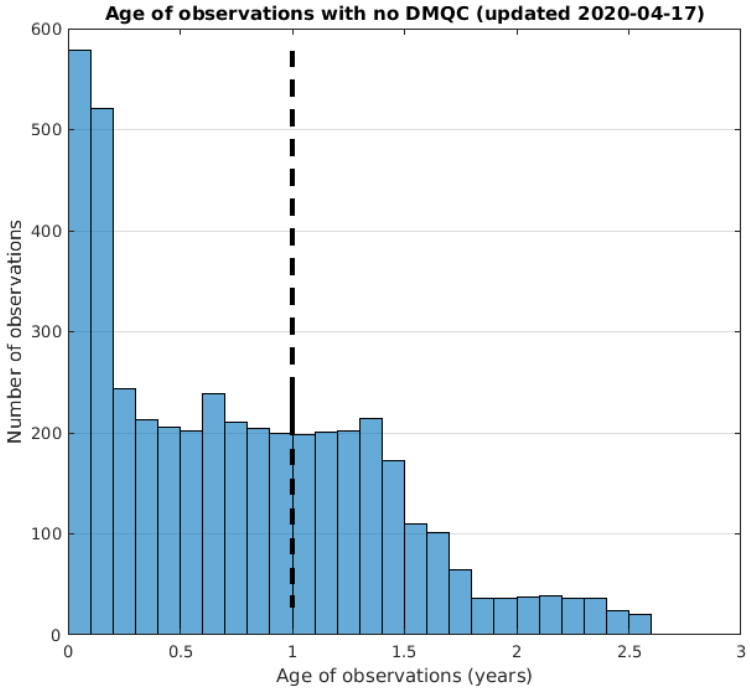


Figure 10: Age of MOCCA observations that have not been quality controlled yet.

4.3. MOCCA floats on the Grey list

The **Grey list** file available on the GDAC (*ftp://ftp.ifremer.fr/ifremer/argo/ar_greylist.txt*) is implemented in the Argo data stream to **stop the real-time distribution** on the GTS of measurements from a sensor that is not working correctly.

The decision to insert a float parameter in the grey list comes from the PI or the delayed-mode operator. A float parameter should be put in the grey list when sensor drift is too big to be corrected adequately in real time, or when the sensor is judged to be not working correctly.

Currently **43 MOCCA floats are on the Grey list** (Table 3):

PLATFORM_CODE	PARAMETER_NAME	START_DATE	END_DATE	QUALITY_CODE	COMMENT	DAC
3901853	PSAL	20190702	0	3	DD (20200203): drifting (OWC Giulio)	IF
3901859	PSAL	20181122	0	4	DD (20190408): drift not rescueable (OWC Birgit)	IF
3901863	PSAL, TEMP	20160812	0	4	CL 20160928	IF
3901867	PSAL	20181122	20190220	3	DD (20190405): drift	IF
3901869	PSAL	20191217	0	3	DD (20200128): drift	IF
3901872	PSAL	20181223	0	3	DD: drift	IF
3901873	PSAL	20190623	0	3	DD (20191120): drifting	IF
3901879	PSAL	20100121	0	3	salinity drift detected	BO
3901880	PSAL	20180527	0	3	Severe PSAL drift to be revisited in DMQC	BO
3901881	PSAL	20200130	0	3	suspected drift	BO
3901882	PSAL	20200122	0	3	drift detected	BO
3901883	PSAL	20190219	0	3	probable sensor drift	BO
3901884	PSAL	20190317	0	4	symptoms of conductivity sensor failure	BO
3901886	PSAL	20200121	0	3	salinity drift dsuspected	BO
3901887	PSAL	20181226	0	3	bias noted when compared to altimetry sla	BO
3901888	PSAL	20200124	0	3	sensor problem	BO
3901889	PSAL	20190717	0	4	symptoms of conductivity sensor drift	BO
3901890	PSAL	20190902	0	3	DD (20191024): fast salty drift	IF
3901891	PSAL	20180521	0	4	Salinity sensor providing routinely spikey data	BO
3901893	PSAL	20181106	0	3	possible drift in salinity	BO
3901894	PSAL	20180729	0	3	possible drift in salinity	BO
3901896	PSAL	20190416	0	4	salinity drift from cycle 73	BO
3901897	PSAL	20181113	0	4	Cell failure after cycle 56	BO
3901898	PSAL	20181003	0	4	sensor problem	BO
3901904	PSAL	20190219	0	4	symptoms of conductivity sensor drift	BO
3901907	PSAL	20180518	0	4	DD (20191220): drifting	IF
3901908	PSAL	20171208	0	3	CC 20171211 Drift on salinity	IF
3901909	PSAL	20180415	0	4	likely salinity drift from cycle 48	BO
3901912	PSAL	20190303	0	3	Possible drift in salinity	BO
3901913	PSAL	20180706	0	3	Drifting salinity sensor potentially correctable in DMQC	BO
3901915	PSAL	20200129	0	2	suspected drift	BO
3901930	PSAL	20190317	0	3	DD (20190607): sensor failure	IF

3901931	PRES, PSAL, TEMP	20191117	0	4	Kistler pressure issue (comment from C.Cabanes)	IF
3901946	PSAL	20181018	0	3	Unusual behaviour and unable to resolve in DMQC as of 08/03/2019	BO
3901948	PSAL	20200129	0	3	salinity drift detected	BO
3901949	PSAL	20200129	0	3	salinity drift suspected	BO
3901952	PSAL	20190209	0	3	Conductivity sensor drift	BO
3901953	PSAL	20180616	0	3	Alimeter warnings suggesting salinity drift from cycle 26 onwards	BO
3901954	PSAL	20190104	0	4	Significant uncorrectable salinity drift	BO
3901956	PSAL	20180415	0	4	sensor problem	BO
3901957	PSAL	20190927	0	4	Bad salinity	BO
3901979	PSAL	20181229	0	3	likely salinity drift from cycle 109	BO
3901981	PSAL	20180514	0	4	CTD plugs accidentally left on so the salinity is spurious	BO

Table 3: MOCCA floats on the Grey list.

Out of these 43 floats, 2 have problems that are not related to a standard CTD drift: float 3901863 has a temperature probe issue and has been recovered, 3901981 has been deployed with the CTD plugs left on so the salinity measurements are not correct.

5. MOCCA FLOATS DMQC RESULTS

5.1. Argo quality control flags and profile quality flags

A **quality flag** indicates the quality of an observation. The flags are assigned in real time or delayed mode according to the Argo quality control manual (Table 4).

n	Meaning	Real-time comment	Delayed-mode comment
0	No QC was performed	No QC was performed.	No QC was performed.
1	Good data	All Argo real-time QC tests passed.	The adjusted value is statistically consistent and a statistical error estimate is supplied.
2	Probably good data	Not used in real-time.	Probably good data.
3	Bad data that are potentially correctable	Test 15 or Test 16 or Test 17 failed and all other real-time QC tests passed. These data are not to be used without scientific correction. A flag '3' may be assigned by an operator during additional visual QC for bad data that may be corrected in delayed mode.	An adjustment has been applied, but the value may still be bad.
4	Bad data	Data have failed one or more of the real-time QC tests, excluding Test 16. A flag '4' may be assigned by an operator during additional visual QC for bad data that are not correctable.	Bad data. Not adjustable.
5	Value changed	Value changed	Value changed
6	Not used	Not used	Not used
7	Not used	Not used	Not used
8	Estimated value	Estimated value (interpolated, extrapolated or other estimation).	Estimated value (interpolated, extrapolated or other estimation).
9	Missing value	Missing value	Missing value

Table 4: Argo QC flags

In the Argo data system, the **quality of a whole CTD profile** is also used and defined as the **percentage of levels** (in the CTD profile) **that contains good data** (Table 5). Good data is viewed as QC 1, 2, 5 or 8 from the table above.

n	Meaning
" "	No QC performed
A	***N*** = 100%; All profile levels contain good data.
B	75% <= ***N*** < 100%
C	50% <= ***N*** < 75%
D	25% <= ***N*** < 50%
E	0% < ***N*** < 25%
F	***N*** = 0%; No profile levels have good data.

Table 5: Argo profile quality flags

The following plots (Figure 11 and Figure 12) give an indication of the data quality of the observations collected by the MOCCA fleet. **About 79% of the profiles contain 100% good data**. 7% of the profiles contains at least 1 level flagged as bad data. Considering that MOCCA Iridium floats collect about 800 to 1000 levels for each Argo profile collected, that is not very significant. **Less than 12% of the MOCCA Argo profiles contains only bad data that should not be used by operational services and scientific users**. These concerns mainly the floats placed on the Grey list.

There is also float 3902136 dead after 6 cycles for which the DMQC has been completed and the data deemed unreliable.

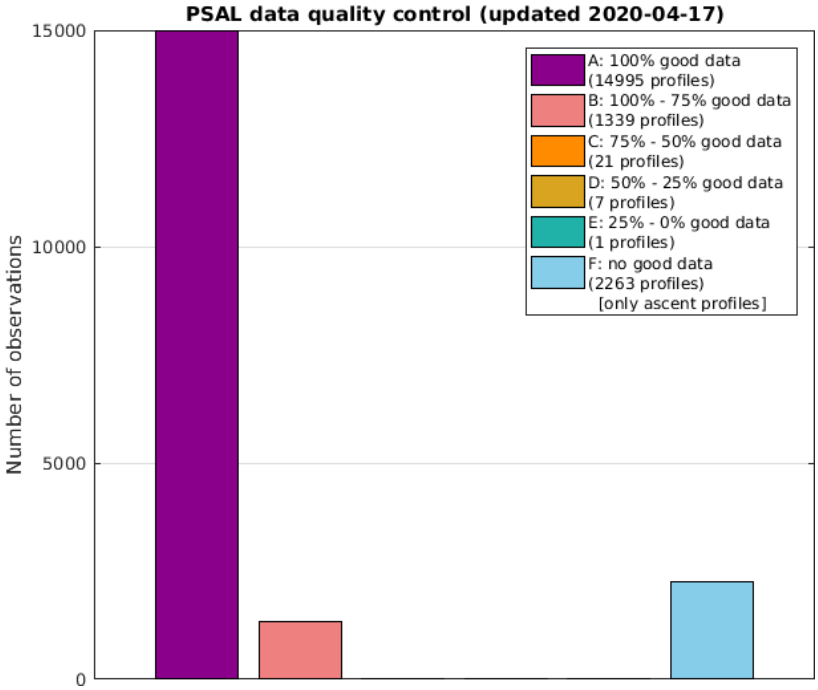


Figure 11: MOCCA Argo profiles quality flags for salinity.

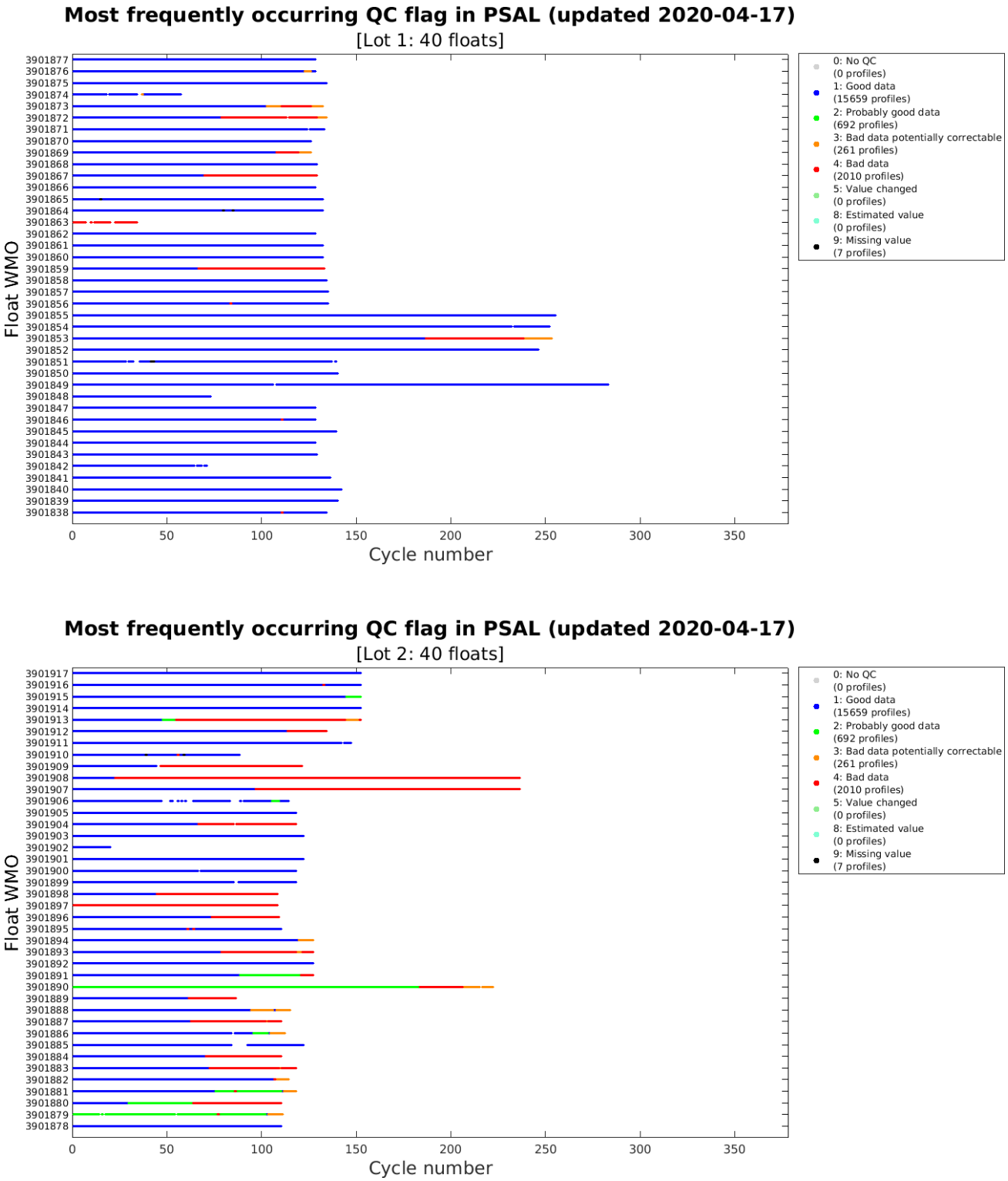
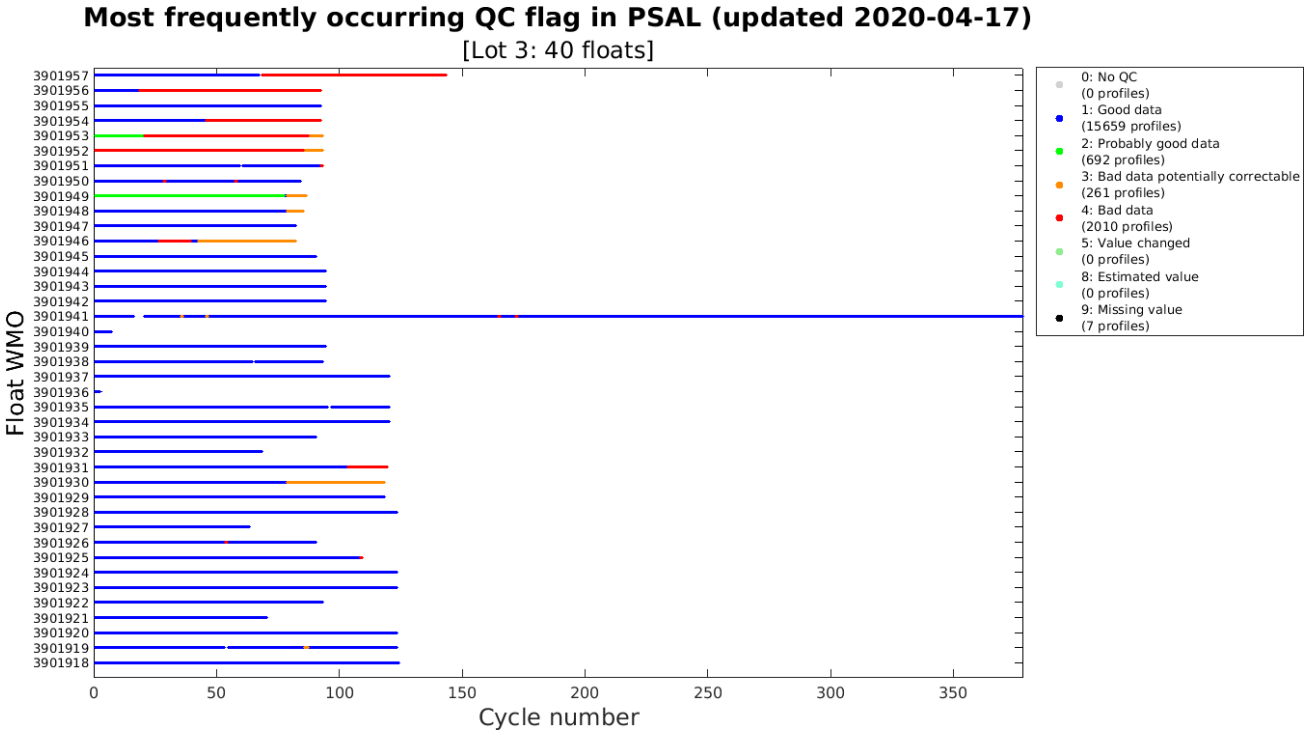
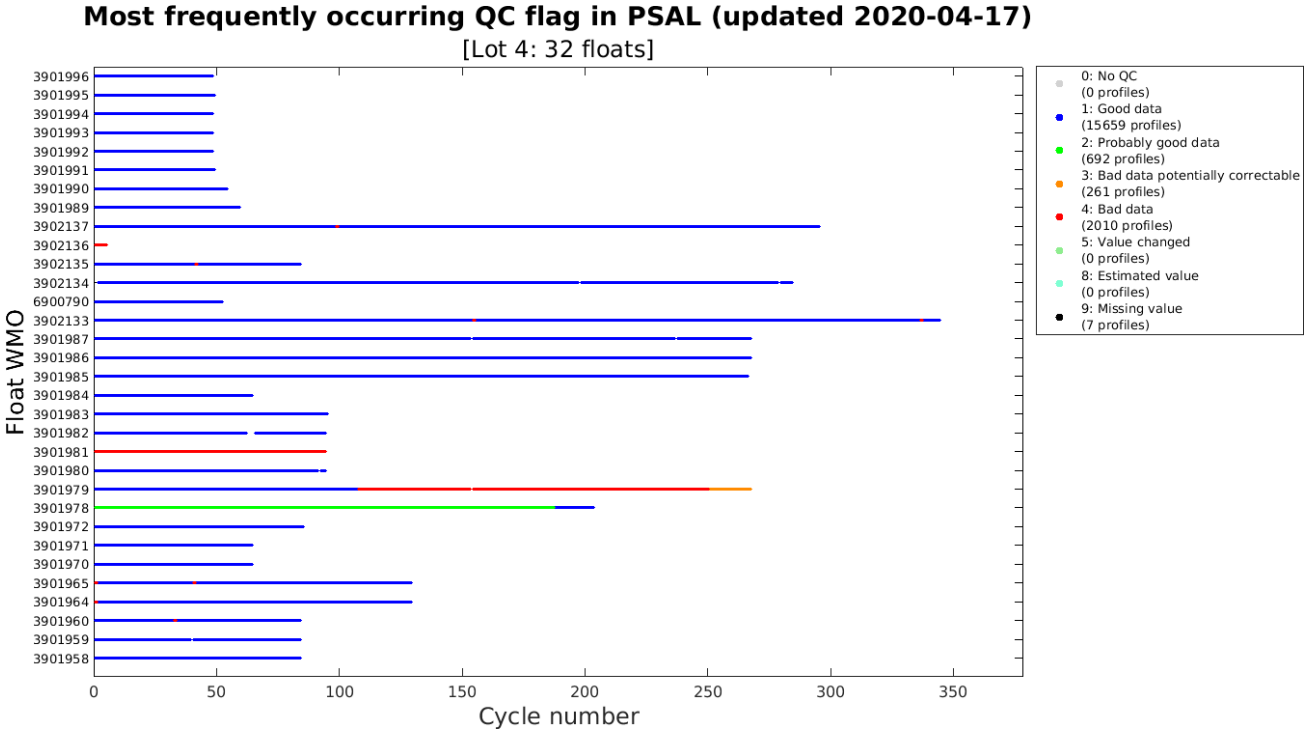


Figure 12: MOCCA Argo profiles most occurring quality flags for salinity, view cycle by cycle.

One can find again (orange and red dots) the floats placed on the Grey list (see 4.3).





5.2. DMQC mean salinity adjustment

Salinity is the main parameter studied for the DMQC, specifically for checking sensor drifts and offsets. **One output of the DMQC is the decision taken by the operator to adjust or not float salinity values**. **When severe offsets or drifts are identified, the operator usually decides not to adjust the data and flag them as bad. When it is adjustable, a correction is applied.** This can be checked in the plots Figure 13 that illustrate the decision of the DMQC operator to adjust or not the PSAL data.

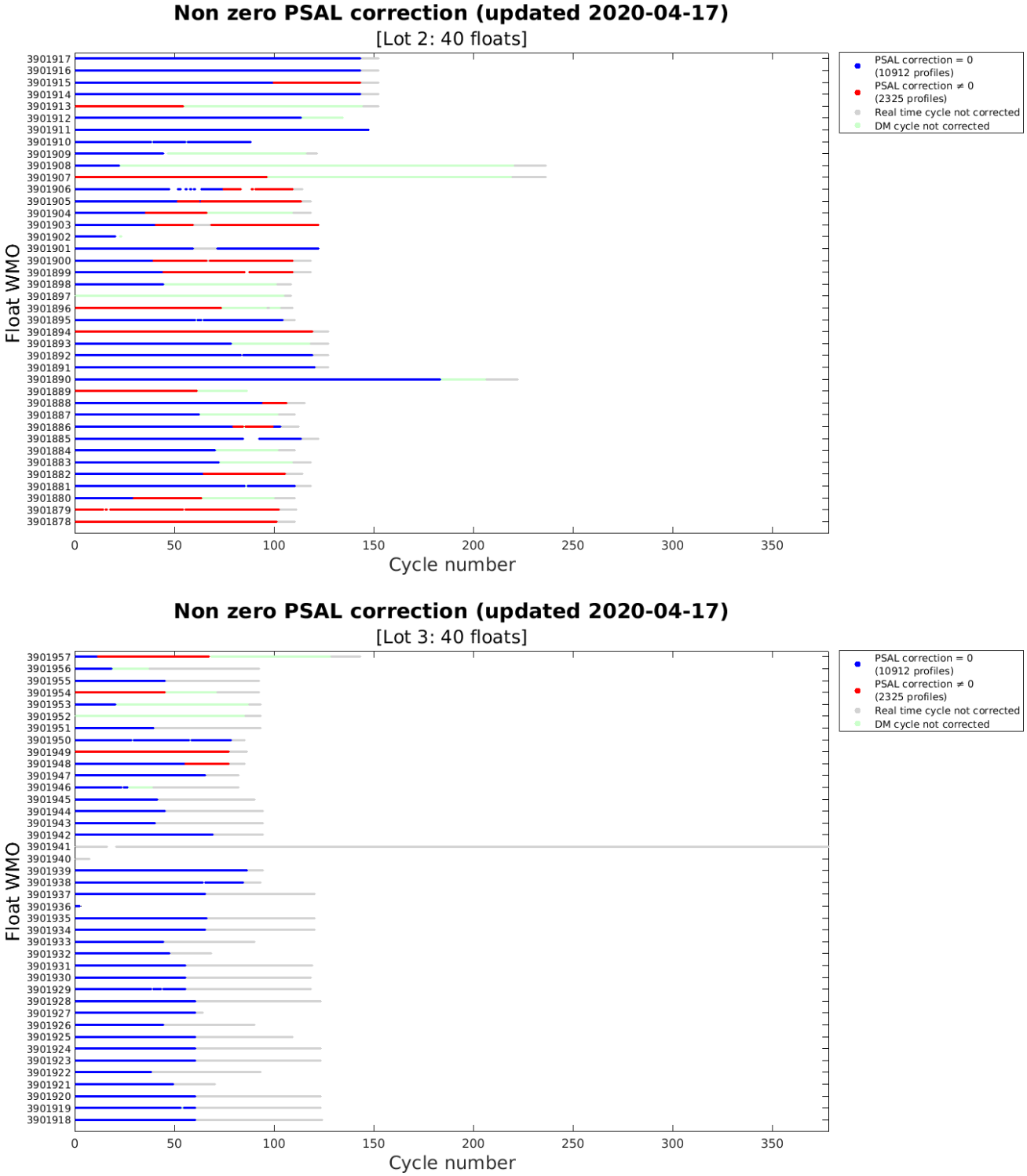
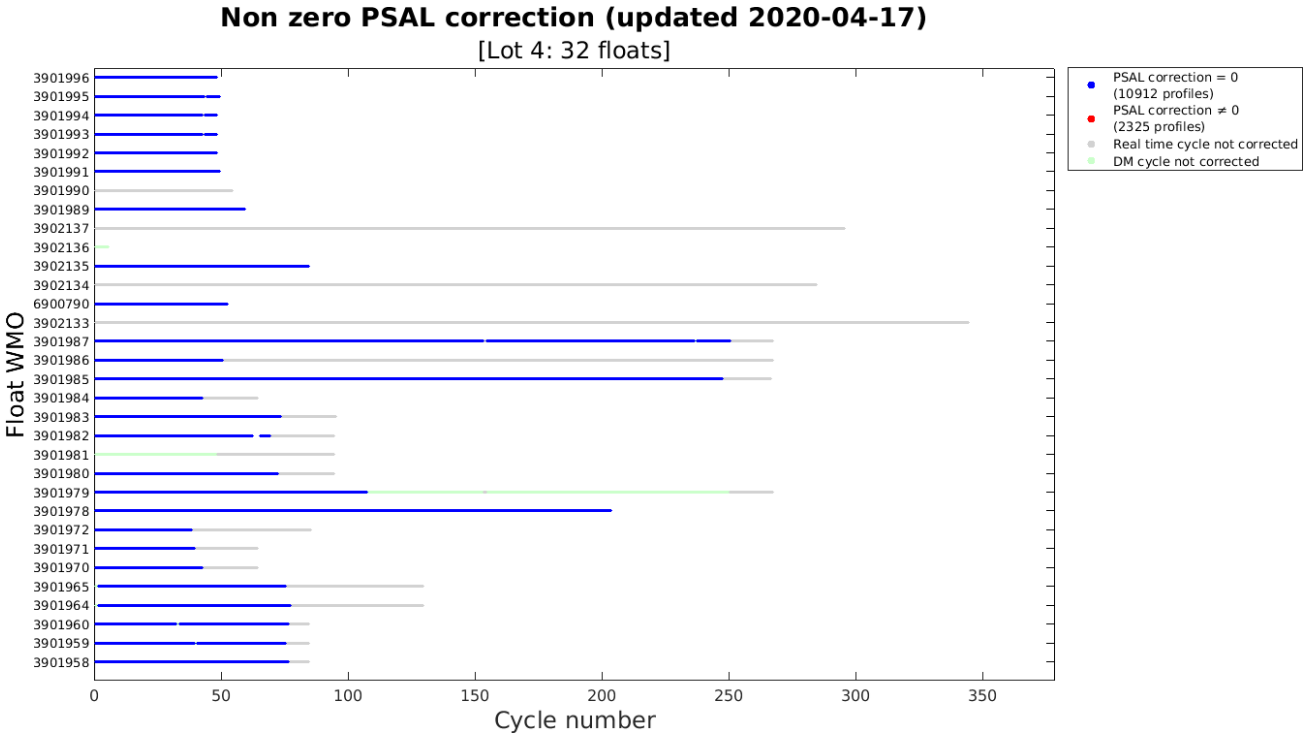


Figure 13: Presence or absence of a PSAL correction for the MOCCA floats.



31 MOCCA floats have received (at least for part of their cycles) a salinity correction.

Figure 14 depicts the mean salinity adjustments (as a result of the DMQC, when the DMQC operator decided to apply a correction to the PSAL data) for each of the 31 adjusted MOCCA Argo profiles. The corrections made are either offset or drift.

Figure 14 gives an indication of the level of correction applied to the salinity profiles in delayed-mode for the MOCCA fleet. The detailed summary of the DMQC analysis performed by each partner for each float is presented hereafter. Each partner has provided diagnostic plots or reports for each float. An example of a complete report with diagnostic plots and analysis is provided in Annex E: report on DMQC of MOCCA float WMO 3901849.

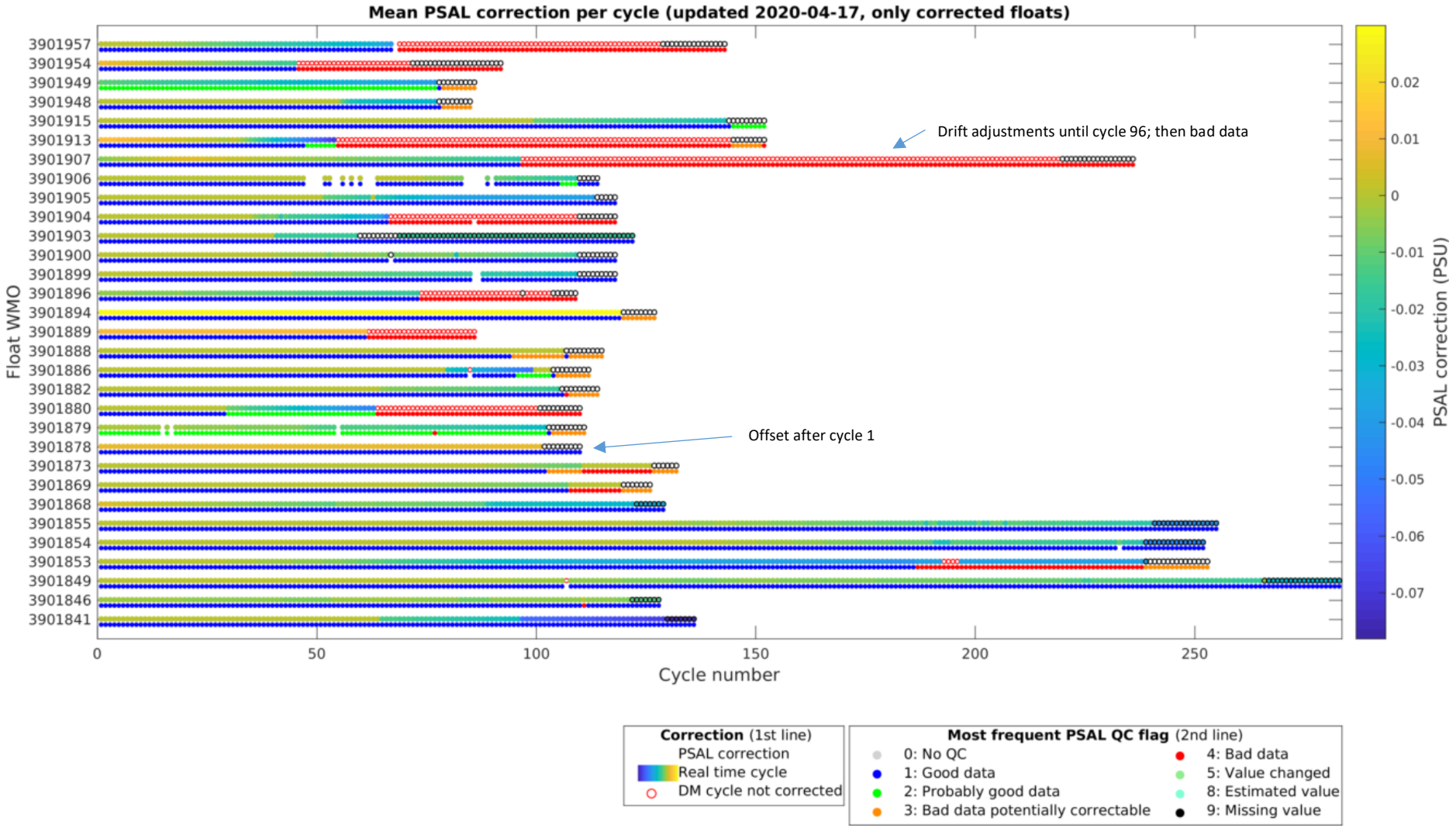


Figure 14: Mean salinity corrections applied in delayed-mode to adjusted MOCCA Argo profiles, view cycle by cycle.

5.3. Synthesis of MOCCA floats highlighted by the DM process

Information coming from the Grey list, GDAC index file, Altimetry QC and comments from the DMQC operators have been assembled in Table 6.

It follows that **56 MOCCA floats have been spotted by the DM process**. 19 floats received at least one Altimetry QC and 43 are on the Grey list.

Drift problems were identified for 46 floats, and

- corrections were possible for 28 floats for part, or all (17 floats) of their cycles. The drift was deemed unadjustable after a certain point for 10 floats. The others need further review, meaning that the DM operator could not at this stage determine the seriousness of the drift.
- corrections were not possible for the other 18 floats. All data have been flagged as bad.

Offset problems were identified for 6 floats, and

- corrections were possible for 3 floats for all of their cycles.
- corrections were possible for 1 float for part of its cycles.
- one float is also affected by strong salty drift, all data have been flagged as bad.
- the last float, lost after 5 cycles is considered as unreliable.

Other problems were identified for 6 floats, including 2 floats for which the data is unreliable for all their cycles (1 recovered, 1 deployed with the CTD plugs left on). Sensor issued were detected for 2 floats.

Spike problems were identified for 3 floats.

Altogether, 2234 profiles have been flagged as bad (F) for these 56 floats. This represents less than 12% of all MOCCA profiles. So, we can conclude that MOCCA dataset is for the time being of pretty good quality.

In September 2018, a *message* to all Argo users was sent by the Argo Steering Team (AST) about a larger than normal number of Sea-Bird Scientific (SBE) CTD cells used in Argo, which developed a high salinity bias within 2 years of deployment. MOCCA floats are equipped with these sensors, so huge efforts have been spent on analysing as much float data as possible to detect any potential affected float and stop the real-time distribution to operational communities. In April 2020, 146 floats were checked and DMQC files submitted to the GDAC. Remaining floats will be examined before the final reporting period to be able to identify possible defects on sensors. It should be noted that corrections are difficult to decide until SBE tells the community more about the cell behaviour.

WMO	Problem	PSAL correction ≠ 0	Altimetry QC	Grey list	Number of bad profiles (F flag)	% bad profiles (F flag)	Conclusion
3901863	Other			x	29	100%	Data unusable
3902136	Offset				5	100%	Data unusable
3901841	Drift	x			0	0%	Drift correctable
3901846	Drift	x			1	1%	Drift correctable
3901849	Drift	x			0	0%	Drift correctable
3901854	Drift	x			0	0%	Drift correctable
3901855	Drift	x			0	0%	Drift correctable
3901868	Drift	x			0	0%	Drift correctable
3901879	Drift	x		x	8	7%	Drift correctable
3901882	Drift	x		x	8	7%	Drift correctable
3901886	Drift	x		x	8	7%	Drift correctable
3901888	Spike, Drift	x	x	x	20	17%	Drift correctable
3901899	Drift	x			0	0%	Drift correctable
3901900	Drift	x	x		0	0%	Drift correctable
3901905	Drift	x			0	0%	Drift correctable
3901906	Drift	x			0	0%	Drift correctable
3901915	Drift	x		x	0	0%	Drift correctable
3901948	Drift	x		x	7	8%	Drift correctable
3901949	Drift	x		x	8	9%	Drift correctable
3901952	Drift		x	x	93	100%	Drift unajustable
3901953	Drift		x	x	73	78%	Drift unajustable
3901869	Drift	x		x	19	15%	Drift unajustable after cycle 108
3901979	Drift			x	159	60%	Drift unajustable after cycle 109
3901873	Drift	x		x	30	23%	Drift unajustable after cycle 110
3901912	Drift			x	21	16%	Drift unajustable after cycle 114
3901956	Drift		x	x	74	80%	Drift unajustable after cycle 18
3901890	Drift			x	38	17%	Drift unajustable after cycle 183
3901853	Drift	x		x	67	26%	Drift unajustable after cycle 187
3901908	Drift			x	214	91%	Drift unajustable after cycle 23
3901898	Drift		x	x	64	59%	Drift unajustable after cycle 44
3901954	Drift	x	x	x	47	51%	Drift unajustable after cycle 45
3901909	Drift			x	75	63%	Drift unajustable after cycle 47
3901913	Drift	x	x	x	98	64%	Drift unajustable after cycle 55
3901897	Drift		x	x	108	100%	Drift unajustable after cycle 56
3901889	Offset, Drift	x	x	x	25	29%	Drift unajustable after cycle 62
3901859	Drift			x	67	50%	Drift unajustable after cycle 66
3901904	Drift	x	x	x	51	43%	Drift unajustable after cycle 66
3901957	Drift	x	x	x	75	53%	Drift unajustable after cycle 67
3901867	Drift			x	60	47%	Drift unajustable after cycle 70
3901884	Drift			x	40	36%	Drift unajustable after cycle 70
3901883	Drift		x	x	46	39%	Drift unajustable after cycle 72
3901896	Drift	x	x	x	36	33%	Drift unajustable after cycle 73
3901872	Drift			x	55	41%	Drift unajustable after cycle 79
3901893	Drift			x	49	39%	Drift unajustable after cycle 79

3901907	Drift	x		x	140	59%	Drift unajustable after cycle 96
3901931	Pressure			x	16	13%	Needs further review
3901880	Drift	x		x	47	43%	Needs further review
3901881	Drift			x	8	7%	Needs further review
3901930	Other			x	40	34%	Needs further review
3901946	Spike		x	x	53	65%	Needs further review
3901878	Offset	x	x		0	0%	Offset correctable
3901887	Offset, Drift		x	x	48	44%	Offset correctable
3901894	Offset	x		x	8	6%	Offset correctable
3901903	Offset	x			0	0%	Offset correctable
3901981	Other			x	94	100%	Salinity data unusable (plugs on the sensor)
3901891	Spike			x	7	6%	Salinity sensor providing routinely spikey data

Table 6: Synthetic view of the floats that have been spotted (corrected or flagged with bad data) as part of the DM processing.

6. FEEDBACK FROM DMQC PARTNERS

6.1. DMQC BSH

WMO_ID	Deployment Date	Number of cycles	Date of last DMQC Files controlled	Date of next DMQC	Result of DMQC
3901838	2016/08/23	1-127	D5 (02/2020) 1-127	Sep. 2020	No correction needed, slight trend at end
3901839	2016/06/25	1-133	D4 (02/2020) 1-133	Sep. 2020	High natural variability, no correction needed now
3901840	2016/05/29	1-135	D5 (02/2020) 1-135	Sep. 2020	No correction needed
3901841	2016/07/31	1-129	D4 (02/2020) 1-129	Oct. 2020	Float greylisted, fast salty drift after cycle 65
3901842	2016/10/09	1-71†	D3 (05/2019) 1-71	----------	No correction needed
3901843	2016/10/13	1-122	D4 (02/2020) 1-122	Sep. 2020	No correction needed
3901844	2016/10/13	1-121	D4 (02/2020) 1-121	Sep. 2020	No correction needed
3901845	2016/06/26	1-133	D4 (02/2020) 1-133	Jan. 2020	No correction needed,
3901846	2016/06/25	1-121	D5 (02/2020) 1-121	Sep. 2020	Slow salty drift
3901847	2016/05/29	1-121	D4 (02/2020) 1-121	Sep. 2020	No correction needed
3901850	2016/06/24	1-133	D4 (02/2020) 1-133	Oct. 2020	No correction needed, S very noisy
3901851	2016/06/25	1-133	D4 (02/2020) 1-133	Sep- 2020	No correction needed
3901856	2016/08/09	1-129	D4 (02/2020) 1-129	May. 2020	Slight trend at end, look again in May before correction
3901857	2016/08/12	1-128	D4 (02/2020) 1-128	Oct. 2020	No correction needed
3901858	2016/08/14	1-128	D4 (02/2020) 1-128	Sep. 2020	No correction needed
3901859	2016/09/01	1-126	D4 (09/2019) 1-111	Mar. 2020	Blacklisted, fast salty drift since cycle 66
3901860	2016/09/05	1-126	D4 (02/2020) 1-126	Oct. 2020	No correction needed
3901861	2017/09/06	1-126	D4 (02/2020) 1-126	Sep. 2020	No correction needed
3901862	2016/08/11	1-128	D4 (02/2020) 1-128	Sep. 2020	No correction needed, S very noisy
3901863	2016/08/12	1-34†	D1 (11/2017) 1-34	----------	All data are bad, no need for formal dmqc
3901864	2016/08/09	1-127	D4 (02/2020) 1-127	Oct. 2020	No correction needed
3901865	2016/08/09	1-126	D4 (02/2020) 1-126	Sep. 2020	No correction needed
3901866	2016/10/17	1-122	D4 (02/2020) 1-122	May 2020	Slight trend at end, look again in May before correction
3901867	2016/10/11	1-124	D4 (02/2020) 1-124	Oct. 2020	Blacklist, fast salty drift since cycle 70
3901868	2016/10/12	1-122	D4 (02/2020) 1-122	Oct. 2020	Blacklist, fast salty drift
3901869	2016/11/10	1-119	D5 (02/2020) 1-119	Sep. 2020	Salinity drift confirmed, bad data after cycle 108
3901870	2016/11/10	1-119	D4 (02/2020) 1-119	Sep. 2020	No correction needed
3901872	2016/08/29	1-127	D5 (02/2020) 1-127	Oct. 2020	Blacklist, fast salty drift since cycle 79, recovery at cycle 120?
3901873	2016/08/23	1-126	D4 (02/2020) 1-126	Sep. 2020	Fast salty drift after cycle 88, not recoverable after cycle 110.

3901874	2016/08/22	1-58†	D2 (06/2018) 1-58	----------	No correction needed
3901875	2016/08/23	1-127	D5 (02/2020) 1-127	Oct. 2020	No correction needed, S noisy
3901876	2016/10/17	1-122	D4 (02/2020) 1-122	Jan. 2020	No correction needed, higher natural variability
3901877	2016/10/21	1-121	D3 (06/2019) 1-121	Oct. 2020	No correction needed now, higher natural variability at beginning
3901895	2017/04/14	1-104	D3 (02/2020) 1-104	Oct. 2020	No correction needed now, higher natural variability
3901896	2017/04/24	1-103	D5 (02/2020) 1-13	Sep. 2020	Blacklist, Fast salty drift since cycle 74
3901897	2017/05/10	1-105	D5 (03/2020) 1-105	Oct. 2020	Blacklist, fast salty drift with depth dependence. Can not be adjusted
3901898	2017/05/10	1-101	D5 (02/2020) 1-101	Oct. 2020	Blacklist, fast salty drift since cycle 45
3901909	2016/12/29	1-114	D4 (02/2020) 1-114	Oct. 2020	Fast salty drift after cycle 47
3901910	2017/06/29	1-88†	D3 (06/2019) 1-88	----------	No correction needed
3901911	2017/06/27	1-137	D3 (02/2020) 1-137	Jan. 2020	No correction needed
3901940	2017/09/20	1-7AD†	Baltic	Dec. 2020	Pending until recalibration of CTD
3901941	2017/09/21	1-382AD†	Baltic	Dec. 2020	Pending until recalibration of CTD
3901942	2017/09/20	1-88	D4 (02/2020) 1-88	Apr. 2020	Tendency for salty drift, check with more cycles
3901946	2018/01/23	1-75	D3 (02/2020) 1-75	Jul. 2020	Strange salty behaviour for cycles 27-69. Float has been on greylist since dmqc2. Decision postponed until more data are available in July.
3901947	2018/01/23	1-75	D3 (02/2020) 1-75	Oct. 2020	No correction needed, high natural variability
3901952	2017/10/05	1-86	D6 (02/2020) 1-85	Oct. 2020	Fast salty drift probably since start. All data flagged as bad because of potential depth dependent behavior.
3901953	2017/10/05	1-86	D4 (02/202) 1-86	Oct. 2020	Fast salty drift since cycle 20
3901966	2018/04/07	1-68	D2 (02/2020) 1-68	Oct. 2020	No correction needed, high natural variability
3901967	2018/04/16	1-84	D2 (02/2020) 1-84	Oct. 2020	No correction needed
3901968	2017/11/02	1-84	D3 (02/2020) 1-84	Oct. 2020	No correction needed
3901969	2018/04/14	1-68	D2 (02/2020) 1-68	Oct. 2020	No correction needed
3901979	2018/02/06	1-246	D2 (02/2020) 1-246	Oct. 2020	Fast salty drifter after cycle 107
3901985	2018/02/07	1-246	D2 (02/2020) 1-246	Oct. 2020	No correction needed, 3 day cycle
3901986	2018/02/06	1-243	D1 (07/2018) 1-50	May. 2020	No reference data available, search for CTD data started
3901987	2018/02/06	1-247	D2 (02/2020) 1-247	Oct. 2020	No correction needed, 3 day cycle
3901989	2018/09/08	1-52	D2 (02/2020) 1-52	Oct. 2020	No correction needed
3901991	2018/12/12	1-42	D2 (02/2020) 1-42	Okt. 2020	No correction needed
3901992	2018/12/27	1-41	D2 (02/2020) 1-41	Oct. 2020	No correction needed
3902133 former 3901940	2017/11/03	1-344AD	Baltic	Dec. 2020	Pending until recalibration of CTD
6900790	2018/11/21	1-48	D2 (02/2020)	Oct. 2020	No correction needed
3902134	2018/10/04	1-284AD†	Baltic	Dec. 2020	Pending until recalibration of CTD
3902135	2018/01/01	1-77	D3 (02/2020)1-77	Oct. 2020	No correction needed
3902136	2017/12/30	1-4†		----------	Fasty salty drift, no formal DMQC needed
3902137	2018/11/09	1-260 AD	Baltic	Dec. 2020	Pending until recalibration of CTD

6.2. DMQC BODC

WMO_ID	Date of DMQC	profiles num on 10 Jan 2020	Profile at which malfunction started	Graylisted?	Correction, concerns
3901878	21/01/2020	101	-	no	Profiles 1-101 offset detected, offset 0.0075 applied, error 0.0015, QC=1
3901879	21/01/2020	102	1	QC=3 from profiles 103	Prodiles 1-101 salty drift detected, OWC applied QC=2; error 0.016.
3901880	21/01/2020	100	30	QC=4 from profiles 101	Profiles 1-29 no corrections, QC=1 error=0.01. Profiles 30-63 strong salty drift, OWC applied qc=2 error=0.016; Profiles 64-101 nonadjustable QC= 4.
3901881	20/01/2020	109	110	QC=3 from profile 111-suspected drift	Profiles 1-75 no corrections, QC=1 error=0.03. Profile 76-110 QC=2 error =0.03.
3901882	21/01/2020	105	65	QC=3 from profile 106	Profiles 1-64 no corrections, QC=1 error=0.01. Profiles 65-105 small, salty drift detected, OWC applied, QC=1, error=0.005.
3901883	21/01/2020	109	73	QC=4 from profile 110	Profiles 1-72 no corrections, QC=1 error=0.005. Profiles 73-109 strong salty drift, QC=4.
3901884	23/01/2020	101	71	QC=4 from profile 102	Profiles 1-70 no corrections, QC=1 error=0.005. Profiles 71-101 strong fresh drift, QC=4.
3901885	23/01/2020	113	-	no	Profiles 1-113 no corrections, QC=1 error=0.005.
3901886	23/01/2020	104	80	QC=3 from profile 104	Profiles 1-79 no corrections, QC=1 errror=0.02. Profiles 80-103 small salty drift d,OWC applied, QC=1, error=0.02.
3901887	23/01/2020	102	63	QC=4 from profile 103	Profiles 1-62 no corrections QC=1 error = 0.01. Profiles 63-102 strong salty drift, QC=4.
3901888	23/01/2020	106	95	QC=3 from profile 107	Profiles 1-94 no corrections QC=1 error=0.005. Profiles 95-106 salty drift detected, OWC applied, QC=3, error =0.016
3901889	23/01/2020	86	62	no, float death	Profile 1-61 offset 0.0107, error 0.001. Profiles 62-106 salty drift detected QC=4.
3901891	10/02/2020	119	-	on the gray list since 20180521	Profiles 1-88 no corrections, QC=1 error=0.01. Profiles 89-120 no corrections, QC=2 error=0.01
3901892	10/02/2020	119	-	no	Profiles 1-119 no corrections, QC=1 error=0.02.
3901893	10/02/2020	118	79	QC=4 from profile 79	Profiles 1-78 no corrections, QC=1, error=0.025. Profiles 79-118 salty drift detected QC=4
3901894	10/02/2020	119	-	no	Profile 1-119 no corrections (offset suspected), QC=1, err=0.02,
3901912	23/01/2020	134	114	no, float death	Profiles 1-113 no corrections, QC=1 error= 0.02. Profiles 114-134 salty drift QC=4;
3901913	23/01/2020	143	1	QC=4 from profiles 145	Profiles 1-55 salty drift detected, OWC applied, QC=1 error=0.01. Profiles 56-144, QC=4
3901914	10/02/2020	143	-	no	Profiles 1-143 noc corrections, QC=1, error =0.01
3901915	23/01/2020	143	100	QC=2 from profle 144	Profiles 1 -99 no corrections, QC=1, error =0.03. Profiles 100-143 small salty drift, OWC applied, QC=1, error=0.01
3901916	23/01/2020	143	-	no	Profiles 1-143 no corrections, QC=1, error =0.025
3901917	23/01/2020	143	-	no	Profiles 1-143 no corrections, QC=1, error =0.01
3901938	10/02/2020	84	-	no	Profiles 1-84 no corrections, QC=1, error =0.01
3901939	23/01/2020	86	-	no	Profiles 1-86 no corrections, QC=1, error =0.01
3901948	23/01/2020	77	56	QC=3 from profile 78	Profiles 1-55 no corrections, QC=1 error=0.01. Profiles 56-77 small salty drift, OWC applied, QC=1, error 0.014
3901949	23/01/2020	77	1	QC=3 from profile 78	Profiles 1-77 salty drift, OWC applied, QC=2, error=0.016
3901950	23/01/2020	77	-	no	Profiles 1-77 no corrections, QC=1, error =0.02
3901958	23/01/2020	76	-	no	Profiles 1-76 no corrections, QC=1, error =0.01
3901959	23/01/2020	75	-	no	Profiles 1-75 no corrections, QC=1, error =0.01
3901960	23/01/2020	76	-	no	Profiles 1-76 no corrections, QC=1, error =0.01

6.3. DMQC IFREMER

6.3.1. 2016 Deployments

Summary

WMO Number	DM Salinity correction
3901871	No correction
3901901	No correction
3901902	No correction
3901903	No correction[1:40] OWC[41:59]
3901918	No correction
3901919	No correction
3901920	No correction
3901923	No correction
3901924	No correction
3901925	No correction
3901927	No correction
3901928	No correction

Real Time QC flags were verified and modified if necessary. Table 3 gives the list of flags that have been modified during the delayed mode process.

WMO Number	Cycle	Param	Old flag	New flag	Levels	Date of modification
3901871	007A	PSAL	1	4	111.2 : 112.1	18/09/2018
	060A	PSAL	1	4	619.9 : 619.9	18/09/2018
3901901	020A	PSAL	1	4	1299.9 : 1990.4	01/10/2018
3901902	016A	PSAL	1	4	92.4 : 92.4	18/09/2018
	018A	PSAL	1	4	165.9 : 165.9	18/09/2018
	020A	PSAL	1	4	234.4 : 234.4	18/09/2018
3901928	060A	PSAL	1	4	6 : 6	08/08/2018

Table 3: Modified flags during DM analysis

WMO Number	Calibration		Correction applied in the D files
	Comparison with the reference CTD cast	Correction from OWC method (CTD ref)	
3901903	na	-0.0014 ± 0.0121 [1:40] -0.0168 ± 0.0135 [41:59] (config. 129)	No correction[1:40] OWC[41:59]

6.3.2. 2017 Deployments

WMO Number	DM Salinity correction
3901929	No correction
3901930	No correction
3901931	No correction
3901956	No Correction[1:18] Unusable data[19:37]

Table 1: Salinity Correction applied in delayed mode for each float

WMO Number	Cycle	Param	Old flag	New flag	Levels	Date of modification
3901930	013A	PSAL	1	4	1713 : 1976	17/10/2018
		TEMP	1	4	1713 : 1976	17/10/2018
		PSAL	1	4	1588 : 1688	17/10/2018
		TEMP	1	4	1588 : 1688	17/10/2018
3901956	019A	PSAL	1	4	3.1 : 1975.5	18/10/2018
	020A	PSAL	1	4	3.9 : 1975.9	18/10/2018
	021A	PSAL	1	4	2.9 : 1987.1	18/10/2018
	022A	PSAL	1	4	3 : 1976.5	18/10/2018
	023A	PSAL	1	4	3.5 : 1990.8	18/10/2018
	024A	PSAL	1	4	3.6 : 1997.4	18/10/2018
	025A	PSAL	1	4	3.1 : 2011.6	18/10/2018
	026A	PSAL	1	4	2.9 : 2021.7	18/10/2018
	027A	PSAL	1	4	3 : 1992	18/10/2018
	028A	PSAL	1	4	2.9 : 1982.4	18/10/2018
	029A	PSAL	1	4	2.9 : 1986.8	18/10/2018
	030A	PSAL	1	4	3.8 : 2006.2	18/10/2018
	031A	PSAL	1	4	3.2 : 1996.5	18/10/2018
	032A	PSAL	1	4	3 : 1992.6	18/10/2018
	033A	PSAL	1	4	3.2 : 2003.2	18/10/2018
	034A	PSAL	1	4	3.9 : 1985.6	18/10/2018
	035A	PSAL	1	4	3.7 : 1977	18/10/2018
	036A	PSAL	1	4	2.9 : 1982.3	18/10/2018
	037A	PSAL	1	4	3.3 : 1980.9	18/10/2018

Table 3: Modified flags during DM analysis

WMO Number	Calibration: Comparison with the reference CTD cast	Calibration: Correction from OWC method (CTD ref)	Correction applied in the D files
3901929	na	-0.0068 ± 0.0149 (config. 129)	No correction
3901930	na	-0.0031 ± 0.01 (config. 129)	No correction
3901931	na	-0.01 ± 0.0139 (config. 129)	No correction
3901956	na	-0.0095 ± 0.0121 [1:18] -0.016*t + -0.052 ± 0.009 [19:37] (config. 129)	No Correction[1:18] Unusable data[19:37]

Table 5: Salinity corrections for the floats proposed by the OWC method or by comparison with a shipboard CTD reference profile. Uncertainties are the statistical uncertainties from the OW method.

Summary

WMO Number	DM Salinity correction
3901922	No correction
3901934	No correction
3901935	No correction
3901936	No correction
3901937	No correction
3901943	No correction
3901951	No correction
3901965	No correction
3901964	No correction
3901945	No correction
3901955	No correction
3901944	No correction
3901926	No correction
3901933	No correction
3901972	No correction

6.3.3. 2018 Deployments

Summary

WMO Number	DM Salinity Correction
3901971	No correction
3901970	No correction
3901980	No correction
3901982	No correction
3901983	No correction
3901954	OWC correction applied
3901984	No correction
3901921	No correction
3901932	No correction

WMO Number	Calibration: Comparison with the reference CTD cast	Calibration: Correction from OWC method	Correction applied in the D files
3901971	na	linear drift (0.015/yr) (config. 1491)	No correction
3901970	na	0.006 ± 0.014 (config. 1491)	No correction
3901980	na	0.006 ± 0.025 and small drift (1 break point) after cycle 25 (config. 1493)	No correction
3901982	na	0.002 ± 0.022 and 0 ± 0.003 after cycle 25 (config. 1493)	No correction
3901983	na	0.005 ± 0.015 and linear drift (0.003/yr) after cycle 25 (config. 1493)	No correction
3901954	na	linear drift (-0.024/yr) up to cycle 45 and strong drift afterward (config. 1293)	OWC correction applied
3901984	na	0.005 ± 0.003 (config. 1493)	No correction
3901921	na	0.005 ± 0.003 (config. 1493)	No correction
3901932	na	0.007 ± 0.005 (config. 1491)	No correction

6.4. DMQC OGS

Float WMO	Status	Correction on salinity	Flag applied to PSAL_ADJUSTED	Pressure	Other
3901907	Active	YES, drift detected, OW applied	Profile 1 to 96 → flag 1 Profile 97 to 219 → flag 4	Autocorrecting	Grey list for salinity (real time). Very strong positive salinity drift (larger than 0.2) up to profile 195. Then, very strong negative salinity offset (larger than 7)
3901849	Active	YES, drift detected, OW applied	Profile 1 to 265 → flag 1	Autocorrecting	Drift from cycle 79
3901848	Inactive	NO	Profile 1 to 73 → flag 1	Autocorrecting	none
3901978	Active	NO	Profile 1 to 187 → flag 2	Autocorrecting	Interannual variability very high. CTD reference dataset is not sufficient for a reliable comparison.
3901853	Active	YES, drift detected, OW applied	Profile 1 to 186 → flag 1 Profile 187 to 238 → flag 4	Autocorrecting	positive salinity drift detected since cycle 27. OW applied from cycle 27 to 238. Salinity is unadjustable after cycle 187 (ΔS > 0.05), hence flag 4 is applied to data from cycle 187 to 238. Salinity should be greylisted with flag 3 in real time since cycle 239
3901908	Active	Drift detected, unadjustable	Profile 1 to 22 → flag 1 Profile 23 to 220 → flag 4	Autocorrecting	Grey list for salinity (real time). Large positive salinity drift from cycle 23. Large negative salinity offset from cycle 132
3901855	Active	YES, drift detected, OW applied	Profile 1 to 240 → flag 1	Autocorrecting	salinity drift from cycle 120
3901852	Active	NO	Profile 1 to 231 → flag 1	Autocorrecting	none
3901854	Active	YES, drift detected, OW applied	Profile 1 to 238 → flag 1	Autocorrecting	Positive salinity drift detected after cycle 141
3901899	Active	not required	Profiles 1 to 44 → flag 1	Autocorrecting	–
		required	Profiles 45 to 109 → flag 1	Autocorrecting	–
3901900	Active	not required	Profiles 1 to 39 → flag 1	Autocorrecting	–
		required	Profiles 40 to 109 → flag 1	Autocorrecting	–
3901904	Active	not required	Profiles 1 to 35 → flag 1	Autocorrecting	–
		required	Profiles 36 to 66 → flag 1	Autocorrecting	–
		not adjustable	Profiles 67 to 109 → flag 4	Autocorrecting	–
3901905	Active	not required	Profiles 1 to 51 → flag 1	Autocorrecting	–
		required	Profiles 52 to 113 → flag 1	Autocorrecting	–
3901906	Active	not required	Profiles 1 to 75 → flag 1	Autocorrecting	–
		required	Profiles 76 to 105 → flag 1	Autocorrecting	–
		adjustable	Profiles 106 to 109 → flag 2	Autocorrecting	–
3901961	Active	not required	Profiles 1 to 55 → flag 1	Autocorrecting	–
		required	Profiles 56 to 77 → flag 1	Autocorrecting	–
3901962	Active	not required	Profiles 1 to 55 → flag 1	Autocorrecting	–
		required	Profiles 56 to 77 → flag 1	Autocorrecting	–
3901963	Active	required	under working	Autocorrecting	
3901993	Active	not required	Profiles 1 to 42 → flag 1	Autocorrecting	–
3901994	Active	not required	Profiles 1 to 42 → flag 1	Autocorrecting	–
3901995	Active	not required	Profiles 1 to 43 → flag 1	Autocorrecting	–
3901996	Active	not required	Profiles 1 to 43 → flag 1	Autocorrecting	–

7. CONCLUSION

Here is the synthesis of the status of Delayed-Mode processing of the MOCCA fleet:

- 146 floats have been DMQC'ed at least once
- 76% of MOCCA observations have already been quality controlled and 88% of observations aged more than 1 year have already been quality controlled
- 43 floats are on the Grey list and that prevents their real-time distribution to operational centres
- 18 floats (including the 17 on the Grey list) have most of their profiles flagged as bad data
- 79% of the MOCCA profiles contain 100% good data and less than 12% contains only bad data

Information coming from the Grey list, GDAC index file, Altimetry QC and comments from the DMQC operators have been assembled in Table 6 and provide a consolidated view of the status of floats highlighted by the DM process.

It follows that **56 MOCCA floats have been spotted by the DM process**. 19 floats received at least one Altimetry QC and 43 are on the Grey list.

Drift problems were identified for 46 floats, and

- corrections were possible for 28 floats for part, or all (17 floats) of their cycles. The drift was deemed unadjustable after a certain point for 10 floats. The others need further review, meaning that the DM operator could not at this stage determine the seriousness of the drift.
- corrections were not possible for the other 18 floats. All data have been flagged as bad.

Offset problems were identified for 6 floats, and

- corrections possible for 3 floats for all of their cycles.
- corrections possible for 1 float for part of its cycles.
- one float is also affected by strong salty drift, all data have been flagged as bad.
- the last float, lost after 5 cycles is considered as unreliable.

Other problems were identified for 6 floats, including 2 floats for which the data is unreliable for all their cycles (1 recovered, 1 deployed with the CTD plugs left on). Sensor issued were detected for 2 floats.

Spike problems were identified for 3 floats.

Altogether, 2234 profiles have been flagged as bad (F) for these 56 floats. This represents less than 12% of all MOCCA profiles. So, we can conclude that MOCCA dataset is for the time being of pretty good quality.

8. ANNEXE: REPORT ON DMQC OF MOCCA FLOAT WMO 3901849

Report from Giulio